



**CITY OF GRASS VALLEY  
PUBLIC WORKS DEPARTMENT  
ENGINEERING DIVISION**

**NOTICE TO CONTRACTORS,  
SPECIAL PROVISIONS, AND  
CONSTRUCTION CONTRACT**

**FOR**

**CDBG MEMORIAL PARK FACILITIES IMPROVEMENT PROJECT  
PROJECT NO. 20-05**

**CDBG MEMORIAL PARK FACILITIES IMPROVEMENT PROJECT  
PROJECT NO. 20-05**



A handwritten signature in blue ink, consisting of stylized initials and a surname, positioned above a horizontal line.

Bjorn P. Jones, PE  
Assistant City Engineer

A handwritten date "4/29/21" in blue ink, positioned above a horizontal line.

Date

**CITY OF GRASS VALLEY  
PUBLIC WORKS DEPARTMENT  
ENGINEERING DIVISION**

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**NOTICE TO CONTRACTORS**

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**Sealed proposals for the work shown on the plans entitled:**

**CDBG MEMORIAL PARK FACILITIES IMPROVEMENT PROJECT  
PROJECT NO. 20-05**

Bids will be received at the City of Grass Valley, Engineering Division, 125 East Main Street, Grass Valley, CA 95945 until **3:30 P.M. on May 10, 2021**, at which time they will be publicly opened and read aloud at said address. Any Protest regarding the award of the contract must be submitted pursuant to the instructions stated in the special provisions.

**GENERAL WORK DESCRIPTION:**

The scope of work, in general, includes; demolition and removal of park facilities (buildings, swimming pool, miscellaneous improvements), clearing grubbing and tree removal, concrete and asphalt concrete removal. Improvement work includes construction of two new community pools, including pool equipment, restroom and maintenance building construction, construction of new pickleball courts and a basketball court and resurfacing of a softball field with artificial turf. Also included is installation of concrete sidewalk, curb, and accessible ramps, retaining walls, drainage improvements, hot mix asphalt paving, pavement marking and striping. Other related items not mentioned above, that are required by the plans, specifications or these Special Provisions shall be performed, placed, constructed, or installed.

Project Location: Memorial Park, in Grass Valley, California

The Engineer's estimate for this project is **\$4,300,000.00**

The time of completion shall consist of **250 Working Days**

**BID INFORMATION:**

Bids are required for the entire work described herein. The City of Grass Valley reserves the right to postpone the date and time for the opening of proposals at any time prior to the date and time announced in the advertisement in accordance with applicable law.

No pre-bid meeting is scheduled for this project.

The City of Grass Valley reserves the right to reject any and all bids or to waive any minor defects or irregularity in bidding in accordance with applicable law. In accordance with California Public Contract Code Section 20103.8, if the City elects to award a contract for performance of the project, the contract will be awarded in accordance with California Public Contract Code Section 20162 and other applicable law to the responsible bidder submitting a responsive bid with the lowest total bid price for the base bid without consideration of the bid price for any additive or deductive items. All bids will remain valid for 90 days after the bid opening. Except as permitted by law and subject to all applicable remedies, including forfeiture of bidder's security, bidders may not withdraw their bid during the 90-day period after the bid opening.

THIS PROJECT IS SUBJECT TO THE "BUY AMERICA" PROVISIONS OF THE SURFACE TRANSPORTATION ASSISTANCE ACT OF 1982 AS AMENDED BY THE INTERMODAL SURFACE TRANSPORTATION EFFICIENCY ACT OF 1991.

This contract is subject to state contract nondiscrimination and compliance requirements pursuant to Government Code, Section 12990.

Attention is directed to the requirements specified in Section 3-1.06, "Contractor License", of the Standard Specifications. The Contractor shall possess a valid California Class "A" Contractor's License, or a combination of the following classes: C-5 - Framing and Rough Carpentry Contractor, C-8 - Concrete Contractor, C10 - Electrical Contractor, C12 - Earthwork and Paving Contractors, C13 - Fencing Contractor, C21 - Building Moving/Demolition Contractor, C27 - Landscaping Contractor, C29 - Masonry Contractor, C33 - Painting and Decorating Contractor, C36 - Plumbing Contractor, C39 - Roofing Contractor, C50 - Reinforcing Steel Contractor, C53 - Swimming Pool Contractor, D-63 Construction Cleanup Contractor, and all other classes required by the categories and types of work included in the contract at the time of the bid award. All licenses shall remain in effect throughout the term of the contract.

Plans, specifications, and proposal forms for bidding this project can be obtained directly from the City of Grass Valley, Engineering Division, 125 E. Main Street, Grass Valley, CA 95945, Telephone (530) 274-4373. A non-refundable fee of seventy dollars (\$70.00) per bid set will be charged if picked up, or eighty (\$80.00) per bid set if mailed. Alternatively, bidders may download an electronic copy of the bid set free of charge from the City's website at <http://www.cityofgrassvalley.com/departments/engineering/rfpstrfqs-and-current-bids>

The City reserves the right, during the bid process and prior to the deadline for submitting bids, to issue one or more addenda, clarifications, or other communication concerning the bid process, including possible changes as to the time, place, and manner for submitting bids. The City will provide this information to any potential bidder who has obtained a bid package directly from the City. The City will also provide notice of the availability of revisions/addenda to any potential bidder who has obtained a bid package electronically from a contractor bid room or other source, if that bidder has provided a request for revisions, including the bidder's name, company, mailing address, phone number, email or fax number and the project name that the bidder is requesting notifications for. The request for revisions shall be submitted as soon as possible, but no later than five (5) business days prior to the date specified for opening bids in the manner described below:

- Emailed: To the attention of the Project Manager at: [bjornj@cityofgrassvalley.com](mailto:bjornj@cityofgrassvalley.com)
- Mailed: To the attention of the Project Manager, City of Grass Valley, Engineering Division, 125 East Main Street, Grass Valley, CA 95945

Bidders who have requested to receive revisions as described above, may only receive email notices of the availability of revisions/addenda. It shall be the bidder's responsibility to access the actual revisions/addenda as electronic copies from the City's website.

The City will also endeavor to provide such revisions/addenda to any contractor bid room which has requested copies of the bid documents. The City takes no responsibility for notifying a bidder who does not obtain bid documents from the City or does not provide the specified request for revisions to the City. Such bidder may be found non-responsive if that bidder fails to acknowledge, as set forth herein, any addenda or does not take into account any additional information provided by the City.

All questions concerning this project shall be provided in writing as soon as reasonably possible, but no later than five (5) working days before the date specified for opening bids. Questions received less than five (5) working days before the date specified for opening bids may not be answered. All questions must be received by the City, in the manner described below.

- Emailed: To the attention of the Project Manager at: [bjornj@cityofgrassvalley.com](mailto:bjornj@cityofgrassvalley.com)
- Mailed: To the attention of the Project Manager, City of Grass Valley, Engineering Division, 125 East Main Street, Grass Valley, CA 95945

Bidders are responsible to confirm receipt of written questions by the Engineering Division. Additionally, the City will answer a bidder's question only if the bidder provides the City a means for a response, including a telephone number, address, and fax number.

Bid Bonds shall be required for this project. The successful bidder shall be required to furnish a Payment Bond and a Performance Bond and certificates of liability and property damage insurance. The amounts of liability and property damage insurance will not be less than the amounts shown in the Contract and shall also include the endorsements specified.

Bidders are urged to obtain DBE participation on this project, although there are no specific goals for DBE participation.

The City of Grass Valley hereby notifies all bidders that it will affirmatively ensure that in any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award.

Pursuant to Section 1773 of the Labor Code, the general prevailing rate of wages for Nevada County have been determined by the Director of the California Department of Industrial Relations (DIR). These wages are set forth in the General Prevailing Wage Rates for this project, may be examined at the office of the Engineering Division, City of Grass Valley and are available from the California Department of Industrial Relations' Internet web site at <http://www.dir.ca.gov/DLSR/PWD>. The Labor Surcharge and Equipment Rental Rates in effect on the date the work is accomplished will apply to work done under this Contract.

A contractor or subcontractor shall not be qualified to bid on, be listed in a bid proposal, subject to the requirements of Section 4104 of the Public Contract Code, or engage in the performance of any contract for public work, as defined in this chapter, unless currently registered and qualified to perform public work pursuant to Labor Code Section 1725.5 . It is not a violation of this section for an unregistered contractor to submit a bid that is authorized by Section 7029.1 of the Business and Professions Code or by Section 10164 or 20103.5 of the Public Contract Code, provided the contractor is registered to perform public work pursuant to Labor Code Section 1725.5 at the time the contract is awarded.

The Federal minimum wage rates for this project as predetermined by the United States Secretary of Labor are set forth in the Bid book and in copies of this book that may be examined at the offices described above where project plans, special provisions, and bid forms may be seen. Addenda to modify the Federal minimum wage rates, if necessary, will be issued to holders of Bid book. Future effective general prevailing wage rates, which have been predetermined and are on file with the California Department of Industrial Relations are referenced but not printed in the general prevailing wage rates.

Attention is directed to the Federal minimum wage rate requirements in the Bid book. If there is a difference between the minimum wage rates predetermined by the Secretary of Labor and the general prevailing wage rates determined by the Director of the California Department of Industrial Relations for similar classifications of labor, the Contractor and subcontractors shall pay not less than the higher wage rate. The Department will not accept lower State wage rates not specifically included in the Federal minimum wage determinations. This includes "helper" (or other classifications based on hours of experience) or any other classification not appearing in the Federal wage determinations. Where Federal wage determinations do not contain the State wage rate determination otherwise available for use by the Contractor and subcontractors, the Contractor and subcontractors shall pay not less than the Federal minimum wage rate, which most closely approximates the duties of the employees in question.

Dated: April 28, 2021

BJORN P. JONES  
ASSISTANT CITY ENGINEER  
CITY OF GRASS VALLEY  
ENGINEERING DIVISION

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## SPECIAL PROVISIONS

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### INSTRUCTIONS TO BIDDERS

#### 1. BIDDER'S REPRESENTATIONS

Each bidder by submitting a bid represents that:

- 1.1. The bidder has read and understands the bid package and the bid is in accordance with all the requirements of the bid package and applicable law.
- 1.2. Neither the bidder nor any subcontractor included on the list of proposed subcontractors submitted with the bid are ineligible to perform work on public works projects pursuant to California Labor Code Sections 1777.1 or 1777.7.
- 1.3. The bidder understands that quantities of unit price items may vary from the estimates provided in the Special Provisions, proposal, technical specifications, and construction contract.
- 1.4. Representatives of the bidder have visited the Project site and have familiarized themselves with the conditions under which the Project work is to be performed to ensure that the Project work may be performed for the amount bid.
- 1.5. The bidder has informed the City in writing no later than five (5) working days prior to the time specified for bid opening of any apparent conflicts, errors, or ambiguities contained in the bid package or between the contents of the bid package and the Project site.

#### 2. PRE-BID COMMUNICATION AND INTERPRETATION OF THE BID PACKAGE

- 2.1. Any bidder that discovers any apparent conflicts, errors, or ambiguities contained in the bid package or between the contents of the bid package and the Project site, or that has questions or requires clarification concerning the bid package or its intent must inform the City in writing as soon as reasonably possible, but no later than five (5) working days before the date specified in the bid opening. Such notice shall be sent as specified in the Notice to Contractors for questions concerning the bid package. Questions received less than five (5) working days before the time specified for opening bids may not be answered.
- 2.2. Any interpretation, correction or change of the bid package prior to bid opening will be made by addendum signed by the City Engineer and transmitted to all bid package recipients. No other interpretation or information concerning the bid package issued prior to the date specified for opening bids will be binding. All addenda signed by the City Engineer and issued prior to the time and date specified for opening bids will form a part of the contract documents and must be acknowledged on the bid forms. Any changes, exceptions or conditions concerning the Project and/or the bid package submitted by any bidder as part of a bid may render that bid non-responsive.
- 2.3. The City takes no responsibility for notifying a bidder who does not obtain bid documents from the City or does not provide the specified Request for Revisions statement to the City. Such bidder may be found non-responsive if that bidder fails to acknowledge, as set forth herein, any addenda or does not take into account any additional information provided by the City.
- 2.4. No other interpretation or information concerning the bid package issued prior to the date specified for opening bids will be binding. All addenda signed by the City Engineer and issued prior to the time and date specified for opening bids will form a part of the contract documents and must be acknowledged on the bid forms. Any changes, exceptions or conditions concerning the Project and/or the bid package submitted by any bidder as part of a bid may render that bid non-responsive.

#### 3. PRE-BID ACCESS TO THE SITE

- 3.1. Prior to submitting a bid, it will be the sole responsibility of each bidder to conduct any additional examination, investigation, exploration, test, study or other inquiry and to obtain any additional information pertaining to the

physical conditions (including surface, subsurface, and underground utilities) at or near the Project site that may affect the cost, progress, or performance of the Project, and that the bidder deems are necessary to prepare its bid for performance of the Project in accordance with the bid package and contract documents. Bidders seeking any such additional examination or other inquiries or information concerning the Project will do so at the bidder's sole expense.

- 3.2. Bidders seeking to conduct any additional examination or other inquiry at the Project site must request site access from the City at least two (2) working days in advance. The location of any excavation, boring or other invasive testing will be subject to approval on behalf of the City and any other agencies with jurisdiction over such testing. Bidders may not conduct tests at the Project site prior to obtaining City approval. The City may require bidders to execute an access agreement or encroachment permit prior to approving testing at the Project site. Once approved testing is complete, bidders shall fill all trenches or holes, restore all pavements to match the existing structural section, and otherwise clean up and restore the test site to its pre-test condition solely at the bidder's expense.
- 3.3. The Bidder's attention is directed to the requirements of Section 2-1.30, "Job Site and Documentation Examination," of the Standard Specifications and these Special Provisions.
- 3.4. An optional pre-bid meeting will be held to access the site and tour facilities. Attendance of prospective bidders is encouraged but not required. The pre-bid meeting is scheduled for March 25, 2021 at 10:00am, to be held at the Memorial Park Pool, 350 Race Street, Grass Valley, CA 95945.

#### 4. BIDDING PROCEDURE

- 4.1. Bids shall be delivered to the City of Grass Valley, Engineering Division, 125 East Main Street, Grass Valley, CA 95945, no later than the time and date specified in the Notice to Contractors. Bids will be opened and read publicly at that time. Bids that are submitted late according to the time shown on the official bid clock located in City Hall will be returned unopened. Telephones for use by bidders are not available at the City offices.
- 4.2. In accordance with California Public Contract Code Section 20170, bids must be presented under sealed cover. Bids must be submitted using the proposal forms furnished with the bid package. Bids must include all documents provided in the Proposal. Bids must bear the bidder's legal name and be signed by a representative authorized to bind the bidder. Bids shall be typed or written in ink. Corrections may be made if initialed by the bidder. No oral or telegraphic modifications of bids, including facsimile modifications, will be considered. Bids that are incomplete or that are not presented on the proposal forms furnished with the bid package may be deemed non-responsive.
- 4.3. Each bid must give the full business address of the bidder. Bids of partnerships must furnish the full name of all partners and must be signed in the partnership name by one of the members of the partnership, or by an authorized representative, followed by the printed name and title of the person signing. Bids of corporations must be signed with the legal name of the corporation, followed by the name of the state of incorporation and by the signature and designation of the president, secretary or other person authorized to bind the corporation. The name of each person signing shall also be typed or printed below the signature. Upon request of the City, bidders will furnish satisfactory evidence of the authority of the person signing the bid. Bids of joint ventures must include a certified copy of the legal agreement constituting the joint venture.
- 4.4. No person, firm, corporation, partnership, or legal joint venture may submit more than one bid for the Project. However, a person, firm, corporation, partnership or legal joint venture that has submitted a subcontract proposal to a bidder, or that has quoted prices on materials to a bidder may submit a subcontract proposal, quote prices to other bidders and submit its own bid.
- 4.5. In accordance with California Public Contract Code Section 20171, all bids must include one of the forms of security specified in Caltrans Standard Specifications in an amount of at least ten (10) percent of the total of the bid prices. Bidders that elect to provide bidder's security in the form of a bid bond must execute a bid bond using the form provided in the bid forms. The bidder's security is tendered as a guarantee that the successful bidder, if awarded the Project contract, will execute and submit to the City all required bonds, certificates of insurance, and completed contract forms and enter into a contract with the City within ten (10) working days of receipt of the Notice of Award. The bidder's security of any successful bidder that fails to do so will be forfeited to the City. All bidders' security not forfeited to the City will be returned once a successful bidder provides all required documents and enters a contract with the City in accordance with all applicable bid package requirements. Forfeiture of the

bidder's security to the City will not waive or otherwise limit any other remedy available to the City under applicable law.

- 4.6. In accordance with California Business and Professions Code Section 7028.15, Public Contract Code Section 20103.5, and as specified in the Notice to Contractors, all Project work must be performed by properly licensed contractors and subcontractors with active licenses in good standing as of the date and time specified for bid opening, or, if the Project involves federal funds, no later than the time the Project contract is awarded. Bidders must verify their Contractor's license number and license expiration date on the proposal cover page under penalty of perjury. Bids that do not satisfy applicable licensing requirements will be considered non-responsive and rejected and may subject the bidder to criminal and/or civil penalties. In addition, all licenses shall remain in effect throughout the term of the contract.
- 4.7. Bids may be withdrawn prior to the time set for bid opening by a written request signed by an authorized representative of the bidder filed with the City Engineer. The bid security submitted with bids so withdrawn will be returned to the bidder. Bidders that have withdrawn their bid in accordance with this provision may submit a new bid prior to the time set for bid opening in accordance with all applicable bid package requirements. Bids may not be withdrawn during the ninety-day period after the time set for bid opening except as permitted by law pursuant to California Public Contract Code Section 5100 and following. Any other bid withdrawal will result in forfeiture of the bidder's bid security to the City.
- 4.8. In submitting a bid to a public purchasing body, the bidder offers and agrees that if the bid is accepted, it will assign to the purchasing body all rights, title and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2 [commencing with Section 16700] of Part 2 of Division 7 of the Business and Professional Code), arising from purchases of goods, services or materials pursuant to the public works contract or the subcontract. This assignment shall be made and become effective at the time the awarding body tenders final payment to the contractor, without further acknowledgment to the parties.

## 5. BID PROTESTS

Any protest of the proposed Project award must be submitted in writing to the City no later than 5:00 PM on the third business day following the date of the bid opening.

- 5.1. The initial protest must contain a complete statement of the basis for the protest.
- 5.2. The protest must state the facts and refer to the specific portion of the document or the specific statute that forms the basis for the protest. The protest must include the name, address, and telephone number of the person representing the protesting party.
- 5.3. The party filing the protest must concurrently transmit a copy of the initial protest to the apparent low bidder.
- 5.4. The party filing the protest must have actually submitted a bid for the Project. A subcontractor of a party filing a bid for the Project may not submit a bid protest. A party may not rely on the bid protest submitted by another bidder but must timely pursue its own protest.
- 5.5. The procedure and time limits set forth in these Instructions to Bidders are mandatory and are the bidders' sole and exclusive remedy in the event of a bid protest. Any bidder's failure to fully comply with these procedures shall constitute a waiver of any right to further pursue a bid protest, including filing of a challenge of the award pursuant to the California Public Contract Code, filing of a claim pursuant to the California Government Code, or filing of any other legal proceedings.
- 5.6. The City shall review all timely protests prior to award of the Project. The City shall not be required to hold an administrative hearing to consider any protests but may do so at its option. At the time of the City Council's consideration of the Project award, the City Council shall also consider the merits of any timely protests. The City Council may either reject the protest and award to the lowest responsible bidder or accept the protest and award the bid to the next lowest responsible bidder. Nothing in this section shall be construed as a waiver of the City Council's right to reject all bids.

## 6. AWARD

- 6.1. The bidder's attention is directed to the provisions in Section 3, "Contract Award and Execution", and Section 4, "Beginning of Work, Time of Completion and Liquidated Damages," of these Special Provisions.
- 6.2. In accordance with applicable law, the City reserves the right to reject any or all bids and to waive any informality in any bid. The City reserves the right to accept any portion of any bid, unless the bid package expressly provides that the award will be made as a whole. If the City elects to award a contract for performance of the Project, the contract will be awarded in accordance with California Public Contract Code Section 20162 and other applicable law to the responsible bidder submitting a responsive bid with the lowest total bid price for the base bid and those additive or deductive alternate items listed in the Proposal. In accordance with the contract documents and other applicable law, the City may add or deduct items of work from the Project after the lowest responsible bidder is determined.
- 6.3. The contract shall be awarded, if an award is made, to the lowest responsible bidder within 90 calendar days from the date bids are publicly opened and declared. If the award is not made within that period, all bids submitted are deemed rejected by the governing body.

A contract shall exist between the Contractor and the City when all of the following steps have been completed.

- (a) Award of the contract by the governing body.
- (b) Execution of a written contract by the Contractor within ten (10) working days of receipt of written notice of award.
- (c) Delivery by the Contractor to the City, the Faithful Performance and Labor and Materials bonds required herein, within ten (10) working days of receipt of written notice of award.
- (d) Delivery by the Contractor to the City, all City-approved Insurance Policies, on the appropriate forms, as required, within ten (10) working days of receipt of written notice of award.

Contractor shall execute a written agreement with the City using the form set forth hereafter.

- 6.4. The successful bidder and any subcontractors and others engaged in performance of the Project shall have valid local business licenses, as applicable, before commencing work on the Project.
- 6.5. Upon verifying that the successful bidder has provided complete, executed copies of all documents specified necessary to execute the contract and an authorized City representative has signed the contract, the Engineering Division will issue a Notice to Proceed in accordance with Section 4, "Beginning of Work, Time of Completion and Liquidated Damages," of these Special Provisions. The number of days within which the Project must be complete begins to run on the project commencement date.

## 7. PRICING

- 7.1. Inconsistency of bid unit items, item prices, and/or totals shall be resolved in accordance with the requirements specified in the Proposal.
- 7.2. Any federal, state, or local tax payable on articles to be furnished for the Project shall be included in the lump sum total bid price and paid by the Contractor under the contract.

## 8. QUANTITIES

- 8.1. Quantities, including but not limited to, material or labor quantities, that are provided in the bid package concerning the Project are estimates only and are provided solely as a general indication of the Project scope. The City does not warrant that such quantity estimates provided in the bid package represent the actual quantities required to perform the Project in accordance with the contract documents. Such quantity estimates do not bind the City and bidders should not rely on them in preparing their bids. Each bidder is solely responsible for determining the quantities on which to base their bids in light of information contained in the bid package, bidder investigation and analysis of the Project and the Project site, and any other analysis or expertise of the bidder concerning the Project.

8.2. The City may amend, decrease, or increase the Project work in accordance with the bidding package and the contract documents. If the City amends, decreases or increases the Project work prior to award of the Project, each bidder will be solely responsible for determining the revised quantities, if any, on which to base their bid in light of information contained in the bid package and any amendments or addenda to the bid package, bidder investigation and analysis of the Project as amended, decreased or increased, the Project site, and any other analysis or expertise of the bidder concerning the Project.

#### 9. SUBSTITUTION OF “OR EQUAL” ITEMS

9.1. In accordance with California Public Contract Code Section 3400 concerning the submittal of an “or Equal” product, bidder’s attention is directed to the requirements of Section 2-1.02, “Required Listing of Proposed Products “or Equals” with Bid Proposal” of these Special Provisions, and the Proposal.

#### 10. SUBCONTRACTING

10.1. Bids must be in accordance with the requirements of the Subletting and Subcontracting Fair Practices Act, California Public Contract Code Section 4100 and the following. Bids must include a completed list of proposed subcontractors on the form included in the bid package. In accordance with California Public Contract Code Section 4104, completed lists of proposed subcontractors must include the name, business location, California contractor license number and public works contractor registration number for each subcontractor that will perform a portion of the Project work (including special fabrication and installation of a portion of the work) valued in excess of one half of one percent of the total Project bid price. If the Project work includes construction of streets or highways, the completed list of proposed subcontractors must include the name, business location, California contractor license number, public works contractor registration number, and the portion of work that will be subcontracted, for each subcontractor that will perform a portion of the Project work (including special fabrications and installation of a portion of the work) valued in excess of one half of one percent of the total Project bid price, or ten thousand dollars (\$10,000), whichever is greater.

10.2. Required listing of the portion of work that will be done by each subcontractor (Bid item number and percentage of subcontracted work of total bid) may be submitted by the prime contractor to the project manager listed in the invitation to bid, within 24 hours after the deadline established for receipt of bids.

10.3. In accordance with California Public Contract Code Section 4106, for any portion of the Project work with a value of more than one half of one percent of the total Project bid price for which no subcontractor is listed, or for which more than one subcontractor is listed, bidders certify by submitting their bids that they are qualified to perform that portion of the Project work and that they will perform that portion of the Project work with their own forces. Bidders may not substitute another subcontractor for a subcontractor listed in their bid except as permitted by the City in accordance with Section 4107 and following of the California Public Contract Code.

10.4. Bidder’s attention is directed to the requirements specified in “Subcontracting,” of these Special Provisions and the Proposal.

#### 11. ASSIGNMENT

11.1. Bidders may not assign, sublet, sell, transfer, or otherwise dispose of their bid or any right, title or interest in their bid, or their obligations under their bid, without the written consent of the City Engineer. Any purported assignment, subletting, sale, transfer or other disposition of a bid or any interest in a bid, or of any obligations under a bid without such written consent will be void and of no effect.

11.2. Bidder’s attention is directed to the requirements specified in Section 5-1.12, “Assignment,” of the Construction Specifications.

#### 12. BONDS

12.1. The successful bidder shall submit to the City a performance bond within ten (10) working days of receiving written notice of award. The successful bidder shall submit to the City a payment or labor and materials bond within ten (10) working days of receiving written notice of award. City shall retain the Performance Bond for a

one-year guarantee period from the date of the City's acceptance of the work. All Project bonds shall be executed using the forms provided in the bid package.

- 12.2. The bonds shall be obtained from a California admitted surety that is licensed by the State of California to act as a surety upon bonds and undertakings and which maintains in this State at least one office for the conduct of its business. The surety shall furnish reports as to its financial condition from time to time upon request by City.
- 12.1. In accordance with California Civil Code Section 9550, labor and materials bond must be in the amount of one hundred percent of the total amount payable by the terms of the Project contract and guarantee payment to persons listed in California Civil Code Section 9100 for work performed and for charges for materials, supplies, and equipment provided under the Project contract (including amounts due under or subject to the Unemployment Insurance Code) in accordance with the requirements of California Civil Code Section 9554.
- 12.2. The performance bond must be in the amount of one hundred percent of the amount payable by the terms of the Project contract to guarantee the faithful performance of the Project work.
- 12.3. Bidder's attention is directed to the requirements specified in Section 3-1.05, "Contract Bonds," and "Warranty," of these Special Provisions, and the Contract.

### 13. LABOR LAWS

- 13.1. Bidders must comply with applicable provisions of the California Labor Code.
- 13.2. In accordance with California Labor Code Section 1771, not less than the general prevailing rate of per diem wages for work of a similar character in the locality in which the Project is to be performed, and not less than the general prevailing rate of per diem wages for holiday and overtime work fixed as provided in the California Labor Code shall be paid to all workers engaged in performing the Project.
- 13.3. In accordance with California Labor Code Section 1770 and following, the Director of Industrial Relations has determined the general prevailing wage per diem rates for work in the locality in which the Project is to be performed. In accordance with California Labor Code Section 1773, the City has obtained the general prevailing rate of per diem wages and the general rate for holiday and overtime work in the locality in which the Project is to be performed for each craft, classification or type of worker needed to perform the Project. In accordance with California Labor Code Section 1773.2, copies of the prevailing rate of per diem wages for Nevada County are on file at the City offices, 125 E. Main Street, Grass Valley, California 95945. These wage rates are not included in the Special Provisions but will be made available on request.
- 13.4. In accordance with California Labor Code Section 1777.1, contractors and subcontractors that are found guilty of willfully violating Chapter 1 of Part 7 of Division 2 of the Labor Code (except for Section 1777.5), or that are found guilty of such violations with intent to defraud, and entities in which such contractors or subcontractors have any interest, may be ineligible to bid on, be awarded, or perform Project work as a subcontractor.
- 13.5. A contractor or subcontractor shall not be qualified to bid on, be listed in a bid proposal, subject to the requirements of Section 4104 of the Public Contract Code, or engage in the performance of any contract for public work, as defined in this chapter, unless currently registered and qualified to perform public work pursuant to Section 1725.5. It is not a violation of this section for an unregistered contractor to submit a bid that is authorized by Section 7029.1 of the Business and Professions Code or by Section 10164 or 20103.5 of the Public Contract Code, provided the contractor is registered to perform public work pursuant to Section 1725.5 at the time the contract is awarded.
- 13.6. Requirements for competitive sealed bidding and design build projects are set out in the Grass Valley Municipal Code sections 3.08 and 3.10 consistent with City Charter Article XIII, Section (2). Skilled and trained workforce requirements set out in Public Contract Code Section 2600 et seq. are not mandated by the City for this project.
- 13.7. Bidder's attention is directed to the requirements specified in "Prevailing Wage," "Labor Nondiscrimination," and "Labor Code Requirements," of these Special Provisions, and Section 7-1.02K, "Labor Code", of the Standard Specifications.



## SECTION 1 GENERAL SPECIFICATIONS AND PLANS

### 1-1.01 GENERAL

The work embraced herein shall be done in accordance with the Project Plans, Standard Specifications and Standard Plans dated 2018 of the Department of Transportation, and the City of Grass Valley's Improvement Standards and in accordance with the following Special Provisions.

Amendments to the Department of Transportation's Standard Specifications set forth in these Special Provisions shall be considered as part of the Standard Specifications for the purposes set forth in Section 5-1.02, "Contract Components" of the Standard Specifications and are included as Attachment A to these Special Provisions. Whenever either the term "Standard Specification is amended" or the term "Standard Specifications are amended" is used in the Special Provisions, the text following said term shall be considered an amendment to the Standard Specifications. In case of conflict between such amendments and the Standard Specifications, the amendments shall take precedence over and be used in lieu of the conflicting portions.

In case of conflict between the City of Grass Valley's Improvement Standards, and these Special Provisions, the Special Provisions shall govern, take precedence over, and be used in lieu of such conflicting portions. The Department of Transportation's Standard Specifications and Standard Plans shall govern over the City of Grass Valley's Improvement Standards.

Units in the United States Standard Measures shall apply to this contract.

### 1-1.02 REVISED STANDARD SPECIFICATIONS AND STANDARD PLANS

All references to the Department of Transportation's Standard Specifications and Standard Plans shall be considered to include any revisions issued by the Office of Construction Contract Standards in effect at the time of printing of these Special Provisions.

Revised Standard Specifications and Standard Plans can be found on the Caltrans website as provided in the following link: <http://www.dot.ca.gov/des/oe/construction-contract-standards.html>.

### 1-1.03 DEFINITIONS AND TERMS

As used herein, unless the context otherwise requires, the following terms have the following meaning:

**City:** City of Grass Valley.

**City Engineer:** The City Engineer of the City of Grass Valley, State of California.

**City Hall:** The City building located at 125 East Main Street, Grass Valley, California, 95945.

**Contract Documents:** All of the written matter describing the contemplated work, including the Plans, Special Provisions, Improvement Standards, Bonds, Agreement, and any approved Change Orders.

**Department:** The Engineering Department of the City of Grass Valley, State of California, except when referring to documents, laws or departments of the State of California. Any reference in question shall be as designated by the Engineer.

**Department of Transportation:** The Engineering Division of the City of Grass Valley, State of California, except when referring to documents, laws, or departments of the State of California. Any reference in questions shall be as designated by the Engineer.

**Director of Transportation:** The City Engineer of the City of Grass Valley, State of California.

**District Director of the District:** The City Engineer of the City of Grass Valley, State of California.

**Engineer:** The City Engineer of the City of Grass Valley, State of California, acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties entrusted to them.

**Improvement Standards:** The Design Standards, Construction Standards and Standard Details of the City of Grass Valley Public Works Department, Engineering Division

**Laboratory:** The established laboratory of the Materials and Research Department of the Department of Transportation of the State of California or laboratories authorized by the Engineer to test materials and work involved in the Contract, except

when referring to documents, laws or departments of the State of California. Any reference in question shall be as designated by the Engineer

**Standard Plans:** The 2018 edition of the Standard Plans of the State of California, Department of Transportation including any revisions to the Standard Plans issued by the Office of Construction Contract Standards in effect at the time of printing of these Special Provisions. Any reference therein to the State of California or a State agency, office, or officer shall be interpreted to refer to the City or its corresponding agency, office, or officer acting under this contract.

**Standard Specifications:** The 2018 edition of the Standard Specifications of the State of California, Department of Transportation including any revisions to the Standard Specifications issued by the Office of Construction Contract Standards in effect at the time of printing of these Special Provisions. Any reference therein to the State of California or a State agency, office, or officer shall be interpreted to refer to the City or its corresponding agency, office, or officer acting under this contract.

**State:** The City of Grass Valley, except when referring to documents, laws, or departments of the State of California. Any reference in question shall be as designated by the Engineer.

**State Highway Engineer:** The City Engineer of the City of Grass Valley, State of California, acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties entrusted to them.

**Transportation Building, Sacramento:** City Hall of the City of Grass Valley, State of California except when referring to documents, laws, or departments of the State of California. Any reference in question shall be as designated by the Engineer.

**Working Day:** Monday through Friday, except holidays, from 7am to 7pm, or as further specified in these Special Provisions.

Contractor's attention is directed to the definitions and terms specified in Section 1, "Purpose and Definitions," of the Design Standards and Section 1, "Purpose and Definitions," of the Construction Standards.

## SECTION 2 BIDDING

### 2-1.01 GENERAL

The bidder's attention is directed to the provisions in Section 2, "Bidding," of the Standard Specifications and these Special Provisions for the requirements and conditions which the bidder must observe in the preparation of the proposal form and the submission of the bid.

Each proposal shall include unit costs, and total costs for the base bid.

Bidders are required to specify a physical business street address to receive certified mail in accordance with the Proposal. The City shall be notified in writing a minimum of thirty (30) days in advance of any changes of address.

Section 2-1.06A, "General," of the Standard Specifications is replaced in its entirety with the following:

Improvement Standards may be viewed at the City of Grass Valley's website: [http://www.cityofgrassvalley.com/services/departments/engineering/Standard\\_Specifications\\_and\\_Drawings](http://www.cityofgrassvalley.com/services/departments/engineering/Standard_Specifications_and_Drawings)

The Notice to Contractors, Special Provisions, and Construction Contract, Proposal and Bidder's Certificates and Improvement Plans may be viewed at the City of Grass Valley website, <http://www.cityofgrassvalley.com/services/departments/engineering/rfp/rfqqs-and-current-bids>, or at City Hall at 125 East Main Street, Grass Valley, CA 95945. The Proposal form is bound separate from the Contract and the Special Provisions.

In addition to the subcontractors required to be listed in conformance with, "Subcontractor List," of these Special Provision, each proposal shall have listed therein the portion of work that will be done by each subcontractor listed. The listing subcontractor shall also set forth the portion of work that will be done by each subcontractor listed. A sheet for listing the subcontractors is included in the Proposal.

A contractor or subcontractor shall not be qualified to bid on, be listed in a bid proposal, subject to the requirements of Section 4104 of the Public Contract Code, or engage in the performance of any contract for public work, as defined in this chapter, unless currently registered and qualified to perform public work pursuant to Labor Code Section 1725.5. It is not a violation of this section for an unregistered contractor to submit a bid that is authorized by Section 7029.1 of the Business and Professions Code or by Section 10164 or 20103.5 of the Public Contract Code, provided the contractor is registered to perform public work pursuant to Section 1725.5 at the time the contract is awarded.

In conformance with Public Contract Code Section 7106, a Noncollusion Affidavit is included in the Proposal. Signing the Proposal shall also constitute signature of the Noncollusion Affidavit.

The contractor, sub recipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR part 26 in the award and administration of Department of Transportation assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate. Each subcontract signed by the bidder must include this assurance.

Failure of the bidder to fulfill the requirements of the Special Provisions for submittals required to be furnished after bid opening, including but not limited to escrowed bid documents, where applicable, may subject the bidder to a determination of the bidder's responsibility in the event it is the apparent low bidder on any future public works contracts.

#### **2-1.02 REQUIRED LISTING OF PROPOSED PRODUCTS "OR EQUALS"**

On the sheet provided herein, to be submitted as part of the proposal, the bidder shall list each proposed substitution of an "equal" product. The bidder shall identify the proposed substitution by the section of the specifications that specifies the product, the name of the product proposed to be substituted out, and the name and manufacturer of the product proposed to be substituted. Prior to the award of the Contract and upon the request of the Engineer, the bidder shall submit the written request for substitution within three (3) days. The request shall be accompanied by evidence satisfactory to the Engineer that the materials and products proposed for use are equal to or better than the materials and products specified or detailed on the plans. The burden of proof as to the quality and suitability of substitutions shall be upon the bidder. Failure to submit the information as requested by the Engineer shall be deemed a voluntary withdrawal of the proposed substitution.

No requests for any substitution shall be allowed unless listed on the sheet provided. No requests for substitution shall be allowed after the opening of the bid. Requests for substitution shall be reviewed and considered by the Engineer promptly after the award of the contract to the lowest responsible Bidder. In its sole discretion, the Engineer may request additional information about the proposed substitution.

The decision by the Engineer as to whether a proposed substitution is an "Equal" product shall be made by the Engineer based upon the information submitted and will be final.

The Engineer will be the sole judge as to whether a proposed substitution is an "Equal" product. The Engineer's decision will be made based upon the information submitted and will be final.

A sheet for listing the proposed substitutions of an "Equal" product, as required herein, is included in the Proposal.

#### **2-1.03 SUBCONTRACTOR LIST**

Contractor's attention is directed to the requirements of "Subcontractor List" of the Standard Specifications, the Proposal, and these Special Provisions.

For each Subcontractor required to be listed, the Subcontractor List included in the proposal must show the **name and place of business, California contractor license number and Public Works contractor registration number** of each Subcontractor to whom the bidders proposes to directly subcontract portions of the work.

Additionally, if not otherwise included in the Subcontractor List submitted with the bid, the prime contractor shall submit a completed Subcontractor List within 24 hours of the bid opening setting forth the bid item number and percentage of the item work that will be done by each Subcontractor listed.

A sheet for listing the subcontractors, as required herein, is included in the Proposal.

#### **2-1.04 BIDDER'S SECURITY**

The form of Bidder's Bond mentioned in "Bidder's Security," of the Standard Specifications will be found following the signature page of the Proposal annexed hereto.

#### **2-1.05 NON-COLLUSION AFFIDAVIT**

In accordance with Public Contract Code 7106, a Non-Collusion Affidavit is included in the proposal.

#### **2-1.06 DISADVANTAGE BUSINESS ENTERPRISES (DBE)**

The City maintains a goal that Disadvantaged Business Enterprises (DBEs), as defined in Part 26, Title 49 CFR, shall be encouraged to participate in the performance of City contracts. The Contractor should ensure that DBEs, as defined in Part 26, Title 49 CFR, have the opportunity to participate in the performance of this contract and shall take all necessary and reasonable steps, as set forth in Part 26, Title 49 CFR, for this assurance. The Contractor shall not discriminate on the basis of race, color, national origin, or gender in the award and performance of subcontracts. Failure to carry out the requirements of this paragraph shall constitute a breach of contract and may result in termination of this contract or other remedy the City may deem appropriate.

Bidders shall be fully informed respecting the requirements of the Code of Federal Regulations and are urged to obtain DBE participation in this project.

Caltrans has engaged the services of a contractor to provide supportive services to contractors and subcontractors to assist in obtaining DBE participation on federally funded construction projects. Bidders and potential subcontractors should check the Caltrans website at <http://www.dot.ca.gov/hq/bep> to verify the current availability of this service.

### **2-1.07 FEDERAL LOBBYING RESTRICTIONS**

Section 1352, Title 31, United States Code prohibits Federal funds from being expended by the recipient or any lower-tier sub-recipient of a Federal-aid contract to pay for any person for influencing or attempting to influence a Federal agency or Congress in connection with the awarding of any Federal-aid contract, the making of any Federal grant or loan, or the entering into of any cooperative agreement.

If any funds other than Federal funds have been paid for the same purposes in connection with this Federal-aid contract, the recipient shall submit an executed certification and, if required, submit a completed disclosure form as part of the bid documents.

A certification for Federal-aid contracts regarding payment of funds to lobby Congress or a Federal agency is included in the Bid book. Standard Form - LLL, "Disclosure of Lobbying Activities," with instructions for completion of the Standard Form is also included in the Bid book. Signing the Bid book shall constitute signature of the Certification.

The above referenced certification and disclosure of lobbying activities shall be included in each subcontract and any lower-tier contracts exceeding \$100,000. All disclosure forms, but not certifications, shall be forwarded from tier to tier until received by the Engineer.

The Contractor, subcontractors and any lower-tier contractors shall file a disclosure form at the end of each calendar quarter in which there occurs any event that requires disclosure or that materially affects the accuracy of the information contained in any disclosure form previously filed by the Contractor, subcontractors and any lower-tier contractors. An event that materially affects the accuracy of the information reported includes:

- (1) A cumulative increase of \$25,000 or more in the amount paid or expected to be paid for influencing or attempting to influence a covered federal action; or
- (2) A change in the person(s) or individual(s) influencing or attempting to influence a covered federal action; or
- (3) A change in the officer(s), employee(s), or member(s) contacted to influence or attempt to influence a covered Federal Action.

### **2-1.08 FEDERAL REQUIREMENTS FOR FEDERAL-AID CONSTRUCTION PROJECTS**

Refer to Section 14 of these Special Provisions.

## **SECTION 3 CONTRACT AWARD AND EXECUTION**

### **3-1.01 GENERAL**

The bidder's attention is directed to the provisions in Section 3, "Contract Award and Execution," of the Standard Specifications, "Award," of the Instruction To Bidders of these Special Provisions, and these Special Provisions for the requirements and conditions concerning submittal of DBE information, award, and execution of contract.

Bid protests are to be delivered to the following address: **Engineering Division, 125 East Main Street, Grass Valley, CA 95945.**

The award of the contract, if it be awarded, will be to the lowest responsible bidder whose bid complies with all the requirements prescribed.

No contractor or subcontractor may be awarded a contract for public work on a public works project (awarded on or after April 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5. This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations.

The contract shall be executed by the successful bidder and shall be returned together with the contract bonds, to the Agency so that it is received within 10 days, not including Saturdays, Sundays and legal holidays, after the bidder has received the contract for execution. Failure to do so shall be just cause for forfeiture of the proposal guaranty. The executed contract documents shall be delivered to the following address: **Engineering Division, 125 East Main Street, Grass Valley, CA 95945.**

### **3-1.02 AWARD OF CONTRACT**

The City of Grass Valley reserves the right to reject any and all bids or to waive any minor defects or irregularity in bidding in accordance with applicable law. In accordance with California Public Contract Code Section 20103.8, if the City elects to award a contract for performance of the project, the contract will be awarded in accordance with California Public Contract Code Section 20162 and other applicable law to the responsible bidder submitting a responsive bid with the lowest total bid price for the base bid without consideration of the bid price for any additive or deductive items. All bids will remain valid for 90 days after the bid opening. Except as permitted by law and subject to all applicable remedies, including forfeiture of bidder's security, bidders may not withdraw their bid during the 90-day period after the bid opening.

### **3-1.03 CONTRACT BONDS**

Contractor shall provide, at the time of the execution of the agreement or contract for work, and at his own expense, a surety bond ("Performance Bond") in an amount equal to at least 100 percent (100%) of the contract price as security for the faithful performance of said agreement within the time prescribed, in a manner satisfactory to the Engineer, and that all materials and workmanship will be free from original or developed defects. This Performance Bond must remain in effect until the end of all warranty periods set forth in the Special Provisions. Contractor shall also provide, at the time of the execution of the agreement or contract for the work, and at his own expense, a separate surety bond ("Payment Bond") in an amount equal to at least 100 percent (100%) of the contract price as security for the payment of all persons performing labor and furnishing materials in connection with said agreement. This Payment Bond shall be maintained by the Contractor in full force and effect until the work is accepted by the City and until all claims for materials and labor are paid and shall otherwise comply with Civil Code. Sureties on each of said bonds shall be satisfactory to the City Attorney.

Should any bond become insufficient, the Contractor shall renew the bond within ten (10) working days after receiving notice from the Engineer.

Should any Surety at any time be unsatisfactory to the City, notice will be given the Contractor to that effect. No further payments shall be deemed due or will be made under said agreement until a new Surety shall qualify and be accepted by the City.

Changes in said agreement of extensions of time, made pursuant to the agreement, shall in no way release the Contractor or Surety from its obligations. Notice of such changes or extensions shall be waived by the Surety.

## **SECTION 4 BEGINNING OF WORK, TIME OF COMPLETION, AND LIQUIDATED DAMAGES**

### **4-1.01 GENERAL**

Attention is directed to the provisions in Section 8-1.04, "Start of Job Site Activities," Section 8-1.05, "Time," and Section 8-1.10, "Liquidated Damages," of the Standard Specifications, and "General Requirements," of these Special Provisions.

The Contractor shall begin work by the date identified in writing in the Notice to Proceed by the City of Grass Valley and shall diligently prosecute the same before the expiration of

#### **250 Working Days**

Beginning on the first day of work or the date stated in the Notice to Proceed, whichever comes first.

The Contractor shall pay to City of Grass Valley the sum of \$500 per day, as liquidated damages, for each and every calendar day delay in finishing the work in excess of the working days prescribed above. At the Engineer's option, said sum may be deducted from any payment due to or to become due the Contractor.

The 72 hours advance notice before beginning work specified in Section 8-1.04, "Start of Job Site Activities," of the Standard Specifications is changed to 5 days advance notice for this project.

### **4-1.02 HOLIDAYS**

Designated legal holidays are: January 1st, the third Monday in January, the third Monday in February, the last Monday in May, July 4th, the first Monday in September, the second Monday in October, November 11th, Thanksgiving Day, the day after Thanksgiving day and December 25th. When a designated legal holiday falls on a Sunday, the following Monday shall be a designated legal holiday. When a designated legal holiday falls on a Saturday, the preceding Friday shall be a designated legal holiday.

### **4-1.03 WINTERIZATION**

The Contractor shall, at his sole expense, winterize the project if construction activities are not completed by October 15. The Contractor shall winterize the project in conformance with the requirements of "Water Pollution Control," of these Special Provisions for all construction activities that take place between October 15<sup>th</sup> and May 1<sup>st</sup>. An acceptable winterization plan shall be submitted to the Engineer no later than October 1st for his review and acceptance.

The Contractor's winterization plan is required for all construction activities that take place between October 15<sup>th</sup> and May 1<sup>st</sup> and shall be in conformance with the requirements of "Water Pollution Control," of these Special Provisions.

The intent of winterization is as follows:

1. To assure that erosion of earthen materials is prevented to greatest extent practicable.
2. To assure that storm waters are allowed to pass through the site without substantial damage to the project site.

After the acceptance of a winterization plan and the installation of all required temporary winterization measures, work may proceed after October 15th, if approval is obtained in writing from the California Regional Water Quality Control Board and the Engineer. All work done after October 15th must be able to be winterized within 24-hour notice.

**Winter Suspension:** The City may, at its option, suspend work between October 15th and May 1st of the following year. If this occurs, the entire site shall be winterized including areas not yet seeded or planted.

Full compensation for conforming to the provisions of this section, not otherwise provided for in other sections of these Special Provisions, shall be considered as included in the prices paid for the various Contract items of work involved and no additional compensation will be allowed.

#### **4-1.04 PRE-CONSTRUCTION CONFERENCE**

A pre-construction conference will be held at the office of the City Engineer for the purpose of discussing with the Contractor the scope of work, contract drawings, specifications, existing conditions, materials to be ordered, equipment to be used, and all essential matters pertaining to the prosecution and the satisfactory completion of the project as required. The Contractor's representative at this conference shall include all major superintendents for the work and may include major subcontractors. A "Key Personnel and Emergency Phone Numbers" list (for which these key personnel could be contacted 24 hours per day, 7 days a week) shall be submitted to the City. Attendance by the Contractor or the Contractor's authorized representative is mandatory.

Full compensation for conforming to the provisions of this section, not otherwise provided for in other sections of these Special Provisions, shall be considered as included in the prices paid for the various Contract items of work involved and no additional compensation will be allowed.

#### **4-1.05 ARCHAEOLOGICAL FINDS**

All articles of archaeological interest, which may be uncovered by the Contractor during the progress of the work, shall be reported immediately to the Engineer. The further operations of the Contractor, with respect to the find will be decided under the direction of the Engineer.

#### **4-1.06 EXTRA WORK**

Section 4-1.05, "Changes and Extra Work," of the Standard Specifications is amended by adding the following between the second and third paragraphs:

If in the opinion of the Engineer, such work cannot reasonably be performed concurrently with other items of work, and if a controlling item of work is delayed thereby, an adjustment of contract time will be made.

#### **4-1.07 SCOPE OF WORK**

Shall conform to the provisions of Section 4, "Scope of Work," of the Standard Specifications and these Special Provisions.

#### **4-1.08 ELIMINATION OF ITEMS OF WORK**

The Contractor's attention is directed to Section 4-1.05, "Changes and Extra Work," of the Standard Specifications concerning the elimination of items of work, and these Special Provisions.

### **SECTION 5 GENERAL**

#### **SECTION 5-1 MISCELLANEOUS**

#### **THE CONTRACTOR AND ALL SUBCONTRACTORS SHALL COMPLY WITH CALIFORNIA LABOR CODE SECTIONS 1774 AND 1775, AND RELATED CODES.**

#### **5-1.01 LABOR NONDISCRIMINATION**

Attention is directed to the following Notice that is required by Chapter 5 of Division 4 of Title 2, California Code of Regulations.

#### **NOTICE OF REQUIREMENT FOR NONDISCRIMINATION PROGRAM**

**(GOV. CODE, SECTION 12990)**

Your attention is called to the "Nondiscrimination Clause", set forth in Section 7-1.02I(2), "Nondiscrimination," of the Standard Specifications, which is applicable to all nonexempt State contracts and subcontracts, and to the "Standard California Nondiscrimination Construction Contract Specifications" set forth therein. The specifications are applicable to all nonexempt State construction contracts and subcontracts of \$5,000 or more.

**5-1.02 LABOR CODE REQUIREMENTS**

For all new projects awarded on or after April 1, 2015, the contractors and subcontractors must furnish electronic certified payroll records to the Labor Commissioner. After January 1, 2015, the requirement to furnish electronic certified payroll records to the Labor Commissioner will apply to all public works projects, whether new or ongoing.

Attention is directed to the provisions in Section 7-1.02K(5), "Working Hours" and Section 7-1.02K(3), "Certified Payroll Records" of the Standard Specifications.

**5-1.03 PREVAILING WAGE**

Attention is directed to the provisions in Section 7-1.02K(2), "Wages" of the Standard Specifications.

The general prevailing wage rates and any applicable changes to these wage rates determined by the Director of Industrial Relations for Nevada County, may be examined at the City of Grass Valley Engineering Division Office and are available from the California Department of Industrial Relations' Internet web site at <http://www.dir.ca.gov/DLSR/PWD>. These wage rates are not included in the Proposal and Construction Contract for the project. Changes, if any, to the general prevailing wage rates will be available at the same location.

The general prevailing wage rates and any applicable changes to these wage rates determined by the United States Department of Labor, Branch of Construction Wage Determinations, for Nevada County, are available at the City of Grass Valley Engineering Division Office located at 125 East Main Street, Grass Valley, CA 95945 [telephone (530) 274-4373]. Changes, if any, to the general prevailing wage rates will be available at the same location. General prevailing wage rates area also available on the California Department of Transportation website: <http://www.dot.ca.gov/hq/esc/oe/federal-wages/>.

The Contractor and any subcontractor shall pay each worker that is employed for any public work done under contract, not less than the higher of the prevailing wage rates as determined by the California Director of Industrial Relations and the United States Department of Labor, Branch of Construction Wage Determinations.

**5-1.04 BUY AMERICA**

Attention is directed to the "Buy America" requirements of the Title 23 United States Code, Section 313 and the regulations adopted pursuant thereto. In accordance with said law and regulations, all manufacturing processes for steel and iron materials furnished for incorporation into the work on this project shall occur in the United States; with the exception that pig iron and processed, pelletized and reduced iron ore manufactured outside of the United States may be used in the domestic manufacturing process for such steel and iron materials. The application of coatings, such as epoxy coating, galvanizing, painting, and any other coating that protects or enhances the value of such steel or iron materials shall be considered a manufacturing process subject to the "Buy America" requirements.

A Certificate of Compliance, conforming to the provisions in "Certificates of Compliance", of the Standard Specifications, shall be furnished for steel and iron materials. The certificates, in addition to certifying that the materials comply with the specifications, shall also specifically certify that all manufacturing processes for the materials occurred in the United States, except for the exceptions allowed herein. The requirements imposed by said law and regulations do not prevent a minimal use of foreign steel and iron materials if the total combined cost of such materials used does not exceed one-tenth of one percent (0.1%) of the total contract cost or \$2,500, whichever is greater. The Contractor shall furnish the Engineer acceptable documentation of the quantity and value of any foreign steel and iron prior to incorporating such materials into the work.

**5-1.05 SUBCONTRACTING**

Attention is directed to the provisions in Section 5-1.13, "Subcontracting," of the Standard Specifications and these Special Provisions.

All subcontractors doing work shall possess an appropriate valid California Contractor's License for the type of work the subcontractor will perform at the time of the bid submittal and the license shall remain in effect throughout the duration of employment on the job.

All applicable license designations and numbers for Subcontractors doing work in excess one-half or one percent of the total bid or \$10,000.00, whichever is greater, shall be included on the LIST OF SUBCONTRACTORS within the Proposal.

No subcontract releases the Contractor from the contract or relieves the Contractor of their responsibility for a subcontractor's work.

If the Contractor violates Pub Cont Code § 4100 et seq., the City of Grass Valley may exercise the remedies provided under Pub Cont Code § 4110. The City of Grass Valley may refer the violation to the Contractors State License Board as provided under Pub Cont Code § 4111.

The Contractor shall perform work equaling at least 30 percent of the value of the original total bid with the Contractor's own employees and equipment, owned or rented, with or without operators.

Each subcontract must comply with the contract.

Submit copies of subcontracts upon request by the Engineer.

Before subcontracted work starts, submit a Subcontracting Request form.

Pursuant to the provisions in Section 1777.1 of the Labor Code, the Labor Commissioner publishes and distributes a list of contractor's ineligible to perform work as a subcontractor on a public works project. This list of debarred contractors is available from the Department of Industrial Relations web site at: <http://www.dir.ca.gov/DLSE/Debar.html>

Upon request by the Engineer, immediately remove and not again use a subcontractor who fails to prosecute the work satisfactorily.

Each subcontract and any lower-tier subcontract that may in turn be made shall include the "Required Contract Provisions Federal-Aid Construction Contracts" in Section 14 of these special provisions. Noncompliance shall be corrected. Payment for subcontracted work involved will be withheld from progress payments due or to become due, until correction is made. Failure to comply may result in termination of the contract.

#### **5-1.06 PROMPT PROGRESS PAYMENT TO SUBCONTRACTORS**

Attention is directed to the provisions in Sections 10262 and 10262.5 of the Public Contract Code concerning prompt payment to subcontractors. A prime contractor or subcontractor shall pay any subcontractor not later than 10 days of receipt of each progress payment in accordance with the provision in Section 7108.5 of the California Business and Professions Code concerning prompt payment to subcontractors. The 10 days is applicable unless a longer period is agreed to in writing. Any delay or postponement of payment over 30 days may take place only for good cause and with the agency's prior written approval. Any violation of Section 7108.5 shall subject the violating contractor or subcontractor to the penalties, sanctions, and other remedies of that section. This requirement shall not be construed to limit or impair any contractual, administrative, or judicial remedies otherwise available to the contractor or subcontractor in the event of a dispute involving late payment or nonpayment by the prime contractor, deficient subcontract performance, or noncompliance by a subcontractor.

#### **5-1.07 PROMPT PAYMENT OF WITHHELD FUNDS TO SUBCONTRACTORS**

No retainage will be held by the agency from progress payments due the prime contractor. Any retainage kept by the prime contractor or by a subcontractor must be paid in full to the earning subcontractor in 30 days after the subcontractor's work is satisfactorily completed. Any delay or postponement of payment may take place only for good cause and with the agency's prior written approval. Any violation of these provisions shall subject the violating contractor or subcontractor to the penalties, sanctions, and remedies specified in Section 7108.5 of the California Business and Professions Code. This requirement shall not be construed to limit or impair any contractual, administrative, or judicial remedies, otherwise available to the contractor or subcontractor in the event of a dispute involving late payment or nonpayment by the contractor, deficient subcontractor performance.

#### **5-1.08 PAYMENTS**

Attention is directed to Sections 9-1.16, "Progress Payments," and 9-1.17, "Payment After Contract Acceptance," of the Standard Specifications and these Special Provisions.

#### **5-1.09 INTEREST ON PAYMENTS**

Interest shall be payable on progress payments, payments after acceptance, final payments, extra work payments, and claim payments shall be in accordance with Section 9-1.03, "Payment Scope," of the Standard Specifications, the Standard Specifications, and these Special Provisions.

The rate of interest payable on any award in arbitration shall be 6 percent per annum if allowed under the provisions of Civil Code Section 3289.

#### **5-1.10 WITHHOLDS**

Payment of withheld funds shall conform to Section 9-1.16E, "Withholds," of the Standard Specifications and these Special Provisions.

Funds withheld from progress payments to ensure performance of the contract that are eligible for payment into escrow or to an escrow agent pursuant to Section 10263 of the California Public Contract Code do not include funds withheld or deducted from payment due to failure of the Contractor to fulfill a contract requirement.



### **5-1.11 PLANS AND WORKING DRAWINGS**

When the specifications require working drawings to be submitted to the Division of Structure Design, the drawings shall be submitted to the Engineer, unless otherwise specifically noted.

### **5-1.12 EXAMINATION OF PLANS, SPECIFICATIONS, CONTRACT, AND SITE OF WORK**

The third through seventh paragraph of Section 2-1.06B, "Supplemental Project Information," of the Standard Specifications is amended to read:

Where the Department has made investigations of site conditions, including subsurface conditions in areas where work is to be performed under the contract, or in other areas, some of which may constitute possible local material sources, bidders or Contractors may, upon written request, inspect the records of the Department as to those investigations subject to and upon the conditions hereinafter set forth.

Attention is directed to "Differing Site Conditions" of these Special Provisions regarding physical conditions at the site which may differ from those indicated in the Contract Documents.

### **5-1.13 DIFFERING SITE CONDITIONS**

Attention is directed to Section 4-1.06, "Differing Site Conditions," of the Standard Specifications.

During the progress of the work, if subsurface or latent conditions are encountered at the site differing materially from those indicated in the Contract Documents or an examination of the conditions above ground at the site, the party discovering those conditions shall promptly notify the other party in writing of the specific differing conditions before they are disturbed and before the affected work is performed.

The Contractor will be allowed 15 days from the notification of the Engineer's determination of whether or not an adjustment of the contract is warranted, in which to file a notice of potential claim in conformance with the provisions of Section 9-1.17D, "Final Payment and Claims," of the Standard Specifications and as specified herein; otherwise the decision of the Engineer shall be deemed to have been accepted by the Contractor as correct. The notice of potential claim shall set forth in what respects the Contractor's position differs from the Engineer's determination and provide any additional information obtained by the Contractor, including but not limited to additional geotechnical data. The notice of potential claim shall be accompanied by the Contractor's certification that the following were made in preparation of the bid: a review of the contract, Contract Documents to the extent they were made available to bidders prior to the opening of bids, and an examination of the conditions above ground at the site. Supplementary information, obtained by the Contractor subsequent to the filing of the notice of potential claim, shall be submitted to the Engineer in an expeditious manner.

### **5-1.14 VALUE ENGINEERING**

Attention is directed to Section 4-1.07, "Value Engineering," of the Standard Specifications.

Prior to preparing a written value engineering change proposal, the Contractor shall request a meeting with the Engineer to discuss the proposal in concept. Items of discussion will also include permit issues, impact on other projects, impact on the project schedule, peer reviews, overall merit of the proposal, and review times required by the City.

If a value engineering change proposal submitted by the Contractor, and subsequently approved by the Engineer, provides for a reduction in contract time, 50 percent of that contract time reduction shall be credited to the City by reducing the contract working days, not including plant establishment. Attention is directed to "Beginning of Work, Time of Completion and Liquidated Damages" of these Special Provisions regarding the working days.

If a value engineering change proposal submitted by the Contractor, and subsequently approved by the Engineer, provides for a reduction in traffic congestion or avoids traffic congestion during construction, 60 percent of the estimated net savings in construction costs attributable to the cost reduction proposal will be paid to the Contractor. In addition to the requirements in Section 4-1.07, "Value Engineering," of the Standard Specifications, the Contractor shall provide detailed comparisons of the traffic handling between the existing contract and the proposed change and estimates of the traffic volumes and congestion.

### **5-1.15 PUBLIC SAFETY**

The Contractor shall provide for the safety of traffic and the public in conformance with the provisions in Section 7-1.04, "Public Safety," of the Standard Specifications and these Special Provisions.

The Contractor shall install temporary railing (Type K) between a lane open to public traffic and an excavation, obstacle, or storage area when the following conditions exist:

- A. Excavations – The near edge of the excavation is 12 feet or less from the edge of the lane, except:

1. Excavations covered with sheet steel or concrete covers of adequate thickness to prevent accidental entry by traffic or the public.
  2. Excavations less than one foot deep.
  3. Trenches less than one foot wide for irrigation pipe or electrical conduit, or excavations less than one foot in diameter.
  4. Excavations parallel to the lane for the purpose of pavement widening or reconstruction.
  5. Excavations in side slopes, where the slope is steeper than 4:1 (horizontal: vertical).
  6. Excavations protected by existing barrier or railing.
- B. Temporarily Unprotected Permanent Obstacles – The work includes the installation of a fixed obstacle together with a protective system, such as a sign structure together with protective railing, and the Contractor elects to install the obstacle prior to installing the protective system; or the Contractor, for the Contractor's convenience and with permission of the Engineer, removes a portion of an existing protective railing at an obstacle and does not replace such railing complete in place during the same day.
- C. Storage Areas – Material or equipment is stored within 12 feet of the lane and the storage is not otherwise prohibited by the provisions of the Standard Specifications and these Special Provisions.

The approach end of temporary railing (Type K), installed in conformance with the provisions in this section "Public Safety" and in Section 7-1.04, "Public Safety," of the Standard Specifications, shall be offset a minimum of 15 feet from the edge of the traffic lane open to public traffic. The temporary railing shall be installed on a skew toward the edge of the traffic lane of not more than one foot transversely to 10 feet longitudinally with respect to the edge of the traffic lane. If the 15-foot minimum offset cannot be achieved, the temporary railing shall be installed on the 10 to 1 skew to obtain the maximum available offset between the approach end of the railing and the edge of the traffic lane, and an array of temporary crash cushion modules shall be installed at the approach end of the temporary railing.

Reflectors on temporary railing (Type K) shall conform to the provisions in "Pre-qualified and Tested Signing and Delineation Materials," of these Special Provisions.

Temporary crash cushion modules shall conform to the provisions in "Temporary Crash Cushion Module" of these Special Provisions.

Except for installing, maintaining, and removing traffic control devices, whenever work is performed or equipment is operated in the following work areas, the Contractor shall close the adjacent traffic lane unless otherwise provided in the Standard Specifications and these Special Provisions:

Approach Speed of Public Traffic (Posted Limit) (Miles Per Hour)	Work Areas
Over 45	Within 6 feet of a traffic lane but not on a traffic lane
35 to 45	Within 3 feet of a traffic lane but not on a traffic lane

The lane closure provisions of this section shall not apply if the work area is protected by permanent or temporary railing or barrier.

When traffic cones or delineators are used to delineate a temporary edge of a traffic lane, the line of cones or delineators shall be considered to be the edge of the traffic lane, however, the Contractor shall not reduce the width of an existing lane to less than 10 feet without written approval from the Engineer.

When work is not in progress on a trench or other excavation that required closure of an adjacent lane, the traffic cones or portable delineators used for the lane closure shall be placed off of and adjacent to the edge of the traveled way. The spacing of the cones or delineators shall be not more than the spacing used for the lane closure.

Suspended loads or equipment shall not be moved nor positioned over public traffic or pedestrian facilities.

**Special Requirements:**

The Contractor attention is directed to "Notification and Scheduling," of these Special Provisions. The Contractor shall notify the Police Department, Fire Departments, Ambulance Service, Schools, CHP, Caltrans, and the Engineer forty-eight (48) hours prior to any lane closure. Notification may be in conjunction with the scheduling requirements of the "Scheduling" portion of the Standard Specifications and these Special Provisions. The Contractor shall coordinate traffic control with the Sheriff's Department with respect to any special events that may be affected by construction activities. Particular attention shall be given to the construction of adequate facilities on any street to permit the passing of emergency vehicles.

Full compensation for conforming to the provisions in this section "Public Safety," including furnishing and installing temporary railing (Type K) and temporary crash cushion modules, shall be considered as included in the contract prices paid for the various items of work involved and no additional compensation will be allowed.

#### **5-1.16 TESTING**

Testing of materials and work shall conform to the provisions in "Quality Assurance," of the Standard Specifications and these Special Provisions.

Whenever the provisions of "Quality Assurance" of the Standard Specifications refer to tests or testing, it shall mean tests to assure the quality and to determine the acceptability of the materials and work.

The Engineer will refer to the "Quality Assurance Program" for acceptance testing requirements as appropriate for the project's size and scope. Minor quantities of materials from a known, reliable source may be accepted without testing if: a visual inspection of the material is performed, and the supplier certifies that the material complies with specification requirements.

For construction materials that have been accepted by a Certificate of Compliance, job site inspection of materials tags and delivery notices shall be performed to verify acceptability of the supplied materials. As directed by the Engineer, further acceptance sampling and testing may be performed at the locations and frequencies as given in the "Quality Assurance Program"

The Engineer will deduct the costs for testing of materials and work found to be unacceptable, as determined by the tests performed by the Department, and the costs for testing of material sources identified by the Contractor which are not used for the work, from moneys due or to become due to the Contractor. The amount deducted will be determined by the Engineer.

#### **5-1.17 RESPONSIBILITY TO OTHER ENTITIES**

The Contractor shall be responsible for any liability imposed by law and for injuries to or death of any person including, but not limited to, workers and the public or damage to property, and shall indemnify and save harmless any county, city or district, its officers and employees connected with the work, within the limits of which county, city or district the work is being performed, all in the same manner and to the same extent conforming to the provisions in Section 7-1.05, "Indemnification," and Section 7-1.06, "Insurance," of the Standard Specifications, for the protection of the State of California and all officers and employees thereof connected with the work.

#### **5-1.18 AREAS FOR CONTRACTOR'S USE**

Attention is directed to the provisions in Section 5-1.32, "Areas for Use," of the Standard Specifications and these Special Provisions.

The project area (contract limits) shall be used only for purposes that are necessary to perform the required work. The Contractor shall not occupy the right of way, or allow others to occupy the right of way, for purposes which are not necessary to perform the required work.

No area is available for the exclusive use of the Contractor within the contract limits. The Contractor shall secure, at the Contractor's own expense, areas required for plant sites, storage of equipment or materials, or for other purposes.

Residence trailers will not be allowed within the project site.

The Contractor shall remove equipment, materials, and rubbish from the work areas and other City-owned property which the Contractor occupies. The Contractor shall leave the areas in a presentable condition in conformance with the provisions in "Cleanup," of the Standard Specifications.

The Contractor shall secure, at the Contractor's own expense, areas required for plant sites, storage of equipment or materials or for other purposes, if sufficient area is not available to the Contractor within the contract limits, or at the sites designated on the plans outside the contract limits.

The Contractor shall take all necessary precautions to protect the staging area from chemical contamination due to oil or fuel spills or any other contaminants. If contamination occurs, the site shall be decontaminated to the satisfaction of the Engineer prior to further improvement to the contaminated area or to further construction activities in general, whichever is applicable as determined by the Engineer. Methods of decontamination shall include any method deemed appropriate by the Engineer including removal and disposition of the contaminated soils in conformance with CEQA and regulatory agency requirements.

Full compensation for conforming to the provisions of this section, including furnishing all labor, materials, grading, tools, equipment and incidentals, and for doing all work associated with this section shall be considered as included in the prices paid for the various Contract items of work involved and no additional compensation will be allowed.

#### **5-1.19 SOUND CONTROL REQUIREMENTS**

The noise level from the Contractor's operations, between the hours of 7:00 p.m. and 7:00 a.m., shall not exceed 86 dBA at a distance of 50 feet, unless night work is otherwise permitted by the City Engineer. This requirement shall not relieve the Contractor from responsibility for complying with local ordinances regulating noise level.

All equipment shall have sound-control devices no less effective than those provided on the original equipment. No equipment shall have an unmuffled exhaust. As directed by the Engineer, the Contractor shall implement the appropriate additional noise mitigation measures including, but not limited to, shutting off idling equipment, or additional notifications of adjacent residents than already specified in these Special Provisions.

The noise level requirement shall apply to the equipment on the job or related to the job, including but not limited to trucks, transit mixers or transient equipment that may or may not be owned by the Contractor. The use of loud sound signals shall be avoided in favor of light warnings except those required by safety laws for the protection of personnel.

Full compensation for conforming to the requirements of this section shall be considered as included in the prices paid for the various contract items of work involved and no additional compensation will be allowed.

#### **5-1.20 PROJECT APPEARANCE**

The Contractor shall maintain a neat appearance to the work and shall cleanup all tracked material and debris on a daily basis.

In areas visible to the public, the following shall apply:

- A. Broken concrete and debris developed during clearing and grubbing shall be disposed of concurrently with its removal. If stockpiling is necessary, the material shall be removed or disposed of weekly.
- B. Mud, dirt, soil, and any debris resulted in trail from equipment and construction will be cleaned and cleared from the roadway and away from traffic daily.
- C. The Contractor shall furnish trash bins for all debris from construction. All debris shall be placed in trash bins daily. Forms or falsework that are to be reused shall be stacked neatly concurrently with their removal. Forms and falsework that are not to be reused are to be disposed of concurrently with their removal.

Full compensation for conforming to the provisions in this section, not otherwise provided for, shall be considered as included in the prices paid for the various contract items of work involved and no additional compensation will be allowed.

#### **5-1.21 RECORDS**

The Contractor shall maintain cost accounting records for the contract pertaining to, and in such a manner as to provide a clear distinction between, the following six categories of costs of work during the life of the contract:

- A. Direct costs of contract item work.
- B. Direct costs of changes in character in conformance with Section 4-1.05B, "Work-Character Changes," of the Standard Specifications.
- C. Direct costs of extra work in conformance with Section 4-1.05, "Changes and Extra Work," of the Standard Specifications.
- D. Direct costs of work not required by the contract and performed for others.
- E. Direct costs of work performed under a notice of potential claim in conformance with the provisions in Section 9-1.17D(2), "Claim Statement," of the Standard Specifications.
- F. Indirect costs of overhead.

Cost accounting records shall include the information specified for extra work in Section 4-1.05, "Changes and Extra Work," of the Standard Specifications. The requirements for furnishing the Engineer completed daily extra work reports shall only apply to work paid for on a force account basis.

The cost accounting records for the contract shall be maintained separately from other contracts, during the life of the contract, and for a period of not less than 3 years after the date of acceptance of the contract. If the Contractor intends to file claims against the Department, the Contractor shall keep the cost accounting records specified above until complete resolution of all claims has been reached.

#### **5-1.22 RELATIONS WITH CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD**

The location of the project is within an area controlled by the Regional Water Quality Control Board. The Contractor shall be fully informed of rules, regulations, and conditions that may govern the Contractor's operations in the areas and shall conduct the work accordingly.

Copies of the order may be obtained at the City of Grass Valley Engineering Division Office located at 125 East Main Street, Grass Valley, CA 95945 [telephone (530) 274-4373].

Attention is directed to Section 5-1.36, "Property and Facility Preservation," and Section 7-1.05, "Indemnification," and Section 7-1.06, "Insurance," of the Standard Specifications.

### 5-1.23 CONTRACTOR'S LICENSING LAWS

Attention is directed to the requirements specified in Section 3-1.06, "Contractor License", of the Standard Specifications. The Contractor shall possess a valid California Class "A" Contractor's License, or a combination of the following classes: C-5 - Framing and Rough Carpentry Contractor, C-8 - Concrete Contractor, C10 - Electrical Contractor, C12 - Earthwork and Paving Contractors, C13 - Fencing Contractor, C21 - Building Moving/Demolition Contractor, C27 - Landscaping Contractor, C29 - Masonry Contractor, C33 - Painting and Decorating Contractor, C36 - Plumbing Contractor, C39 - Roofing Contractor, C50 - Reinforcing Steel Contractor, C53 - Swimming Pool Contractor, D-63 Construction Cleanup Contractor, and all other classes required by the categories and types of work included in the contract at the time of the bid award. All licenses shall remain in effect throughout the term of the contract.

### 5-1.24 ARBITRATION

Section 9-1.22, "Arbitration," of the Standard Specifications is amended in its entirety to read as follows:

#### Section 9-1.22, "Dispute Resolution"

9-1.22 All claims filed with the City must be in writing and include the documents necessary to substantiate the claim. Claims must be filed within the time limits set forth in this contract. In no circumstances, however, may a claim be filed after the day of final payment. Nothing in this subsection is intended to extend the time limit or supersede notice requirements for the filing of claims as set forth elsewhere in this contract.

#### 1) Claims of \$50,000.00 or Less

- (a) The City will respond in writing to all written claims less than or equal to fifty thousand dollars (\$50,000.00) within forty-five (45) days of receipt of the claim. Within thirty (30) days of receipt of the claim, the City may request any additional documentation supporting the claim or relating to defenses or claims the City may have against the claimant.
- (b) If additional information is thereafter required, it shall be requested and provided pursuant to this subsection, upon mutual agreement of the City and the claimant.
- (c) The City's written response to the claim, as further documented, shall be submitted to the claimant within fifteen (15) days after receipt of the further documentation or within a period of time no greater than that taken by the claimant in producing the additional information, whichever is greater.

#### 2) Claims Between \$50,000.01 and \$375,000.00

- (a) The City will respond in writing to all written claims between fifty thousand dollars and one cent (\$50,000.01) and less than or equal to three hundred seventy-five thousand dollars (\$375,000.00), within sixty (60) days of receipt of the claim. Within thirty (30) days of receipt of the claim, the City may request, in writing, any additional documentation supporting the claim or relating to defense to the claim the City may have against the claimant.
- (b) If additional information is thereafter required, it shall be requested and provided pursuant to this Subdivision, upon mutual agreement of the City and the claimant.
- (c) The City's written response to the claim, as further documented, shall be submitted to the claimant within thirty (30) days after receipt of the further documentation or within a period of time no greater than that taken by the claimant in producing the additional information or requested documents, whichever is greater.

#### 3) Claims in Excess of \$375,000.00 The City shall, within a reasonable time after the presentation of any claim in excess of \$375,000.00, make a decision in writing on such claim.

#### 4) Meet and Confer Conference

- (a) If the claimant disputes the City's written response, or the City fails to respond within the time prescribed, the claimant may so notify the City, in writing, either within fifteen (15) days of receipt of the City's response or within fifteen (15) days of the City's failure to respond within the time prescribed, respectively,

and demand an informal conference to meet and confer for settlement of the issues in dispute. Upon a demand, the City shall schedule a meet and confer conference within thirty (30) days for settlement of the dispute.

- (b) If, following the meet and confer conference, the claim or any portion thereof remains in dispute, the claimant may file a claim pursuant to Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.6 of Title 1 of the California Government Code. For the purposes of those provisions, the running of the period of time within which a claim must be filed shall be tolled from the time the claimant submits his or her written claim pursuant to this Section until the time that claim is denied as a result of the meet and confer process, including any period of time utilized by the meet and confer process.

- 5) Contractor's Duty During Claim Resolution: The Contractor shall proceed with the Work in accordance with the plans and specifications and determinations and instructions of the City Engineer during the resolution of any claims disputes.
- 6) Certification. The Contractor shall certify in writing, at the time of submission of any claim, as follows:

I certify under penalty of perjury under the laws of the State of California, that the claim is made in good faith, that the supporting data are accurate and complete, and that the amount requested accurately reflects the monies due for work performed under the Contract for which the City of Grass Valley is liable.

By: \_\_\_\_\_  
(Contractor's signature)

- 7) City Remedies. In the event the Contractor refuses or neglects to make good any loss or damage for which the Contractor is responsible under this Contract, the City may itself, or by the employment of others, make good any such loss or damage, and the cost and expense of doing so, including any reasonable engineering, legal and other consultant fees, and any costs of administrative and managerial services, shall be charged to the Contractor. Such costs and expenses may be deducted by the City from claims for payment made by the Contractor for work completed or remaining to be completed.
- 8) Assignment. In entering into a public works contract or a subcontract to supply goods, services, or materials pursuant to this contract, the Contractor and all subcontractors shall offer and agree to assign to the City all rights, title, and interest in and to all causes of action it may have under section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2 [commencing with Section 16700] of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, services or materials pursuant to the public works contract or subcontract. This assignment shall be made and become effective at the time the City tenders final payment to the Contractor, without further acknowledgment by the parties.
- 9) Contractor Waiver and Limitation. The Contractor agrees that it can be adequately compensated by money damages for any breach of this Contract which may be committed by the City and hereby agrees that no default, act, or omission of the City or the Engineer, shall constitute a material breach of the Contract entitling the Contractor to cancel or rescind the provisions of this Contract or (unless the City shall so consent or direct in writing) to suspend or abandon performance of all or any part of the work. The Contractor hereby waives any and all rights and remedies to which it might otherwise be or become entitled, save only its right to money damages.
- 10) Venue. Any litigation arising out of this Contract shall be brought in the Superior Court of Nevada County, and the Contractor hereby waives the removal provisions of Code of Civil Procedure Section 394.

#### **5-1.25 NOTICE OF POTENTIAL CLAIM**

Attention is directed to the requirements specified in Section 5-1.43, "Potential Claims And Dispute Resolution," of the Standard Specifications.

#### **5-1.26 FINAL PAYMENT AND CLAIMS**

Attention is directed to Section 9-1.17D, "Final Payment and Claims," of the Standard Specifications.

If the Contractor files a timely written statement of claims in response to the proposed final estimate, the City will submit a claim position letter to the Contractor by hand delivery or deposit in the U.S. mail. The claim position letter will delineate

the City's position on the Contractor's claims. If the Contractor disagrees with the claim position letter, the Contractor shall submit a written notification of its disagreement to be received by the City not later than 15 days after the Contractor's receipt of the claim position letter. The written notification of disagreement shall set forth the basis for the Contractor's disagreement and be submitted to the office designated in the claim position letter. The Contractor's failure to provide a timely, written notification of disagreement shall constitute the Contractor's acceptance and agreement with the determinations provided in the claim position letter and with final payment pursuant to the claim position letter.

If the Contractor files a timely notification of disagreement with the City claim position letter, the City Engineer or a board of review appointed by the City Engineer shall review claims that remain in dispute and may meet with the Contractor within 45 days after receipt by the City of the notification of disagreement. Attendance by the Contractor at the City meeting concerning the notification of disagreement shall be mandatory.

If the City fails to submit a claim position letter to the Contractor within 135 days after the acceptance of the contract and the Contractor has claims that remain in dispute, the Contractor may request a meeting with the City Engineer or a board of review appointed by the City Engineer to review claims that remain in dispute. The Contractor's request for a meeting shall identify the claims that remain in dispute. If the Contractor files a request for a meeting, the City Engineer or a board of review appointed by the City Engineer will meet with the Contractor within 45 days after the City receives the request for the meeting. Attendance by the Contractor at this review meeting shall be mandatory.

Failure of the Contractor to file a timely written statement of claims in response to the proposed final estimate, or to file a timely notification of disagreement with the City's claim position letter, or to attend the City's review meeting shall constitute a failure to pursue diligently and exhaust the administrative remedies in the contract and shall be a bar to future legal proceedings by Contractor.

#### **5-1.27 SURFACE MINING AND RECLAMATION ACT**

Attention is directed to the Surface Mining and Reclamation Act of 1975, commencing in Public Resources Code, Mining and Geology, Section 2710, which establishes regulations pertinent to surface mining operations, and to California Public Contract Code Section 10295.5.

Material from mining operations furnished for this project shall only come from permitted sites in compliance with California Public Contract Code Section 10295.5.

#### **5-1.28 REMOVAL OF ASBESTOS AND HAZARDOUS SUBSTANCES**

When the presence of asbestos or hazardous substances are not shown on the plans or indicated in the specifications and the Contractor encounters materials which the Contractor reasonably believes to be asbestos or a hazardous substance as defined in Section 25914.1 of the Health and Safety Code, and the asbestos or hazardous substance has not been rendered harmless, the Contractor may continue work in unaffected areas reasonably believed to be safe. The Contractor shall immediately cease work in the affected area and report the condition to the Engineer in writing.

In conformance with Section 25914.1 of the Health and Safety Code, removal of asbestos or hazardous substances including exploratory work to identify and determine the extent of the asbestos or hazardous substance will be performed by separate contract.

If delay of work in the area delays the current controlling operation, the delay will be considered a right of way delay and the Contractor will be compensated for the delay in conformance with the provisions in Section 8-1.07, "Delays," of the Standard Specifications.

#### **5-1.29 EXCAVATION SAFETY PLANS**

The Contractor's attention is directed to requirements of "Earthwork," of the Special Provisions concerning Temporary Shoring Plan and Section 7-1.02K(6)(b), "Excavation Safety," of the Standard Specifications.

The Contractor shall submit a Temporary Shoring Safety System Plan to the Engineer in accordance with "Earthwork," of these Special Provisions. The Contractor's attention is directed to the requirements specified in Section "Earthwork," of these Special Provisions.

Full compensation for conforming to the provisions of this section, not otherwise provided for in other sections of these Special Provisions, shall be considered as included in the prices paid for the various Contract items of work involved and no additional compensation will be allowed.

#### **5-1.30 AIR POLLUTION CONTROL**

Air pollution control shall conform to the provisions of Section 14-9, "Air Quality," of the Standard Specifications and these Special Provisions.

No burning of materials to be disposed of will be permitted for this project.

Full compensation for conforming to the provisions of this section including, but not limited to, obtaining permits and performing work in accordance with any permit requirements, not otherwise provided for, shall be considered as included in the prices paid for the various Contract items of work involved and no additional compensation will be allowed.

### 5-1.31 PERMITS

Attention is directed to the provisions in Sections 5-1.20B, "Permits, Licenses, Agreements, and Certifications," of the Standard Specifications and these Special Provisions.

Full compensation for conforming to the provisions in this Section and to the requirements in the permit, not otherwise provided for in other sections of these Special Provisions, shall be considered as included in the prices paid for the various Contract items of work involved and no additional compensation will be allowed.

### 5-1.32 INSURANCE

Throughout the period of this agreement, the CONTRACTOR shall provide the following minimum insurance coverage as listed below. CONTRACTOR shall file with CITY certificate(s) of Insurance and endorsements, in a form acceptable to CITY, and consistent with this agreement at the time of execution of this agreement. The insurance company must be acceptable to CITY, with a Best's Rating of no less than A:VII. Documentation of such rating acceptable to the CITY shall be provided at the same time Insurance Certificates are submitted.

Any deductibles must be declared to, and approved by, the City.

In the event any of the required policies are canceled prior to the completion of the project and the CONTRACTOR does not furnish a new certificate(s) of insurance prior to cancellation, the CITY may obtain the required insurance and deduct the premium(s) from Contract monies due the CONTRACTOR.

#### 5-1.32.1 WORKER'S COMPENSATION AND EMPLOYERS LIABILITY INSURANCE

The CONTRACTOR shall maintain adequate Workers' Compensation Insurance under the Laws of the State of California. CONTRACTOR shall fully comply with the provisions of Section 3700 of the Labor Code, which requires every employer to be insured against liability for Workers' Compensation or to undertake self insurance in accordance with the provisions of that Code, before commencing the performance of the work. CONTRACTOR shall require all subcontractors to maintain adequate Workers' Compensation Insurance. Certificates of such Workers' Compensation shall be filed forthwith with the CITY upon demand.

By CONTRACTOR'S signature hereunder, CONTRACTOR certifies that he/she is aware of the provisions of Section 3700 of the California Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that Code, and he/she will comply with such provisions before commencing the performance of this Contract. If such insurance is underwritten by any agency other than State Compensation Fund, such agency shall be a company authorized to do business in the State of California.

Worker's Compensation Insurance shall be provided as required by any applicable law or regulation. Employer's liability insurance shall be provided in amounts not less than the following:

One Million dollars (\$1,000,000) each accident for bodily injury by accident

One Million dollars (\$1,000,000) policy limit for bodily injury by disease

One Million dollars (\$1,000,000) each employee for bodily injury by disease

If there is an exposure of injury to CONTRACTOR'S employees under the U.S. Longshoremen's and Harbor Worker's Compensation Act, the Jones Act, or under laws, regulations, or statutes applicable to maritime employees, coverage shall be included for such injuries or claims.

Each Worker's Compensation policy shall be endorsed with the following specific language:

**Cancellation Notice:** "This policy shall not be canceled or materially changed without first giving thirty (30) days prior written notice to the City of Grass Valley."

**Waiver of Subrogation:** "The Insurance Company agrees to waive all rights of subrogation against the City of Grass Valley, its elected or appointed officials, agents, employees and volunteers for losses paid under the terms of this policy which arise from the work performed by the Named Insured for the City of Grass Valley."

#### 5-1.32.2 GENERAL LIABILITY INSURANCE

Commercial General Liability insurance covering all operations by or on behalf of CONTRACTOR, providing insurance for bodily injury liability and property damage liability for the limits of liability indicated below and including coverage for: premises; operations; products and completed operations; contractual liability insuring the obligations assumed by CONTRACTOR in this Agreement; broad form property damage (including completed operations); explosion, collapse, and underground hazards; personal injury liability.

Except with respect to bodily injury and property damage included within the products and completed operations hazards, the aggregate limits, where applicable, shall apply separately to CONTRACTOR'S work under the Contract.

One of the following forms is required: Commercial General Liability (Occurrence); or Commercial General Liability (Claims Made).



If CONTRACTOR carries a Commercial General Liability (Occurrence) policy:

1. The limits of liability shall not be less than:
  - One Million dollars (\$1,000,000) each occurrence (combined single limit for bodily injury and property damage)
  - One Million dollars (\$1,000,000) Personal Injury Liability
  - Two Million dollars (\$2,000,000) Products-Completed Operations
  - Two Million dollars (\$2,000,000) General Aggregate
2. If the policy does not have an endorsement providing that the General Aggregate Limit applies separately, or if defense costs are included in the aggregate limits, then the required aggregate limits shall be Two Million dollars (\$2,000,000).

### **5-1.32.3 CONFORMITY OF COVERAGES**

If more than one policy is used to meet the required coverages, such as a separate umbrella policy, such policies shall be consistent with all other applicable policies used to meet these minimum requirements. For example, all policies shall be Occurrence Liability policies, or all shall be Claims Made Liability policies if approved by the CITY as noted above. In no case shall the types of coverages be different.

### **5-1.32.4 ADDITIONAL REQUIREMENTS**

**Premium Payments:** The insurance companies shall have no recourse against the CITY and funding agencies, its officers, and employees or any of them for payment of any premiums or assessments under any policy issued by a mutual insurance company.

**Policy Deductibles:** The CONTRACTOR shall be responsible for all deductibles in all of CONTRACTOR'S insurance policies. The amount of deductibles for insurance coverage required herein should be reasonable and subject to CITY'S approval.

**CONTRACTOR'S Obligations:** CONTRACTOR'S indemnity and other obligations shall not be limited by the foregoing insurance requirements and shall survive the expiration of this agreement.

**Material Breach:** Failure of the CONTRACTOR to maintain the insurance required by this agreement, or to comply with any of the requirements of this section, shall constitute a material breach of the entire agreement.

**Duration of Coverage:** City must be an additional insured for completed operations for a period of one (1) year after completion of the work.

**Project Reference:** The Certificate of Insurance must reference the project specifically by project title

### **5-1.32.5 ENDORSEMENTS**

Each Commercial General Liability policy shall be endorsed with the following specific language:

**Cancellation Notice:** "This policy shall not be canceled, material reduced, or materially changed without first giving thirty (30) days prior written notice to the City of Grass Valley."

**"Provisions Regarding the Insured's Duties:** Any failure to comply with reporting provisions of the policy or breaches or violations of warranties shall not affect coverage provided to the City of Grass Valley, its elected or appointed officers, officials, employees or volunteers."

"Except as stated above, nothing herein shall be held to waive, alter or extend any of the limits, conditions, agreements or exclusions of the policy to which this endorsement is attached."

"The City of Grass Valley, and additional insureds, and all insureds officers, agents, outside parties hired to inspect and/or design the work, employees, and volunteers are to be covered as insured for all liability arising out of the operations by or on behalf of the named insured in the performance of this Agreement."

The City of Grass Valley's policy of insurance shall be excess and noncontributing. "The insurance provided by the Contractor, including any excess liability or umbrella form coverage, is primary coverage to the City of Grass Valley and additional insureds, with respect to any insurance or self-insurance programs maintained by the City of Grass Valley and additional insureds, and no insurance held or owned by the City of Grass Valley and additional insureds shall be called upon to contribute to a loss."

### **5-1.32.6 AUTOMOBILE LIABILITY INSURANCE**

CONTRACTOR shall provide Automobile Liability insurance covering bodily injury and property damage in an amount no less than One Million dollars (\$1,000,000) combined single limit for each occurrence.

Covered vehicles shall include owned, non-owned, and hired automobiles/trucks.

**Endorsements:** The endorsements listed above for General Liability shall also apply to the Automobile Liability Policy.

### 5-1.33 WARRANTY

Should any failure of the work occur within a period of one year from the acceptance of the project by the Grass Valley City Council due to faulty materials, poor workmanship, or defective equipment, the Contractor shall promptly make the needed repairs at his or her expense in accordance with the Special Provisions and to the satisfaction of the Engineer.

Security for this warranty shall be in the form of the Performance Bond, required elsewhere in these specifications, which shall remain in effect for a period of one (1) year after acceptance of the project by the Grass Valley City Council. The Performance Bond will not be reduced to an amount less than the bid amount of the project prior to the expiration of the one (1) year warranty period.

The City is hereby authorized to make such repairs, or to have such repairs made by others, if the Contractor fails to make such repairs, or to have such repairs made by others, if the Contractor fails to make or undertake with due diligence the aforesaid repairs within ten (10) days after receiving written notice of such failure or within a time specified in the notice if different; provided, however, that in case of an emergency where, in the opinion of the Engineer, that delay would cause serious loss or damages, or a serious hazard to the public, and a reasonable attempt has been made to notify the Contractor, the repairs may be made without prior notice to the Contractor; and the Contractor's sureties shall be liable for the entire cost thereof.

### SECTION 6 (BLANK)

### SECTION 7 (BLANK)

### SECTION 8 MATERIALS

#### SECTION 8-1 MISCELLANEOUS

##### PREQUALIFIED AND TESTED SIGNING AND DELINEATION MATERIALS

The Department maintains the following list of Pre-qualified and Tested Signing and Delineation Materials. The Engineer shall not be precluded from sampling and testing products on the list of Pre-qualified and Tested Signing and Delineation Materials.

The manufacturer of products on the list of Pre-qualified and Tested Signing and Delineation Materials shall furnish the Engineer a Certificate of Compliance in conformance with the provisions in Certificates of Compliance," of the Standard Specifications for each type of traffic product supplied.

For those categories of materials included on the list of Pre-qualified and Tested Signing and Delineation Materials, only those products shown within the listing may be used in the work. Other categories of products, not included on the list of Pre-qualified and Tested Signing and Delineation Materials, may be used in the work provided they conform to the requirements of the Standard Specifications.

Materials and products may be added to the list of Pre-qualified and Tested Signing and Delineation Materials if the manufacturer submits a New Product Information Form to the New Product Coordinator at the Transportation Laboratory. Upon a Departmental request for samples, sufficient samples shall be submitted to permit performance of required tests. Approval of materials or products will depend upon compliance with the specifications and tests the Department may elect to perform.

#### 8-1.02.1 PAVEMENT MARKERS

##### PAVEMENT MARKERS, PERMANENT TYPE

###### Retroreflective With Abrasion Resistant Surface (ARS)

- A. Apex, Model 921AR (4" x 4")
- B. Avery Dennison, Models C88 (4" x 4"), 911 (4" x 4") and 953 (2.75" x 4.5")
- C. Ray-O-Lite, Model "AA" ARS (4" x 4")
- D. 3M Series 290 (3.5" x 4")
- E. 3M Series 290 PSA, with pressure sensitive adhesive pad (3.5" x 4")

###### Retroreflective With Abrasion Resistant Surface (ARS)

(for recessed applications only)

- A. Avery Dennison, Model 948 (2.3" x 4.7")
- B. Avery Dennison, Model 944SB (2" x 4")\*
- C. Ray-O-Lite, Model 2002 (2.3" x 4.6")
- D. Ray-O-Lite, Model 2004 ARS (2" x 4")\*

\*For use only in 4.5 inch wide (older) recessed slots

**Non-Reflective, 4 inches Round**

- A. Apex Universal (Ceramic)
- B. Apex Universal, Models 929 (ABS) and 929PP (Polypropylene)
- C. Glowlite, Inc. (Ceramic)
- D. Hi-Way Safety, Inc., Models P20-2000W and 2001Y (ABS)
- E. Interstate Sales, "Diamond Back" (Polypropylene)
- F. Novabrite Models Cdot (White) Cdot-y (Yellow), Ceramic
- G. Novabrite Models Pdot-w (White) Pdot-y (Yellow), Polypropylene
- H. Three D Traffic Works TD10000 (ABS), TD10500 (Polypropylene)

**PAVEMENT MARKERS, TEMPORARY TYPE**

**Temporary Markers For Long Term Day/Night Use (6 months or less)**

- A. Vega Molded Products "Temporary Road Marker" (3" x 4")

**Temporary Markers For Short Term Day/Night Use (14 days or less)**

(For seal coat or chip seal applications, clear protective covers are required)

- A. Apex Universal, Model 932
- B. Bunzl Extrusion, Models T.O.M., T.R.P.M., and "HH" (High Heat)
- C. Hi-Way Safety, Inc., Model 1280/1281
- D. Glowlite, Inc., Model 932

**STRIPING AND PAVEMENT MARKING MATERIAL**

**Permanent Traffic Striping and Pavement Marking Tape**

- A. Advanced Traffic Marking, Series 300 and 400
- B. Brite-Line, Series 1000
- C. Brite-Line, "DeltaLine XRP"
- D. Swarco Industries, "Director 35" (For transverse application only)
- E. Swarco Industries, "Director 60"
- F. 3M, "Stamark" Series 380 and 5730
- G. 3M, "Stamark" Series 420 (For transverse application only)

**Temporary (Removable) Striping and Pavement Marking Tape (6 months or less)**

- A. Advanced Traffic Marking, Series 200
- B. Brite-Line, Series 100
- C. Garlock Rubber Technologies, Series 2000
- D. P.B. Laminations, Aztec, Grade 102
- E. Swarco Industries, "Director-2"
- F. Trelleborg Industries, R140 Series
- G. 3M, Series 620 "CR", and Series A750
- H. 3M, Series A145, Removable Black Line Mask  
(Black Tape: for use only on Asphalt Concrete Surfaces)
- I. Advanced Traffic Marking Black "Hide-A-Line"  
(Black Tape: for use only on Asphalt Concrete Surfaces)
- J. Brite-Line "BTR" Black Removable Tape  
(Black Tape: for use only on Asphalt Concrete Surfaces)
- K. Trelleborg Industries, RB-140  
(Black Tape: for use only on Asphalt Concrete Surfaces)

**Preformed Thermoplastic (Heated in place)**

- A. Avery Dennison, "Hotape"
- B. Flint Trading, "Premark," "Premark 20/20 Flex," and "Premark 20/20 Flex Plus"
- C. Ennis Paint Inc., "Flametape"

**Ceramic Surfacing Laminate, 6" x 6"**

- A. Highway Ceramics, Inc.

**8-1.02.2 DELINEATORS AND MARKERS**

**CLASS 1 DELINEATORS**

**One Piece Driveable Flexible Type, 66 inches**

- A. Bunzl Extrusion, "Flexi-Guide Models 400 and 566"
- B. Carsonite, Curve-Flex CFRM-400
- C. Carsonite, Roadmarker CRM-375
- D. FlexStake, Model 654 TM
- E. GreenLine Models HWD1-66 and CGD1-66

**Special Use Type, 66 inches**

- A. Bunzl Extrusion, Model FG 560 (with 18 inches U-Channel base)
- B. Carsonite, "Survivor" (with 18 inches U-Channel base)
- C. Carsonite, Roadmarker CRM-375 (with 18 inches U-Channel base)
- D. FlexStake, Model 604
- E. GreenLine Models HWDU and CGD (with 18 inches U-Channel base)
- F. Impact Recovery Model D36, with #105 Driveable Base
- G. Safe-Hit with 8 inches pavement anchor (SH248-GP1)
- H. Safe-Hit with 15 inches soil anchor (SH248-GP2) and with 18 inches soil anchor (SH248-GP3)

**Surface Mount Type, 48 inches**

- A. Bent Manufacturing Company, Masterflex Model MF-180EX-48
- B. Carsonite, "Super Duck II"
- C. FlexStake, Surface Mount, Models 704 and 754 TM
- D. Impact Recovery Model D48, with #101 Fixed (Surface-Mount) Base
- E. Three D Traffic Works "Channelflex" ID No. 522248W

**CHANNELIZERS****Surface Mount Type, 36 inches**

- A. Bent Manufacturing Company, Masterflex Models MF-360-36 (Round) and MF-180-36 (Flat)
- B. Bunzl Extrusion, Flexi-Guide Models FG300PE and FG300UR
- C. Carsonite, "Super Duck" (Flat SDF-436, Round SDR-336)
- D. Carsonite, "Super Duck II" Model SDCF203601MB "The Channelizer"
- E. FlexStake, Surface Mount, Models 703 and 753 TM
- F. GreenLine, Model SMD-36
- G. Hi-Way Safety, Inc. "Channel Guide Channelizer" Model CGC36
- H. Impact Recovery Model D36, with #101 Fixed (Surface-Mount) Base
- I. Repo, Models 300 and 400
- J. Safe-Hit, Guide Post, Model SH236SMA
- K. Three D Traffic Works "Channelflex" ID No. 522053W

**Lane Separation System**

- A. Bunzl "Flexi-Guide (FG) 300 Curb System"
- B. Qwick Kurb, "Klemmfix Guide System"
- C. Recycled Technology, Inc. "Safe-Lane System"

**CONICAL DELINEATORS, 42 inches**

(For 28 inch Traffic Cones, see Standard Specifications)

- A. Bent Manufacturing Company "T-Top"
- B. Plastic Safety Systems "Navigator-42"
- C. Radiator Specialty Company "Enforcer"
- D. Roadmaker Company "Stacker"
- E. Traffix Devices "Grabber"
- F. Three D Traffic Works "Ringtop" TD7000, ID No. 742143

**OBJECT MARKERS****Type "K", 18 inches**

- A. Bunzl, Model FG318PE
- B. Carsonite, Model SMD 615
- C. FlexStake, Model 701 KM
- D. Repo, Models 300 and 400
- E. Safe-Hit, Model SH718SMA

**Type "K-4" / "Q" Object Markers, 24 inches**

- A. Bent Manufacturing "Masterflex" Model MF-360-24
- B. Bunzl Extrusion, Model FG324PE
- C. Carsonite, Super Duck II
- D. FlexStake, Model 701KM
- E. Repo, Models 300 and 400
- F. Safe-Hit, Models SH8 24SMA\_WA and SH8 24GP3\_WA
- G. The Line Connection, Model DP21-4Q
- H. Three D Traffic Works "Q" Marker, ID No. 531702W

**BARRIER MARKERS AND TEMPORARY RAILING REFLECTORS**

**Impactable Type**

- A. ARTUK, "FB"
- B. Bunzl Extrusion, Models PCBM-12 and PCBM-T12
- C. Duraflex Corp., "Flexx 2020" and "Electriflexx"
- D. Hi-Way Safety, Inc., Model GMKRM100
- E. Plastic Safety Systems "BAM" Models OM-BARR and OM-BWAR
- F. Three D Traffic Works "Roadguide" Model TD 9304

**Non-Impactable Type**

- A. ARTUK, JD Series
- B. Plastic Safety Systems "BAM" Models OM-BITARW and OM-BITARA
- C. Vega Molded Products, Models GBM and JD
- D. Plastic Vacuum Forming, "Cap-It C400"

**METAL BEAM GUARD RAIL POST MARKERS**

(For use to the left of traffic)

- A. Bunzl Extrusion, "Mini" (3" x 10")
- B. Creative Building Products, "Dura-Bull, Model 11201"
- C. Duraflex Corp., "Railrider"
- D. Plastic Vacuum Forming, "Cap-It C300"

**CONCRETE BARRIER DELINEATORS, 16 inches**

(For use to the right of traffic)

- A. Bunzl Extrusion, Model PCBM T-16
- B. Safe-Hit, Model SH216RBM

**CONCRETE BARRIER-MOUNTED MINI-DRUM (10 inches x 14 inches x 22 inches)**

- A. Stinson Equipment Company "SaddleMarker"

**SOUND WALL DELINEATOR**

(Applied vertically. Place top of 3" x 12" reflective element at 48 inches above roadway)

- A. Bunzl Extrusion, PCBM S-36

**GUARD RAILING DELINEATOR**

(Place top of reflective element at 48 inches above plane of roadway)

**Wood Post Type, 27 inches**

- A. Bunzl Extrusion, FG 427 and FG 527
- B. Carsonite, Model 427
- C. FlexStake, Model 102 GR
- D. GreenLine GRD 27
- E. Safe-Hit, Model SH227GRD
- F. Three D Traffic Works "Guardflex" TD9100

**Steel Post Type**

- A. Carsonite, Model CFGR-327 with CFGRBK300 Mounting Bracket

### 8-1.02.3 SIGN MATERIALS

#### RETROREFLECTIVE SHEETING

##### Channelizers, Barrier Markers, and Delineators

- A. Avery Dennison T-6500 Series (For rigid substrate devices only)
- B. Avery Dennison WR-6100 Series
- C. Nippon Carbide Industries, Flexible Ultralite Grade (ULG) II
- D. Reflexite, PC-1000 Metalized Polycarbonate
- E. Reflexite, AC-1000 Acrylic
- F. Reflexite, AP-1000 Metalized Polyester
- G. Reflexite, Conformalight, AR-1000 Abrasion Resistant Coating
- H. 3M, High Intensity

##### Traffic Cones, 13 inches Sleeves

- A. Reflexite SB (Polyester), Vinyl or "TR" (Semi-transparent)

##### Traffic Cones, 4 inch x 6 inch Sleeves

- A. Nippon Carbide Industries, Flexible Ultralite Grade (ULG) II
- B. Reflexite, Vinyl, "TR" (Semi-transparent) or "Conformalight"
- C. 3M Series 3840
- D. Avery Dennison S-9000C

##### Barrels and Drums

- A. Avery Dennison WR-6100
- B. Nippon Carbide Industries, Flexible Ultralite Grade (ULG) II
- C. Reflexite, "Conformalight", "Super High Intensity" or "High Impact Drum Sheeting"
- D. 3M Series 3810

##### Barricades: Type I, Medium-Intensity (Typically Enclosed Lens, Glass-Bead Element)

- A. American Decal, Adcolite
- B. Avery Dennison, T-1500 and T-1600 series
- C. 3M Engineer Grade, Series 3170

##### Barricades: Type II, Medium-High-Intensity (Typically Enclosed Lens, Glass-Bead Element)

- A. Avery Dennison, T-2500 Series
- B. Kiwalite Type II
- C. Nikkalite 1800 Series

##### Signs: Type II, Medium-High-Intensity (Typically Enclosed Lens, Glass-Bead Element)

- A. Avery Dennison, T-2500 Series
- B. Kiwalite, Type II
- C. Nikkalite 1800 Series

##### Signs: Type III, High-Intensity (Typically Encapsulated Glass-Bead Element)

- A. Avery Dennison, T-5500 and T-5500A Series
- B. Nippon Carbide Industries, Nikkalite Brand Ultralite Grade II
- C. 3M Series 3870

##### Signs: Type IV, High-Intensity (Typically Unmetallized Microprismatic Element)

- A. Avery Dennison, T-6500 Series
- B. Nippon Carbide Industries, Crystal Grade, 94000 Series
- C. Nippon Carbide Industries, Model No. 94847 Fluorescent Orange
- D. Nippon Carbide Industries, Model No. 94844 Fluorescent Yellow Green

##### Signs: Type VI, Elastomeric (Roll-Up) High-Intensity, without Adhesive

- A. Avery Dennison, WU-6014
- B. Novabrite LLC, "Econobrite"
- C. Reflexite "Vinyl"

- D. Reflexite "SuperBright"
- E. Reflexite "Marathon"
- F. 3M Series RS34 Orange and RS20 Fluorescent Orange

**Signs: Type VII, Super-High-Intensity (Typically Unmetallized Microprismatic Element)**

- A. 3M LDP Series 3924 Fluorescent Orange
- B. 3M LDP Series 3970

**Signs: Type VIII, Super-High-Intensity (Typically Unmetallized Microprismatic Element)**

- A. Avery Dennison, T-7500 Series
- B. Avery Dennison, T-7511 Fluorescent Yellow
- C. Avery Dennison, T-7513 Fluorescent Yellow Green
- D. Avery Dennison, W-7514 Fluorescent Orange
- E. Nippon Carbide Industries, Nikkalite Crystal Grade Series 92800
- F. Nippon Carbide Industries, Nikkalite Crystal Grade Model 92844 Fluorescent Yellow/Green
- G. Nippon Carbide Industries, Nikkalite Crystal Grade Model 92847 Fluorescent Orange

**Signs: Type IX, Very-High-Intensity (Typically Unmetallized Microprismatic Element)**

- A. 3M VIP Series 3981 Diamond Grade Fluorescent Yellow
- B. 3M VIP Series 3983 Diamond Grade Fluorescent Yellow/Green
- C. 3M VIP Series 3990 Diamond Grade

**SPECIALTY SIGNS**

- A. Hallmark Technologies, Inc., All Sign STOP Sign (All Plastic), 30 inches
- B. Reflexite "Endurance" Work Zone Sign (with Semi-Rigid Plastic Substrate)

**SIGN SUBSTRATE**

**Fiberglass Reinforced Plastic (FRP)**

- A. Fiber-Brite
- B. Sequentia, "Polyplate"
- C. Inteplast Group "InteCel" (0.5 inch for Post-Mounted CZ Signs, 48 inches or less)

**Aluminum Composite**

- A. Alcan Composites "Dibond Material, 0.08 inch" (for temporary construction signs only)
- B. Mitsubishi Chemical America, Alpolic 350 (for temporary construction signs only)

**SECTION 8-2 PORTLAND CEMENT CONCRETE**

Portland cement concrete shall conform to the provisions in Section 90, "Concrete," of the Standard Specifications and these Special Provisions.

Mineral admixture shall be combined with cement in conformance with the provisions in Section 901.02B(3), "Supplementary Cementitious Materials," of the Standard Specifications for the concrete materials.

The Department maintains a list of sources of fine and coarse aggregate that have been approved for use with a reduced amount of mineral admixture in the total amount of cementitious material to be used. A source of aggregate will be considered for addition to the approved list if the producer of the aggregate submits to the Transportation Laboratory certified test results from a qualified testing laboratory that verify the aggregate complies with the requirements. Prior to starting the testing, the aggregate test shall be registered with the Department. A registration number can be obtained by calling (916) 227-7228. The registration number shall be used as the identification for the aggregate sample in correspondence with the Department. Upon request, a split of the tested sample shall be provided to the Department. Approval of aggregate will depend upon compliance with the specifications, based on the certified test results submitted, together with any replicate testing the Department may elect to perform. Approval will expire 3 years from the date the most recent registered and evaluated sample was collected from the aggregate source.

Qualified testing laboratories shall conform to the following requirements:

- A. Laboratories performing ASTM Designation: C 1293 shall participate in the Cement and Concrete Reference Laboratory (CCRL) Concrete Proficiency Sample Program and shall have received a score of 3 or better on all tests of the previous 2 sets of concrete samples.
- B. Laboratories performing ASTM Designation: C 1260 shall participate in the Cement and Concrete Reference Laboratory (CCRL) Pozzolan Proficiency Sample Program and shall have received a score of 3 or better on the shrinkage and soundness tests of the previous 2 sets of pozzolan samples.

Aggregates on the list shall conform to one of the following requirements:

- A. When the aggregate is tested in conformance with the requirements in California Test 554 and ASTM Designation: C 1293, the average expansion at one year shall be less than or equal to 0.040 percent; or
- B. When the aggregate is tested in conformance with the requirements in California Test 554 and ASTM Designation: C 1260, the average of the expansion at 16 days shall be less than or equal to 0.15 percent.

The amounts of cement and mineral admixture used in cementitious material shall be sufficient to satisfy the minimum cementitious material content requirements specified in Section 90-1.02, "Materials," of the Standard Specifications and shall conform to the following:

- A. The minimum amount of cement shall not be less than 75 percent by weight of the specified minimum cementitious material content.
- B. The minimum amount of mineral admixture to be combined with cement shall be determined using one of the following criteria:
  - 1. When the calcium oxide content of a mineral admixture is equal to or less than 2 percent by weight, the amount of mineral admixture shall not be less than 15 percent by weight of the total amount of cementitious material to be used in the mix.
  - 2. When the calcium oxide content of a mineral admixture is greater than 2 percent by weight, and any of the aggregates used are not listed on the approved list as specified in these Special Provisions, then the amount of mineral admixture shall not be less than 25 percent by weight of the total amount of cementitious material to be used in the mix.
  - 3. When the calcium oxide content of a mineral admixture is greater than 2 percent by weight and the fine and coarse aggregates are listed on the approved list as specified in these Special Provisions, then the amount of mineral admixture shall not be less than 15 percent by weight of the total amount of cementitious material to be used in the mix.
  - 4. When a mineral admixture that conforms to the provisions for silica fume in Section 90-1.02B(3), "Supplementary Cementitious Materials," of the Standard Specifications is used, the amount of mineral admixture shall not be less than 10 percent by weight of the total amount of cementitious material to be used in the mix.
  - 5. When a mineral admixture that conforms to the provisions for silica fume in Section 90-1.02B(3), "Supplementary Cementitious Materials," of the Standard Specifications is used and the fine and coarse aggregates are listed on the approved list as specified in these Special Provisions, then the amount of mineral admixture shall not be less than 7 percent by weight of the total amount of cementitious material to be used in the mix.
- C. The total amount of mineral admixture shall not exceed 35 percent by weight of the total amount of cementitious material to be used in the mix. The total weight of cement and mineral admixture per cubic yard shall not exceed the specified maximum cementitious material content.

Unless otherwise specified, mineral admixture will not be required in Portland cement concrete used for precast concrete girders.

The Contractor will be permitted to use Type III Portland cement for concrete used in the manufacture of precast concrete members.

## **SECTION 9 (BLANK)**

## **SECTION 10 CONSTRUCTION DETAILS**

### **SECTION 10-1 GENERAL**

#### **10-1.01 SCOPE OF WORK**

The scope of work, in general, includes; demolition and removal of park facilities (buildings, swimming pool, miscellaneous improvements), clearing grubbing and tree removal, concrete and asphalt concrete removal. Improvement work includes construction of two new community pools, including pool equipment, restroom and maintenance building construction, construction of new pickleball courts and a basketball court and resurfacing of a softball field with artificial



turf. Also included is installation of concrete sidewalk, curb, and accessible ramps, retaining walls, drainage improvements, hot mix asphalt paving, pavement marking and striping. Other related items not mentioned above, that are required by the plans, specifications or these Special Provisions shall be performed, placed, constructed, or installed.

### **10-1.02 GENERAL REQUIREMENTS**

The order of work shall conform to the provisions in the Standard Specifications and these Special Provisions.

The Contractor's attention is directed to the requirements of "Cooperation", "Mobilization," "Maintaining Traffic" and "Traffic Control System" of these Special Provisions, the Project Plans, and the Standard Specifications.

Except as otherwise provided or with City Engineer approval of reduced roadway widths, the full width of the traveled way shall be open for use by public traffic on Saturdays, Sundays and designated legal holidays; after 4:00 p.m. Monday through Friday and when construction operations are not actively in progress.

Weekend hours of work, which do not significantly change the cost of the work may be permitted upon the written request of the Contractor if, in the opinion of the Engineer, public traffic will be adequately served and the work expedited. These deviations shall not be adopted by the Contractor until the Engineer has approved them in writing. All other modifications will be made by contract change order.

The Contractor shall provide the Engineer all required submittals within the time frame specified by the Special Provisions, the Project Plans, and/or the Standard Specifications.

The Contractor shall submit to the Engineer a progress schedule in accordance with Section 8-1.02, "Schedule," of the Standard Specifications and these Special Provisions. Attention is directed to the requirements of these sections for scheduling a pre-construction scheduling conference within 10 working days of the approval of the contract and submitting a baseline schedule to the Engineer within 20 days of the contract approval.

The Contractor is responsible for verifying the location of all existing underground facilities, within the project area, that may have potential to conflict with the location of proposed improvements, and other work as shown on the Plans. The City has made every effort to show locations of any and all existing surface and subsurface structures. However, actual field conditions and locations can vary considerably from the plan locations. Therefore, the City cannot, and does not, assume responsibility for the existence or location of any structure such as, but not limited to, utilities and pipelines. The contractor is responsible for contacting all agencies and/or owners to verify this information prior to and during construction of any of the proposed improvements. If any existing utilities are found in conflict with the proposed location of the improvements shown on the plans, the Contractor shall contact the Engineer. The Engineer shall provide the Contractor with new grades to eliminate such conflict or shall arrange to have the utilities relocated to avoid the conflict. The Contractor shall work with the Engineer to schedule surveyors to be onsite during pot-holing of conflicts for utility elevation verification. Any delays, which may result from failure of the Contractor to pothole potential utility conflicts, shall be at the Contractor's expense.

At the end of each working day if a difference in excess of three inches (3") exists between the elevation of the existing pavement and the elevation of excavations within six feet (6') of the traveled way, material shall be placed and compacted against the vertical cuts adjacent to the traveled way unless Type K barrier rail has been placed between the traveled way and the excavation in accordance with "Type K Temporary Railing" of the Standard Specifications and these Special Provisions. During excavation operations, native material may be used for this purpose; however, once placing of the structural section commences, structural material shall be used. The material shall be placed to the level of the elevation of the top of existing pavement and tapered at a slope of 1:4 (vertical:horizontal) or flatter to the bottom of the excavation. Treated base shall not be used for the taper. Full compensation for placing the material on a 1:4 slope, regardless of the number of times the material is required, and subsequent removing or reshaping of the material to the lines and grades shown on the plans shall be considered as included in the contract price paid for the materials involved and no additional compensation will be allowed. No payment will be made for material placed in excess of that required for the structural section.

Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all work involved in the provisions of this section, including, but not limited to, coordination with the applicable utility companies, pot-holing, excavation and backfill as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer shall be considered as included in prices paid for the various Contract Items of work involved and no additional compensation will be allowed.

### **10-1.03 REQUEST FOR INFORMATION**

All Requests for Information (RFI's) from the Contractor shall be submitted in writing to the Engineer and shall be numbered sequentially as they are generated. The Engineer will have 5 working days from the date of receipt of each RFI to provide a response to the Contractor. All requests must come from the prime Contractor, the Engineer will not respond to RFI's received directly from subcontractors.

If the response provided by the Engineer is not satisfactory for the Contractor, the RFI may be re-submitted with more detailed requests noting the particular areas that have not been addressed. The Engineer will have three (3) working days to respond to the second request from the Contractor. If the second response is still not satisfactory to the Contractor, a meeting will be scheduled to resolve any outstanding items that have not been properly addressed.

A Request for Information shall only be used for obtaining information or clarification on project documents. The RFI process is not the proper media for notification of potential claims, writing letters, requesting a change order, etc... If the Contractor wishes to file a Notice of Potential Claim, it shall be filed in accordance with Section 5-1.43, "Potential Claims and Dispute Resolution," of the Standard Specifications.

#### **10-1.04 LINES AND GRADES**

Attention is directed to "Lines and Grades," of the Standard Specifications.

The Contractor shall be responsible for setting stakes or marks that the Contractor determines to be necessary to establish the lines and grades required for the completion of the work specified. The Engineer reserves the right to check, correct or require layout work to be revised in order to construct the improvements as shown on the plans and as directed by the Engineer. If any stakes or marks are destroyed or damaged, it is the Contractor's responsibility to reestablish the stakes or marks.

If the Contractor determines that conditions in the field would cause a conflict with the lines and grades shown on the plans or otherwise feels that there are errors in the lines and grades to be established he shall immediately notify the Engineer for clarification. Attention is directed to "Requests for Information" of these provisions.

The City will provide the Contractor with an AutoCAD .dwg file for surveying use, consisting of the project plans of the proposed improvements and a survey base map of the park based upon a 2020 aerial drone survey. A generated triangular irregular network surface and one foot existing contours are available in the drawing.

Full compensation for conforming to the provisions of this section shall be considered as included in the prices paid for the various Contract items of work involved and no additional compensation will be allowed.

#### **10-1.05 WATER POLLUTION CONTROL**

##### **10-1.05.1 GENERAL**

Water pollution control work shall conform to the provisions in Section 13, "Water Pollution Control," of the Standard Specifications, section of these Special Provisions entitled "Relations With California Regional Water Quality Control Board," and these Special Provisions.

The Contractor shall perform water pollution control work in conformance with the requirements in the "Storm Water Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Preparation Manual" and addenda in effect on the day the Notice to Contractors is dated. This manual is referred to as the "Preparation Manual." Copies of the Preparation Manual may be obtained from:

State of California  
Department of Transportation  
Publication Distribution Unit  
1900 Royal Oaks Drive  
Sacramento, California 95815  
Telephone: (916) 445-3520

The Preparation Manual and other references for performing water pollution control work are available from the Department's Construction Storm Water and Water Pollution Control web site at: <http://www.dot.ca.gov/hq/construc/stormwater/stormwater1.htm>.

The Contractor shall know and fully comply with applicable provisions of the Manuals, and Federal, State, and local regulations and requirements that govern the Contractor's operations and storm water and non-storm water discharges from both the project site and areas of disturbance outside the project limits during construction. Attention is directed to Section 7, "Legal Relations and Responsibility to the Public," of the Standard Specifications and these Special Provisions.

Water pollution control requirements shall apply to storm water and non-storm water discharges from areas outside the project site that are directly related to construction activities for this contract including, but not limited to, asphalt batch plants, material borrow areas, concrete plants, staging areas, storage yards and access roads. The Contractor shall comply with the Manuals for those areas and shall implement, inspect and maintain the required water pollution control practices. Installing, inspecting and maintaining water pollution control practices on areas outside the highway right of way not specifically arranged and provided for by the Department for the execution of this contract, will not be paid for.

The Contractor shall be responsible for penalties assessed or levied on the Contractor or the City as a result of the Contractor's failure to comply with the provisions in this section "Water Pollution Control" including, but not limited to, compliance with the applicable provisions of the Manuals, and Federal, State and local regulations and requirements as set forth therein.

Penalties as used in this section shall include fines, penalties and damages, whether proposed, assessed, or levied against the Department or the Contractor, including those levied under the Federal Clean Water Act and the State Porter-Cologne Water Quality Control Act, by governmental agencies or as a result of citizen suits. Penalties shall also include payments made or costs incurred in settlement for alleged violations of the Manuals, or applicable laws, regulations, or requirements. Costs incurred could include sums spent instead of penalties, in mitigation or to remediate or correct violations.

The Contractor shall notify the Engineer immediately upon request from the regulatory agencies to enter, inspect, sample, monitor, or otherwise access the project site or the Contractor's records pertaining to water pollution control work. The Contractor and the Department shall provide copies of correspondence, notices of violations, enforcement actions or proposed fines by regulatory agencies to the requesting regulatory agency.

#### **10-1.05.2 WATER POLLUTION CONTROL IMPLEMENTATION**

Unless otherwise specified, the Contractor shall be responsible throughout the duration of the project for installing, constructing, inspecting, maintaining, removing, and disposing of the water pollution control practices. Unless otherwise directed by the Engineer, the Contractor's responsibility for "Water Pollution Control" implementation shall continue throughout any temporary suspension of work ordered in conformance with the provisions in Section 8-1.06, "Suspensions," of the Standard Specifications. Requirements for installation, construction, inspection, maintenance, removal, and disposal of water pollution control practices shall conform to the requirements in the Manuals and these Special Provisions.

If the Contractor or the Engineer identifies a deficiency in the implementation of the "Water Pollution Control" practices, the deficiency shall be corrected immediately. The deficiency may be corrected at a later date and time if requested by the Contractor and approved by the Engineer in writing but shall be corrected prior to the onset of precipitation. If the Contractor fails to correct the identified deficiency by the date agreed or prior to the onset of precipitation, the project shall be in nonconformance with this section. Attention is directed to Section 5-1.03, "Engineer's Authority," of the Standard Specifications, and to "Retention of Funds" of this section for possible nonconformance penalties.

If the Contractor fails to conform to the provisions of this section, "Water Pollution Control," the Engineer may order the suspension of construction operations until the project complies with the requirements of this section.

#### **10-1.05.3 PAYMENT**

Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in "Water Pollution Control" including, but not limited to installing, constructing, inspecting, maintaining, removing, and disposing of the water pollution control practices including non-storm water management, waste management and materials pollution water pollution control practices, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer shall be considered as included in the various items of work requiring these activities, and no additional compensation will be allowed therefore.

#### **10-1.05.4 CONSTRUCTION SITE MANAGEMENT**

Construction site management shall consist of controlling potential sources of water pollution before they come in contact with storm water systems or watercourses. The Contractor shall control material pollution and manage waste and non-storm water existing at the construction site by implementing effective handling, storage, use, and disposal practices.

The Contractor shall train all employees and subcontractors regarding:

- A. Material pollution prevention and control;
- B. Waste management;
- C. Non-storm water management;
- D. Identifying and handling hazardous substances; and
- E. Potential dangers to humans and the environment from spills and leaks or exposure to toxic or hazardous substances.

Training shall take place before starting work on this project. New employees shall receive the complete training before starting work on this project. The Contractor shall have regular meetings to discuss and reinforce spill prevention and control; material delivery, storage, use, and disposal; waste management; and non-storm water management procedures.

Instructions for material and waste handling, storage, and spill reporting and cleanup shall be posted at all times in an open, conspicuous, and accessible location at the construction site.

Non-hazardous construction site waste and excess material shall be recycled when practical or disposed of in accordance with the provisions in Section 5-1.20B(4), "Contractor-Property Owner Agreement," of the Standard Specifications, unless otherwise specified.

Vehicles and equipment at the construction site shall be inspected on a frequent, predetermined schedule, and by the operator each day of use. Leaks shall be repaired immediately, or the vehicle or equipment shall be removed from the construction site.

#### **10-1.05.4.1 SPILL PREVENTION AND CONTROL**

The Contractor shall implement spill and leak prevention procedures when chemicals or hazardous substances are stored. Spills of petroleum products; substances listed under CFR Title 40, Parts 110, 117, and 302; and sanitary and septic waste shall be contained and cleaned up as soon as is safe.

Minor spills involve small quantities of oil, gasoline, paint, or other material that can be controlled by the first responder upon discovery of the spill. Cleanup of minor spills includes:

- A. Containing the spread of the spill,
- B. Recovering the spilled material using absorption,
- C. Cleaning the contaminated area, and
- D. Disposing of contaminated material promptly and properly.

Semi-significant spills are those that can be controlled by the first responder with the help of other personnel. Cleanup of semi-significant spills shall be immediate. Cleanup of semi-significant spills includes:

- A. Containing the spread of the spill;
- B. Recovering the spilled material using absorption if the spill occurs on paved or an impermeable surface;
- C. Containing the spill with an earthen dike and digging up contaminated soil for disposal if the spill occurs on dirt;
- D. Covering the spill with plastic or other material to prevent contaminating runoff if the spill occurs during precipitation; and
- E. Disposing of contaminated material promptly and properly.

Significant or hazardous spills are those that cannot be controlled by construction personnel. Notifications of these spills shall be immediate. The following steps shall be taken:

- A. Construction personnel shall not attempt to clean up the spill until qualified staff have arrived;
- B. Notify the Engineer and follow up with a written report;
- C. Obtain the services of a spills contractor or hazardous material team immediately;
- D. Notify the local emergency response team by dialing 911 and county officials at the emergency phone numbers kept on the construction site;
- E. Notify the Governor's Office of Emergency Services Warning Center at (805) 852-7550;
- F. Notify the National Response Center at (800) 424-8802 regarding spills of Federal reportable quantities in conformance with CFR Title 40, Parts 110, 119, and 302;
- G. Notify other agencies as appropriate, including:
  - 1. Fire Department,
  - 2. Public Works Department,
  - 3. Highway Patrol,
  - 4. City Police or County Sheriff Department,
  - 5. Department of Toxic Substances,
  - 6. California Division of Oil and Gas,
  - 7. Cal OSHA, or
  - 8. Regional Water Resources Control Board.

The contractor shall oversee and enforce proper spill prevention and control measures. Minor, semi-significant, and significant spills shall be reported to the contractor who shall notify the Engineer immediately.

The Contractor shall prevent spills from entering storm water runoff before and during cleanup. Spills shall not be buried or washed with water.

The Contractor shall keep material or waste storage areas clean, well-organized, and equipped with enough cleanup supplies for the material being stored. Plastic shall be placed under paving equipment when not in use to catch drips.

#### **10-1.05.4.2 MATERIAL MANAGEMENT**

Material shall be delivered, used, and stored for this contract in a manner that minimizes or eliminates discharge of material into the air, storm drain systems, or watercourses.

The Contractor shall implement the practices described in this section when taking delivery of, using, or storing the following materials:

A. Hazardous chemicals including:

1. Acids,
2. Lime,
3. Glues,
4. Adhesives,
5. Paints,
6. Solvents, and
7. Curing compounds;

B. Soil stabilizers and binders;

C. Fertilizers;

D. Detergents;

E. Plaster;

F. Petroleum products including:

1. Fuel,
2. Oil, and
3. Grease;

G. Asphalt components and concrete components; and

H. Pesticides and herbicides.

The Contractor shall supply the Material Safety Data Sheet to the Engineer for material used or stored. The Contractor shall keep an accurate inventory of material delivered and stored at the construction site.

Employees trained in emergency spill cleanup procedures shall be present when hazardous materials or chemicals are unloaded.

The Contractor shall use recycled or less hazardous products when practical.

Application of herbicides and pesticides shall be performed by a licensed applicator. The Contractor shall complete the Report of Chemical Spray forms when spraying herbicides or pesticides, and shall submit a copy to the Engineer before application.

#### **Material Storage**

The Contractor shall store liquids, petroleum products, and substances listed in CFR Title 40, Parts 110, 117, and 302 in containers or drums approved by the United States Environmental Protection Agency, and place them in secondary containment facilities.

Secondary containment facilities shall be impervious to the materials stored there for a minimum contact time of 72 hours.

Throughout the rainy season secondary containment facilities shall be covered during non-working days and when precipitation is predicted. Secondary containment facilities shall be adequately ventilated.

The Contractor shall keep the secondary containment facility free of accumulated rainwater or spills. After precipitation, or in the event of spills or leaks, accumulated liquid shall be collected and placed into drums within 24 hours. These liquids shall be handled as hazardous waste in accordance with the provisions in "Hazardous Waste" of these Special Provisions, unless testing determines them to be non-hazardous.

Incompatible materials, such as chlorine and ammonia, shall not be stored in the same secondary containment facility.

Materials shall be stored in the original containers with the original product labels maintained in legible condition. Damaged or illegible labels shall be replaced immediately.

The secondary containment facility shall have the capacity to contain precipitation from a 24-hour-long, 25-year storm; and 10 percent of the aggregate volume of all containers, or all of the volume of the largest container within the facility, whichever is greater.

The Contractor shall store bagged or boxed material on pallets. Throughout the rainy season, bagged or boxed material shall be protected from wind and rain during non-working days and when precipitation is predicted.

The Contractor shall provide sufficient separation between stored containers to allow for spill cleanup or emergency response access. Storage areas shall be kept clean, well-organized, and equipped with cleanup supplies appropriate for the materials being stored.

The Contractor shall repair or replace perimeter controls, containment structures, covers, and liners as needed. Storage areas shall be inspected before and after precipitation, and at least weekly during other times.

### **Stockpile Management**

The Contractor shall reduce or eliminate potential air and water pollution from stockpiled material including soil, paving material, or pressure treated wood. Stockpiles shall be located out of floodplains when possible, and at least 50 feet from concentrated flows of storm water, drainage courses, or inlets unless written approval is obtained from the Engineer.

The Contractor may discontinue adding or removing material for up to 21 days and a stockpile will still be considered active.

The Contractor shall protect active stockpiles with plastic or geotextile cover, soil stabilization measures, or with linear sediment barrier when precipitation is predicted. Active stockpiles of cold mix asphalt concrete shall be placed on an impervious surface and covered with plastic when precipitation is predicted.

The Contractor shall protect inactive soil stockpiles with a plastic or geotextile cover, or with soil stabilization measures at all times during the rainy season. A linear sediment barrier around the perimeter of the stockpile shall also be used. During the non-rainy season soil stockpiles shall be covered and protected with a linear sediment barrier when precipitation is predicted. The Contractor shall control wind erosion during dry weather as provided in "Dust Control," of the Standard Specifications.

Stockpiles of Portland cement concrete rubble, asphalt concrete, asphalt concrete rubble, aggregate base, or aggregate sub-base shall be covered with plastic or geotextile, or protected with a linear sediment barrier at all times during the rainy season, and when precipitation is predicted during the non-rainy season.

Stockpiles of cold mix asphalt concrete shall be placed on and covered with impermeable material at all times during the rainy season, and when precipitation is predicted during the non-rainy season.

Stockpiles of pressure treated wood shall be covered with impermeable material and placed on pallets at all times during the rainy season, and when precipitation is predicted during the non-rainy season.

The Contractor shall repair or replace linear sediment barriers and covers as needed or as directed by the Engineer to keep them functioning properly. Sediment shall be removed when it accumulates to 1/3 of the linear sediment barrier height.

### **10-1.05.4.3 WASTE MANAGEMENT**

#### **Solid Waste**

The Contractor shall not allow litter or debris to accumulate anywhere on the construction site, including storm drain grates, trash racks, and ditch lines. The Contractor shall pick up and remove trash and debris from the construction site at least once a week. The contractor shall monitor solid waste storage and disposal procedures on the construction site. The Contractor shall provide enough dumpsters of sufficient size to contain the solid waste generated by the project. Dumpsters shall be emptied when refuse reaches the fill line. Dumpsters shall be watertight. The Contractor shall not wash out dumpsters on the construction site. The Contractor shall provide additional containers and more frequent pickup during the demolition phase of construction

Solid waste includes:

- A. Brick,
- B. Mortar,
- C. Timber,
- D. Metal scraps,
- E. Sawdust,

- F. Pipe,
- G. Electrical cuttings,
- H. Non-hazardous equipment parts,
- I. Styrofoam and other packaging materials,
- J. Vegetative material and plant containers from highway planting, and
- K. Litter and smoking material, including litter generated randomly by the public.

Trash receptacles shall be provided and used in the Contractor's yard, field trailers, and locations where workers gather for lunch and breaks.

#### **Hazardous Waste**

The Contractor shall implement hazardous waste management practices when waste is generated on the construction site from the following substances:

- A. Petroleum products,
- B. Asphalt products,
- C. Concrete curing compound,
- D. Pesticides,
- E. Acids,
- F. Paints,
- G. Stains,
- H. Solvents,
- I. Wood preservatives,
- J. Roofing tar, and
- K. Materials classified as hazardous by California Code of Regulations, Title 22, Division 4.5; or listed in CFR Title 40, Parts 110, 117, 261, or 302.

Nothing in these Special Provisions shall relieve the Contractor of the responsibility for compliance with Federal, State, and local laws regarding storage, handling, transportation, and disposal of hazardous wastes.

The CONTRACTOR shall oversee and enforce hazardous waste management practices. Production of hazardous materials and hazardous waste on the construction site shall be kept to a minimum. Perimeter controls, containment structures, covers, and liners shall be repaired or replaced when damaged.

The Contractor shall have a laboratory certified by the California Department of Public Health (CDPH) sample and test waste when hazardous material levels are unknown to determine safe methods for storage and disposal.

The Contractor shall segregate potentially hazardous waste from non-hazardous waste at the construction site. Hazardous waste shall be handled, stored, and disposed of as required in California Code of Regulations, Title 22, Division 4.5, Section 66262.34; and in CFR Title 49, Parts 261, 262, and 263.

The Contractor shall store hazardous waste in sealed containers constructed and labeled with the contents and date accumulated as required in California Code of Regulations, Title 22, Division 4.5; and in CFR Title 49, Parts 172, 173, 178, and 179. Hazardous waste containers shall be kept in temporary containment facilities conforming to the provisions in "Material Storage" of these Special Provisions.

There shall be adequate storage volume and containers shall be conveniently located for hazardous waste collection. Containers of hazardous waste shall not be overfilled and hazardous wastes shall not be mixed. Containers of dry waste that are not watertight shall be stored on pallets. The Contractor shall not allow potentially hazardous waste to accumulate on the ground. Hazardous waste shall be stored away from storm drains, watercourses, moving vehicles, and equipment.

The Contractor shall clean water based or oil based paint from brushes or equipment within a contained area and shall not contaminate soil, watercourses, or storm drain systems. Paints, thinners, solvents, residues, and sludges that cannot be recycled or reused shall be disposed of as hazardous waste. When thoroughly dry, latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths shall be disposed of as solid waste.

The Contractor shall dispose of hazardous waste within 90 days of being generated. Hazardous waste shall be disposed of by a licensed hazardous waste transporter using uniform hazardous waste

manifest forms and taken to a Class I Disposal Site. A copy of the manifest shall be provided to the Engineer.

### **Contaminated Soil**

The Contractor shall identify contaminated soil from spills or leaks by noticing discoloration, odors, or differences in soil properties. Soil with evidence of contamination shall be sampled and tested by a laboratory certified by CDPH. If levels of contamination are found to be hazardous, the soil shall be handled and disposed of as hazardous waste.

The Contractor shall prevent the flow of water, including ground water, from mixing with contaminated soil by using one or a combination of the following measures:

- A. Berms,
- B. Cofferdams,
- C. Grout curtains,
- D. Freeze walls, or
- E. Concrete seal course.

If water mixes with contaminated soil and becomes contaminated, the water shall be sampled and tested by a laboratory certified by the CDPH. If levels of contamination are found to be hazardous, the water shall be handled and disposed of as hazardous waste.

### **Concrete Waste**

The Contractor shall implement practices to prevent the discharge of Portland cement concrete or asphalt concrete waste into storm drain systems or watercourses.

Portland cement concrete or asphalt concrete waste shall be collected at the following locations and disposed of:

- A. Where concrete material, including grout, is used;
- B. Where concrete dust and debris result from demolition;
- C. Where sawcutting, coring, grinding, grooving, or hydro-concrete demolition of Portland cement concrete or asphalt concrete creates a residue or slurry; or
- D. Where concrete trucks or other concrete-coated equipment is cleaned at the construction site.

### **Sanitary and Septic Waste**

Wastewater from sanitary or septic systems shall not be discharged or buried within the Department right of way. The CONTRACTOR shall inspect sanitary or septic waste storage and monitor disposal procedures at least weekly. Sanitary facilities that discharge to the sanitary sewer system shall be properly connected and free from leaks.

The Contractor shall obtain written approval from the local health agency, city, county, and sewer district before discharging from a sanitary or septic system directly into a sanitary sewer system and provide a copy to the Engineer. The Contractor shall comply with local health agency requirements when using an on-site disposal system.

### **Liquid Waste**

The Contractor shall not allow construction site liquid waste, including the following, to enter storm drain systems or watercourses:

- A. Drilling slurries or fluids,
- B. Grease-free or oil-free wastewater or rinse water,
- C. Dredgings,
- D. Liquid waste running off a surface including wash or rinse water, or
- E. Other non-storm water liquids not covered by separate permits.

The Contractor shall hold liquid waste in structurally sound, leak proof containers such as:

- A. Sediment traps,
- B. Roll-off bins, or
- C. Portable tanks.



Liquid waste containers shall be of sufficient quantity and volume to prevent spills and leaks. The containers shall be stored at least 50 feet from storm drains, watercourses, moving vehicles, and equipment.

The Contractor shall remove and dispose of deposited solids from sediment traps as provided in "Solid Waste" of these Special Provisions, unless determined infeasible by the Engineer.

Liquid waste may require testing to determine hazardous material content before disposal.

Drilling fluids and residue shall be disposed of outside the highway right of way. If the Engineer determines that an appropriate location is available, fluids and residue exempt under California Code of Regulations, Title 23, Section 2511(g) may be dried by infiltration and evaporation in a leak proof container. The remaining solid waste may be disposed of as provided in "Solid Waste" of these Special Provisions.

#### **10-1.05.4.4 NON-STORM WATER MANAGEMENT**

##### **Water Control and Conservation**

The Contractor shall prevent erosion or the discharge of pollutants into storm drain systems or watercourses by managing the water used for construction operations. The Contractor shall obtain the Engineer's approval before washing anything on the construction site with water that could discharge into a storm drain system or watercourse. Discharges shall be reported to the Engineer immediately.

The Contractor shall implement water conservation practices when water is used on the construction site. Irrigation areas shall be inspected, and watering schedules shall be adjusted to prevent erosion, excess watering, or runoff. The Contractor shall shut off the water source to broken lines, sprinklers, or valves, and they shall be repaired as soon as possible. When possible, water from waterline flushing shall be reused for landscape irrigation. Paved areas shall be swept and vacuumed, not washed with water.

Construction water runoff, including water from water line repair, shall be directed to areas to infiltrate into the ground and shall not be allowed to enter storm drain systems or watercourses. Spilled water shall not be allowed to escape water truck filling areas. When possible, the Contractor shall direct water from off-site sources around the construction site, or shall minimize contact with the construction site.

##### **Illegal Connection and Discharge Detection and Reporting**

The Contractor shall inspect the construction site and the site perimeter before beginning work for evidence of illegal connections, discharges, or dumping. Subsequently, the construction site and perimeter shall be inspected on a frequent, predetermined schedule.

The Contractor shall immediately notify the Engineer when illegal connections, discharges, or dumping are discovered. The Contractor shall take no further action unless directed by the Engineer. Unlabeled or unidentifiable material shall be assumed to be hazardous.

The Contractor shall look for the following evidence of illegal connections, discharges, or dumping:

- A. Debris or trash piles,
- B. Staining or discoloration on pavement or soils,
- C. Pungent odors coming from drainage systems,
- D. Discoloration or oily sheen on water,
- E. Stains or residue in ditches, channels or drain boxes,
- F. Abnormal water flow during dry weather,
- G. Excessive sediment deposits,
- H. Nonstandard drainage junction structures, or
- I. Broken concrete or other disturbances near junction structures.

##### **Vehicle and Equipment Cleaning**

The Contractor shall limit vehicle and equipment cleaning or washing on the construction site to that necessary to control vehicle tracking or hazardous waste. Vehicles and equipment shall not be cleaned on the construction site with soap, solvents, or steam until the Engineer has been notified. The resulting waste shall be contained and recycled, or disposed of as provided in "Liquid Waste" or "Hazardous Waste" of these Special Provisions, whichever is applicable. The Contractor shall not use diesel to clean vehicles or equipment and shall minimize the use of solvents.

The Contractor shall clean or wash vehicles and equipment in a structure equipped with disposal facilities. If using a structure is not possible, vehicles and equipment shall be cleaned or washed in an outside area with the following characteristics:

- A. Located at least 50 feet from storm drainage systems or watercourses,
- B. Paved with asphalt concrete or Portland cement concrete,
- C. Surrounded by a containment berm, and
- D. Equipped with a sump to collect and dispose of wash water.

When washing vehicles or equipment with water, the Contractor shall use as little water as possible. Hoses shall be equipped with a positive shutoff valve.

Wash racks shall discharge to a recycle system or to another system approved by the Engineer. Sumps shall be inspected regularly, and liquids and sediments shall be removed as needed.

#### **Vehicle and Equipment Fueling and Maintenance**

The Contractor shall fuel or perform maintenance on vehicles and equipment off the construction site whenever practical. When fueling or maintenance must be done at the construction site, the Contractor shall designate a site, or sites, and obtain approval from the Engineer before using. The fueling or maintenance site shall be protected from storm water, shall be on level ground, and shall be located at least 50 feet from drainage inlets or watercourses. The CONTRACTOR shall inspect the fueling or maintenance site regularly. Mobile fueling or maintenance shall be kept to a minimum.

The Contractor shall use containment berms or dikes around the fueling and maintenance area. Adequate amounts of absorbent spill cleanup material and spill kits shall be kept in the fueling and maintenance area and on fueling trucks. Spill cleanup material and kits shall be disposed of immediately after use. Drip pans or absorbent pads shall be used during fueling or maintenance unless performed over an impermeable surface.

Fueling or maintenance operations shall not be left unattended. Fueling nozzles shall be equipped with an automatic shutoff control. Vapor recovery fueling nozzles shall be used where required by the Air Quality Management District. Nozzles shall be secured upright when not in use. Fuel tanks shall not be topped-off.

The Contractor shall recycle or properly dispose of used batteries and tires.

#### **Material and Equipment Used Over Water**

Drip pans and absorbent pads shall be placed under vehicles or equipment used over water, and an adequate supply of spill cleanup material shall be kept with the vehicle or equipment. Drip pans or plastic sheeting shall be placed under vehicles or equipment on docks, barges, or other surfaces over water when the vehicle or equipment will be idle for more than one hour.

The Contractor shall provide watertight curbs or toe boards on barges, platforms, docks, or other surfaces over water to contain material, debris, and tools. Material shall be secured to prevent spills or discharge into water due to wind.

#### **Structure Removal Over or Adjacent to Water**

The Contractor shall not allow demolished material to enter storm water systems or watercourses. The Contractor shall use covers and platforms approved by the Engineer to collect debris. Attachments shall be used on equipment to catch debris on small demolition operations. Debris catching devices shall be emptied regularly and debris shall be handled as provided in "Waste Management" of these Special Provisions.

The CONTRACTOR shall inspect demolition sites within 50 feet of storm water systems or watercourses every day.

#### **Paving, Sealing, Sawcutting, and Grinding Operations**

The Contractor shall prevent the following material from entering storm drain systems or water courses:

- A. Cementitious material,
- B. Asphaltic material,
- C. Aggregate or screenings,
- D. Grinding or sawcutting residue,
- E. Pavement chunks, or

F. Shoulder backing.

The Contractor shall cover drainage inlets and use linear sediment barriers to protect downhill watercourses until paving, sealing, sawcutting, or grinding operations are completed and excess material has been removed. Drainage inlets and manholes shall be covered during the application of seal coat, tack coat, slurry seal, or fog seal.

During the rainy season or when precipitation is predicted, paving, sawcutting, and grinding operations shall be limited to places where runoff can be captured. Seal coat, tack coat, slurry seal, or fog seal operations shall not begin if precipitation is predicted for the application or the curing period. The Contractor shall not excavate material from existing roadways during precipitation.

The Contractor shall vacuum up slurry from sawcutting operations immediately after the slurry is produced. Slurry shall not be allowed to run onto lanes open to public traffic or off the pavement.

The Contractor shall collect residue from Portland cement concrete grinding operations with a vacuum attachment on the grinding machine. The residue shall not be left on the pavement or allowed to flow across the pavement.

Material excavated from existing roadways may be stockpiled as provided in "Stockpile Management" of these Special Provisions if approved by the Engineer. Asphalt concrete chunks used in embankment shall be placed above the water table and covered by at least one foot of material.

Substances used to coat asphalt trucks and equipment shall not contain soap, foaming agents, or toxic chemicals.

### **Thermoplastic Striping and Pavement Markers**

Thermoplastic striping and preheating equipment shutoff valves shall work properly at all times when on the construction site. The Contractor shall not preheat, transfer, or load thermoplastic within 50 feet of drainage inlets or watercourses. The Contractor shall not fill the preheating container to more than 6 inches from the top. Truck beds shall be cleaned daily of scraps or melted thermoplastic.

The Contractor shall not unload, transfer, or load bituminous material for pavement markers within 50 feet of drainage inlets or watercourses. All pressure shall be released from melting tanks before removing the lid to fill or service. Melting tanks shall not be filled to more than 6 inches from the top.

The Contractor shall collect bituminous material from the roadway after marker removal.

### **Pile Driving**

The Contractor shall keep spill kits and cleanup material at pile driving locations. Pile driving equipment shall be parked over drip pans, absorbent pads, or plastic sheeting where possible. When not in use, pile driving equipment shall be stored at least 50 feet from concentrated flows of storm water, drainage courses, or inlets. The Contractor shall protect pile driving equipment by parking it on plywood and covering it with plastic when precipitation is predicted. The CONTRACTOR shall inspect the pile driving area every day for leaks and spills.

The Contractor shall use vegetable oil instead of hydraulic fluid when practical.

### **Concrete Curing**

The Contractor shall not overspray chemical curing compound. Drift shall be minimized by spraying as close to the concrete as possible. Drainage inlets shall be covered before applying curing compound.

The Contractor shall minimize the use and discharge of water by using wet blankets or similar methods to maintain moisture when curing concrete.

### **Concrete Finishing**

The Contractor shall collect and dispose of water and solid waste from high-pressure water blasting. Drainage inlets within 50 feet shall be covered before sandblasting. The nozzle shall be kept as close to the surface of the concrete as possible to minimize drift of dust and blast material. Blast residue may contain hazardous material.

Containment structures for concrete finishing operations shall be inspected for damage before each day of use and before predicted precipitation. Liquid and solid waste shall be removed from the containment structure after each work shift.

**10-1.05.4.5 PAYMENT**

Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in spill prevention and control, material management, waste management, non-storm water management, and dewatering and identifying, sampling, testing, handling, and disposing of hazardous waste, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer shall be considered as included in the contract prices paid for the items of work that require construction site management and no additional compensation will be allowed.

**10-1.05.5 TEMPORARY CONCRETE WASHOUT FACILITY**

Temporary concrete washout facilities shall be constructed, maintained, and later removed at the locations shown on the approved Storm Water Pollution Prevention Plan in conformance with "Water Pollution Control" of these Special Provisions, and in conformance with details shown on the plans and these Special Provisions.

Temporary concrete washout facilities shall be one of the water pollution control practices for waste management and materials pollution control. The Storm Water Pollution Prevention Plan shall include the use of temporary concrete washout facilities.

**10-1.05.5.1 MATERIALS**

**Plastic Liner**

Plastic liners shall be single ply, new polyethylene sheeting, a minimum of 10 mils thick and shall be free of holes, punctures, tears or other defects that compromise the impermeability of the material. Plastic liners shall not have seams or overlapping joints.

**Gravel-filled Bags**

Gravel bag fabric shall be non-woven polypropylene geotextile (or comparable polymer) and shall conform to the following requirements:

Specification	Requirements
Weight per unit area, ounces per square yard, min. ASTM Designation: D 5261	8.0
Grab tensile strength (one inch grip), kilonewtons, min. ASTM Designation: D 4632*	205
Ultraviolet stability, percent tensile strength retained after 500 hours, ASTM Designation: D 4355, xenon arc lamp method	70

\* or appropriate test method for specific polymer

Gravel bags shall be between 24 inches and 32 inches in length, and between 16 inches and 20 inches in width.

Yarn used for binding gravel bags shall be as recommended by the manufacturer or bag supplier and shall be of a contrasting color.

Gravel shall be between 3/8 inch and 3/4 inch in diameter, and shall be clean and free from clay balls, organic matter, and other deleterious materials.

The opening of gravel-filled bags shall be secured to prevent gravel from escaping. Gravel-filled bags shall be between 30 pounds and 50 pounds in weight.

**Straw Bales**

Straw for straw bales shall conform to the provisions in Section 13-10.02H, "Straw Bales," of the Standard Specifications.

Straw bales shall be a minimum of 14 inches in width, 18 inches in height, 36 inches in length and shall have a minimum weight of 50 pounds. The straw bale shall be composed entirely of vegetative matter, except for binding material.

Straw bales shall be bound by either wire, nylon or polypropylene string. Jute or cotton binding shall not be used. Baling wire shall be a minimum of 16 gage in diameter. Nylon or polypropylene string shall be approximately 0.08-inch in diameter with 80 pounds of breaking strength.

**Stakes**

Stakes shall be wood or metal. Wood stakes shall be untreated fir, redwood, cedar, or pine and cut from sound timber. They shall be straight and free of loose or unsound knots or other defects which would render them unfit for the purpose intended. Wood stakes shall be a minimum 2" x 2" in size. Metal stakes may be used as an alternative, and shall be a minimum of 0.5-inch in diameter. Stakes shall be a minimum of 4 feet in length. The tops of the metal stakes shall be bent at a 90-degree angle or capped with an orange or red plastic safety cap that fits snugly to the metal stake. The Contractor shall submit a sample of the metal stake and plastic cap, if used, for the Engineer's approval prior to installation.

#### **Staples**

Staples shall be as shown on the plans. An alternative attachment device such as geotextile pins or plastic pegs may be used instead of staples. The Contractor shall submit a sample of the alternative attachment device for the Engineer's approval prior to installation.

#### **Signs**

Wood posts for signs shall conform to the provisions in "Wood Posts," of the Standard Specifications. Lag screws shall conform to the provisions in "Sign Panel Fastening and Mounting Hardware," of the Standard Specifications.

Plywood shall be freshly painted for each installation with not less than 2 applications of flat white paint. Sign letters shown on the plans shall be stenciled with commercial quality exterior black paint. Testing of paint will not be required.

#### **10-1.05.5.2 INSTALLATION**

Temporary concrete washout facilities shall be as follows:

- A. Temporary concrete washout facilities shall be installed prior to beginning placement of concrete and located a minimum of 50 feet from storm drain inlets, open drainage facilities, and water courses unless determined infeasible by the Engineer. Temporary concrete washout facilities shall be located away from construction traffic or access areas at a location determined by the Contractor and approved by the Engineer.
- B. A sign shall be installed adjacent to each washout facility at a location determined by the Contractor and approved by the Engineer. Signs shall be installed in conformance with the provisions in "Construction," and "Sign Panel Installation," of the Standard Specifications.
- C. The length and width of a temporary concrete washout facility may be increased from the minimum dimensions shown on the plans, at the Contractor's expense and upon approval of the Engineer.
- D. Temporary concrete washout facilities shall be constructed in sufficient quantity and size to contain liquid and concrete waste generated by washout operations for concrete wastes. These facilities shall be constructed to contain liquid and concrete waste without seepage, spills, or overflow.
- E. Berms for below grade temporary concrete washout facilities shall be constructed from compacted native material. Gravel may be used in conjunction with compacted native material.
- F. A plastic liner shall be installed in below grade temporary concrete washout facilities.

Details for an alternative temporary concrete washout facility shall be submitted to the Engineer for approval at least 7 days prior to installation.

Temporary concrete washout facilities shall be disposed of in conformance with the provisions in Section 13-9, "Temporary Concrete Washouts," of the Standard Specifications.

Ground disturbance, including holes and depressions, caused by the installation and removal of the temporary concrete washout facilities shall be backfilled and repaired in conformance with the provisions in Section 15, "Existing Facilities," of the Standard Specifications.

#### **10-1.05.5.3 MAINTENANCE**

Temporary concrete washout facilities shall be maintained to provide adequate holding capacity with a minimum freeboard of 12 inches. Maintaining temporary concrete washout facilities shall include removing and disposing of hardened concrete and returning the facilities to a functional condition. Hardened concrete materials shall be removed and disposed of in conformance with the provisions in Section 13-9, "Temporary Concrete Washouts," of the Standard Specifications. Holes, rips, and voids in the plastic liner shall be patched and repaired by taping or the plastic liner shall be replaced. The plastic liner shall be

replaced when patches or repairs compromise the impermeability of the material as determined by the Engineer.

Gravel bags shall be replaced when the bag material is ruptured or when the yarn has failed, allowing the bag contents to spill out.

Temporary concrete washout facilities shall be repaired or replaced on the same day the damage occurs. Damage to temporary concrete washout facilities resulting from the Contractor's vehicles, equipment, or operations shall be repaired at the Contractor's expense.

#### **10-1.05.5.4 PAYMENT**

Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in constructing a temporary concrete washout facility, complete in place, including excavation and backfill, maintenance, and removal, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer shall be included in the various items of work requiring concrete and no additional compensation will be allowed.

### **10-1.06 PROPERTY AND FACILITY PRESERVATION**

Attention is directed to Section 5-1.36 "Property and Facility Preservation," of the Standard Specifications and these Special Provisions.

Existing utilities and facilities shall be preserved and protected from damage by the Contractor. An effort has been made to show existing surface and underground structures on the plans, however not all infrastructure may be shown, and infrastructure locations may be in different locations from those described. The Contractor is responsible for contacting all agencies and utility owners to verify the location of underground infrastructure prior to and during construction.

The Contractor shall be responsible to repair, restore, replace and stabilize, as closely as possible to existing condition any facilities, landscaping, or any other improvements, that are disturbed as a result of accessing or repairing the sewer lines or performing work associated with this contract.

Before starting any work that could damage or interfere with underground infrastructure, the Contractor shall pothole and locate existing infrastructure, including laterals and appurtenances, and shall determine the presence of other underground infrastructure inferred from visible facilities such as buildings, meters and junction boxes. Existing infrastructure damaged due to negligence of the Contractor shall be completely repaired at the Contractor's expense and in coordination with the effected utility owner.

The Contractor shall accurately tie off and record the location of all utility covers, cleanouts, pull boxes and manholes to be lowered or temporarily overlaid prior to raising to grade. A copy of said record shall be provided to the Engineer prior to resurfacing the street.

Existing trees, shrubs and other plants, that are not to be removed as shown on the plans or specified in these Special Provisions and are injured or damaged by reason of the Contractor's operations, shall be replaced by the Contractor. The minimum size of tree replacement shall be 24 inch box and the minimum size of shrub replacement shall be No. 15 container {15-gallon}. Replacement ground cover plants shall be from flats and shall be planted 12 inches on center. Replacement of Carpobrotus ground cover plants shall be from cuttings and shall be planted 12 inches on center. Replacement planting shall conform to the requirements in "Replacement Plants," of the Standard Specifications. The Contractor shall water replacement plants in conformance with the provisions in "Watering," of the Standard Specifications.

Damaged or injured plants shall be removed and disposed of outside the highway right of way in conformance with the provisions in 5-1.20B(4), "Contractor-Property Owner Agreement," of the Standard Specifications. At the option of the Contractor, removed trees and shrubs may be reduced to chips. The chipped material shall be spread within the highway right of way at locations designated by the Engineer.

Replacement planting of injured or damaged trees, shrubs, and other plants shall be completed prior to the start of the plant establishment period. Replacement planting shall conform to the provisions in Section 20-7, "Highway Planting," of the Standard Specifications.

Replacement planting of injured or damaged trees, shrubs and other plants shall be completed not less than 20 working days prior to acceptance of the contract. Replacement plants shall be watered as necessary to maintain the plants in a healthy condition.

Survey monuments and markers shown on the plans or encountered within the project limits shall be protected from damage by the Contractor. The Contractor shall notify the Engineer of monuments encountered and shall not remove or disturb said monument until the monument can be cross-referenced and tied out by a licensed surveyor. The Contractor shall allow a minimum of one working day for such referencing to be accomplished. When notified by the Engineer that the ties have been completed, the monument or marker can then be removed. The Contractor is not responsible for the replacement of any monument or marker of which the removal is necessitated by the work performed and which has been referenced and tied. If through negligence or carelessness on the part of the Contractor, notification is not made as provided above, markers are removed, or disturbed which are not in direct conflict with the construction, the Contractor shall be responsible for the

cost of referencing, resurveying, and replacement of the monument or marker. Such sums for the replacement shall be deducted from the final contract payment.

Full compensation for conforming to the provisions of this section shall be considered as included in the prices paid for the various Contract items of work involved and no additional compensation will be allowed.

#### **10-1.07 COOPERATION**

Attention is directed to Section 5-1.09, "Partnering," and Section 5-1.20, "Coordination with Other Entities," of the Standard Specifications and these Special Provisions. Attention is also directed to "General Requirements" of these Special Provisions.

Following is a list of some, but not necessarily all, of the utility companies that may have facilities in the project area:

<u>Utility Company</u>	<u>Contact Person</u>	<u>Telephone Number</u>
Pacific Gas & Electric	Lee Wells	530-477-3254
AT&T	Astrid Willard	916-484-2388
Comcast Cable	Justin Haggin	530-790-3369
City of Grass Valley – Sewer/Water/Storm Drain	Public Works Department	530-274-4350
California Department of Transportation (Caltrans)	District 3 Office	530-741-5474

The Contractor shall coordinate with Pacific Gas and Electric Company for the removal, relocation, repair, or disturbance of any gas or electric facilities caused by project work.

The Contractor shall coordinate with the AT&T for the removal, relocation, repair, or disturbance of any telecommunications facilities caused by project work.

The Contractor shall coordinate with the Comcast Cable for the removal, relocation, repair, or disturbance of any cable television facilities caused by project work.

The Contractor shall coordinate with the City of Grass Valley for the removal, relocation, repair, or disturbance of any water, sewer storm drain facilities caused by project work.

The Contractor shall coordinate with Caltrans for any traffic control, clearing grubbing or any improvement, repair, or disturbance within State right of way caused by project work.

Any utilities not listed above or damaged by the Contractor during the course of project work shall be repaired or replaced in cooperation with the affected utility company.

The Contractor shall provide sufficient notification to the affected utility company to allow time for scheduling and completion of the required work. Any delays resulting from the Contractor's failure to properly notify or schedule utility company work shall be at the Contractor's expense.

Full compensation for conforming to the provisions of this section shall be considered as included in prices paid for the various Contract items of work involved and no additional compensation will be allowed.

#### **10-1.08 PROGRESS SCHEDULE**

Progress schedules are required for this contract and shall be submitted in conformance with the provisions in Section 8-1.02, "Schedule," of the Standard Specifications and these Special Provisions. The Contractor shall notify the Engineer on a daily basis of the areas of work scheduled for the following day.

The Contractor shall submit to the Engineer a practicable "Critical Path Method" progress schedule within 10 working days of approval of the contract, and within 10 working days of the Engineer's written request at any other time.

The progress schedule shall follow the general order of work detailed in "General Requirements," of these Special Provisions, and shall meet the milestones listed in "Beginning of Work, Time of Completion, and Liquidated Damages," of these Special Provisions.

Full compensation for conforming to the provisions of this section shall be considered as included in prices paid for the various Contract items of work involved and no additional compensation will be allowed.

#### **10-1.09 OBSTRUCTIONS**

Attention is directed to Section 5-1.20, "Coordination with Other Entities," of the Standard Specifications and of these Special Provisions.

Attention is directed to the existence of certain underground facilities that may require special precautions be taken by the Contractor to protect the health, safety and welfare of workers and of the public. Facilities requiring special precautions include, but are not limited to: natural gas in pipelines underground electric supply system conductors or cables, with potential to ground of more than 300 V, either directly buried or in a duct or conduit which do not have concentric grounded or other effectively grounded metal shields or sheaths, water mains, gravity sanitary sewer lines, and telephone conduits.

The Contractor shall notify the Engineer and the appropriate regional notification center for operators of subsurface installations at least 2 working days, but not more than 14 calendar days, prior to performing any excavation or other work

close to any underground pipeline, conduit, duct, wire or other structure. Regional notification centers include, but are not limited to, the following:

Notification Center	Telephone Number
Underground Service Alert – Northern California (USA)	1-800-227-2600

The Contractor is hereby notified that prior to commencing construction, he is responsible for contacting all utility companies for verification at the construction site of the locations of all underground facilities that may conflict with the placement of the improvements shown on the plans. Where potential conflict exists, the Contractor shall pothole existing utilities to determine their elevation. Call “Underground Service Alert” at 800-227-2600 forty-eight (48) hours before any excavation is started.

Full compensation for conforming to the provisions of this section, including exposing existing utilities, and any potholing, not otherwise provided for, shall be considered as included in the prices paid for the various Contract items of work involved and no additional compensation will be allowed.

**10-1.10 DUST CONTROL**

Dust control shall conform to the provisions in "Dust Control," of the Standard Specifications and these Special Provisions.

Full compensation for conforming to the provisions of this section shall be considered as included in the prices paid for the various Contract items of work involved and no additional compensation will be allowed.

**10-1.11 MOBILIZATION**

Mobilization shall conform to the provisions in the Standard Specifications and these Special Provisions.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all work involved in “Mobilization,” including but not limited to the movement of personnel, equipment, supplies and incidentals to the project site shall be included in the contract lump sum price paid for “Mobilization,” and no additional compensation will be allowed.

**10-1.12 TRAFFIC CONTROL SYSTEM**

A traffic control system shall consist of closing traffic lanes in conformance with the details shown on the plans, the provisions in Section 12, "Temporary Traffic Control," of the Standard Specifications, the provisions in "Maintaining Traffic," “Closure Requirements and Conditions,” and "Construction Area Signs," of these Special Provisions.

The provisions in this section will not relieve the Contractor from the responsibility to provide additional devices or take measures as may be necessary to comply with the provisions in Section 7-1.04, "Public Safety," of the Standard Specifications.

Any existing traffic stripes, pavement marking and pavement markers that are obliterated or removed by the Contractor or as directed by the Engineer shall be reinstalled by the Contractor before the completion of this project. Any conflicting markings shall be completely removed as identifiable pavement markings under daylight or at night, wet or dry conditions.

If components in the traffic control system are displaced or cease to operate or function as specified, from any cause, during the progress of the work, the Contractor shall immediately repair the components to the original condition or replace the components and shall restore the components to the original location.

During traffic stripe operations and pavement marker placement operations using bituminous adhesive, traffic shall be controlled, at the option of the Contractor, with either stationary or moving lane closures. During other operations, traffic shall be controlled with stationary lane closures.

STATIONARY TYPE LANE CLOSURE: When lane closures are made for work periods only, at the end of each work period, components of the traffic control system, except portable delineators placed along open trenches or excavation adjacent to the traveled way, shall be removed from the traveled way and shoulder. If the Contractor so elects, the components may be stored at selected central locations designated by the Engineer within the limits of the highway right of way.

Each vehicle used to place, maintain, and remove components of a traffic control system on multi lane highways shall be equipped with a Type II flashing arrow sign and radios which shall be in operation when the vehicle is being used for placing, maintaining, or removing the components. Vehicles equipped with Type II flashing arrow sign not involved in placing, maintaining, or removing the components when operated within a stationary type lane closure shall only display the caution display mode. The sign shall be controllable by the operator of the vehicle while the vehicle is in motion. The flashing arrow sign shown on the plans shall not be used on the vehicles which are doing the placing, maintaining, and removing of components of a traffic control system, and shall be in place before a lane closure requiring its use is completed.

When flaggers are required, they shall have radios and be in contact with personnel in the work area.



One-way traffic shall be controlled through the project in conformance with the Caltrans Standard Plan T-13, "Traffic Control System for Lane Closure on Two Lane Conventional Highways" and these Special Provisions.

MOVING LANE CLOSURE: Flashing arrow signs used in moving lane closures shall be truck-mounted. Changeable message signs used in moving lane closure operations shall conform to the provisions in "Portable Changeable Message Signs," of the Standard Specifications, except the signs shall be truck-mounted and the full operation height of the bottom of the sign may be less than 7 feet above the ground, but should be as high as practicable.

Flashing arrow signs shall be in the caution display mode when used on 2-lane, 2-way highways.

Truck-mounted attenuators (TMA) for use in moving lane closures shall be any of the following approved models, or equal:

- A. Hexfoam TMA Series 3000, Alpha 1000 TMA Series 1000 and Alpha 2001 TMA Series 2001, manufactured by Energy Absorption Systems, Inc., One East Wacker Drive, Chicago, IL 60601-2076, telephone (312) 467-6750
  1. Distributor (northern): Traffic Control Service, Inc., 8585 Thys Court, Sacramento, CA 95828, telephone (800) 884-8274, FAX (916) 387-9734
  2. Distributor (southern): Traffic Control Service, Inc., 1881 Betmor Lane, Anaheim, CA 92805, telephone (800) 222-8274
- B. Cal T-001 Model 2 or Model 3, manufacturer and distributor: Hexcel Corporation, 11711 Dublin Boulevard, P.O. Box 2312, Dublin, CA 94568, telephone (925) 551-4900
- C. Renco Rengard Model Nos. CAM 8-815 and RAM 8-815, manufacturer and distributor: Renco Inc., 1582 Pflugerville Loop Road, P.O. Box 730, Pflugerville, TX 78660-0730, telephone (800) 654-8182

Each TMA shall be individually identified with the manufacturer's name, address, TMA model number, and a specific serial number. The names and numbers shall each be a minimum ½ inch high and located on the left (street) side at the lower front corner. The TMA shall have a message next to the name and model number in ½ inch high letters which states, "The bottom of this TMA shall be \_\_\_\_\_ inches ± \_\_\_\_\_ inch above the ground at all points for proper impact performance." Any TMA which is damaged or appears to be in poor condition shall not be used unless recertified by the manufacturer. The Engineer shall be the sole judge as to whether used TMAs supplied under this contract need recertification. Each unit shall be certified by the manufacturer to meet the requirements for TMA in conformance with the standards established by the Transportation Laboratory.

Approvals for new TMA designs proposed as equal to the above approved models shall be in conformance with the procedures (including crash testing) established by the Transportation Laboratory. For information regarding submittal of new designs for evaluation contact: Transportation Laboratory, 5900 Folsom Boulevard, Sacramento, California 95819.

New TMAs proposed as equal to approved TMAs or approved TMAs determined by the Engineer to need recertification shall not be used until approved or recertified by the Transportation Laboratory.

Contractor shall submit a traffic control plan to the Engineer for acceptance prior to beginning any construction activities. All such plans shall conform to Section 12, "Temporary Traffic Control," of the Standard Specifications, the Manual of Traffic Control, and these Special Provisions.

Traffic control system required by work, which is classed as extra work, as provided in Section 4-1.05, "Changes and Extra Work," of the Standard Specifications, will be paid for as a part of the extra work.

Full compensation for furnishing all labor (including flagging costs), materials (including signs, markings, and markers), tools, equipment, and incidentals and for doing all work involved in "Traffic Control System," including, but not limited to, placing, removing, storing, maintaining, moving to new locations, replacing and disposing of the components of the accepted Traffic Control Plan, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer shall be considered as included in the Contract lump sum price paid for "Traffic Control System," and no additional compensation will be allowed.

Attention is directed to Sections 9-1.16, "Progress Payments," and 9-1.17, "Payment After Contract Acceptance," of the Standard Specifications and these Special Provisions. Payments for the contract item "Traffic Control System" will be made on the basis of the percent of work done on all items of work excluding the item for "Traffic Control System."

The adjustment provisions in Section 4-1.05, "Changes and Extra Work," of the Standard Specifications shall not apply to the item of traffic control system. Adjustments in compensation for traffic control system will be made only for increased or decreased traffic control system required by changes ordered by the Engineer and will be made on the basis of the cost of the increased or decreased traffic control necessary. The adjustment will be made on a force account basis as provided in Section 9-1.04, "Force Account," of the Standard Specifications for increased work and estimated on the same basis in the case of decreased work.

#### **10-1.12.1 TRAFFIC CONTROL PLAN**

The Traffic Control Plan for controlling the traffic and parking, including shoulder closures, detours and lane closures on City roadways, applicable bikeways, pedestrian facilities, and State Highways in conjunction with the work shall be submitted by the Contractor. The Traffic Control Plan shall be consistent with all specific site conditions and work conditions for this project.

Contractor shall submit three (3) copies of a proposed Traffic Control Plan to the City Engineer for review and comments no later than five (5) working days after the pre-construction conference. Construction shall not begin until the traffic control plan has been reviewed and accepted by the City Engineer. The contractor shall allow five (5) working days for review by the City. If revisions are required, as determined by the City Engineer, the Contractor shall revise and resubmit the Traffic Control Plan within five (5) calendar days of receipt of comments and shall allow five (5) working days for review of the revised traffic control plans. Upon acceptance of the Traffic Control Plan by the City Engineer, three (3) additional copies of the traffic control plan, incorporating all the required changes, shall be submitted to the City Engineer. Failure to submit an acceptable traffic control plan shall not in any way delay the start of the contract working days. The Traffic Control Plan shall be prepared and stamped by a Civil Engineer or Traffic Engineer licensed to practice engineering in the State of California. If the Contractor makes significant changes to the accepted Traffic Control Plan, these changes must also be prepared and stamped by a licensed Civil Engineer or Traffic Engineer.

The Traffic Control Plan shall conform to the Plans, Standard Specifications, the California MUTCD dated September 26, 2006, Section 12, "Temporary Traffic Control," of the Standard Specifications, and these Special Provisions.

The Traffic Control Plan shall be accepted by the Engineer prior to the start of construction. The Contractor shall not proceed with any construction until proper traffic control has been provided to the satisfaction of the Engineer. Failure to comply with any specification herein or with direction from the Engineer may result in work stopped until compliance is restored.

Any lost days due to improper traffic control will be charged against the Contractor's allowable working days.

The Contractor's Traffic Control Plan shall include and detail pedestrian access facilities through the construction areas within the Project right of way in accordance with Section 12-4, "Maintaining Traffic" of the Standard Specifications, for review and acceptance by the Engineer.

The Traffic Control Plan shall include preparation of a plan for the work to be performed within the project limits including, but not limited to, all flagging, signs, portable message signs, barricades, temporary striping, cones, pedestrian access facilities and other incidentals associated with, but not limited to, the widening of the roadway, installation of signal poles and conduits and reconstruction of sidewalks.

Acceptance by the City Engineer of the submitted traffic control plan shall in no way relieve the Contractor of his responsibility for any and all safety requirements conforming to the Standard Specifications, these Special Provisions or others of any public authority having jurisdiction for the safety of persons and property, or to protect them from damage, injury or loss.

Full compensation for conforming to the provisions of this section shall be considered as included in the Contract lump sum price paid for "Traffic Control System," and no additional compensation will be allowed.

#### **10-1.13 CONSTRUCTION AREA TRAFFIC CONTROL DEVICES**

Flagging, signs, and temporary traffic control devices furnished, installed, maintained, and removed when no longer required shall conform to the provisions in Section 12, "Temporary Traffic Control," of the Standard Specifications and these Special Provisions.

Category 1 temporary traffic control devices are defined as small and lightweight (less than 100 pounds) devices. These devices shall be certified as crashworthy by crash testing, crash testing of similar devices, or years of demonstrable safe performance. Category 1 temporary traffic control devices include traffic cones, plastic drums, portable delineators, and channelizers.

If requested by the Engineer, the Contractor shall provide written self-certification for crashworthiness of Category 1 temporary traffic control devices at least 5 days before beginning any work using the devices or within 2 days after the request if the devices are already in use. Self-certification shall be provided by the manufacturer or Contractor and shall include the following:

- A. Date,
- B. Federal Aid number (if applicable),
- C. Contract number, district, county, route and post mile of project limits,
- D. Company name of certifying vendor, street address, city, state and zip code,
- E. Printed name, signature and title of certifying person; and
- F. Category 1 temporary traffic control devices that will be used on the project.

The Contractor may obtain a standard form for self-certification from the Engineer.

Category 2 temporary traffic control devices are defined as small and lightweight (less than 100 pounds) devices that are not expected to produce significant vehicular velocity change but may cause potential harm to impacting vehicles. Category 2 temporary traffic control devices include barricades and portable sign supports.

Category 2 temporary traffic control devices shall be on the Federal Highway Administration's (FHWA) list of Acceptable Crashworthy Category 2 Hardware for Work Zones. This list is maintained by FHWA and can be located at:

[http://safety.fhwa.dot.gov/roadway\\_dept/road\\_hardware/listing.cfm?code=workzone](http://safety.fhwa.dot.gov/roadway_dept/road_hardware/listing.cfm?code=workzone).

The Department also maintains this list at:

<http://www.dot.ca.gov/hq/traffops/signtech/signdel/pdf/Category2.pdf>.

Category 2 temporary traffic control devices that have not received FHWA acceptance shall not be used. Category 2 temporary traffic control devices in use that have received FHWA acceptance shall be labeled with the FHWA acceptance letter number and the name of the manufacturer. The label shall be readable and permanently affixed by the manufacturer. Category 2 temporary traffic control devices without a label shall not be used.

If requested by the Engineer, the Contractor shall provide a written list of Category 2 temporary traffic control devices to be used on the project at least 5 days before beginning any work using the devices or within 2 days after the request if the devices are already in use.

Category 3 temporary traffic control devices consist of temporary traffic-handling equipment and devices that weigh 100 pounds or more and are expected to produce significant vehicular velocity change to impacting vehicles. Temporary traffic-handling equipment and devices include crash cushions, truck-mounted attenuators, temporary railing, temporary barrier, and end treatments for temporary railing and barrier.

Type III barricades may be used as sign supports if the barricades have been successfully crash tested, meeting the NCHRP Report 350 criteria, as one unit with a construction area sign attached.

Category 3 temporary traffic control devices shall be shown on the plans or on the Department's Highway Safety Features list. This list is maintained by the Division of Engineering Services and can be found at: [http://www.dot.ca.gov/hq/esc/approved\\_products\\_list/HighwaySafe.htm](http://www.dot.ca.gov/hq/esc/approved_products_list/HighwaySafe.htm).

Category 3 temporary traffic control devices that are not shown on the plans or not listed on the Department's Highway Safety Features list shall not be used.

Full compensation for providing self-certification for crashworthiness of Category 1 temporary traffic control devices and for providing a list of Category 2 temporary traffic control devices used on the project shall be considered as included in the prices paid for the various Contract items of work requiring the use of the Category 1 or Category 2 temporary traffic control devices and no additional compensation will be allowed.

#### 10-1.14 CONSTRUCTION AREA SIGNS

Construction Area Signs shall be furnished, installed, maintained, and removed when no longer required in conformance with the provisions in Section 12, "Temporary Traffic Control," of the Standard Specifications and these Special Provisions.

Attention is directed to the provisions in "Pre-qualified and Tested Signing and Delineation Materials" of these Special Provisions. Type II retroreflective sheeting shall not be used on construction area sign panels. Type III, IV, VII, VIII, or IX retroreflective sheeting shall be used for stationary mounted construction area sign panels.

Orange background on construction area signs shall be fluorescent orange.

Repair to construction area sign panels will not be allowed, except when approved by the Engineer. At nighttime under vehicular headlight illumination, sign panels that exhibit irregular luminance, shadowing or dark blotches shall be immediately replaced at the Contractor's expense.

The Contractor shall notify the appropriate regional notification center for operators of subsurface installations at least 2 working days, but not more than 14 calendar days, prior to commencing excavation for construction area sign posts. The regional notification centers include, but are not limited to, the following:

Notification Center	Telephone Number
Underground Service Alert – Northern California (USA)	(800) 642-2444 (800) 227-2600

Excavations required to install construction area signs shall be performed by hand methods without the use of power equipment, except that power equipment may be used if it is determined there are no utility facilities in the area of the proposed post holes. The post hole diameter, if backfilled with Portland cement concrete, shall be at least 4 inches greater than the longer dimension of the post cross section.

Construction area signs placed within 15 feet from the edge of the travel way shall be mounted on stationary mounted sign supports as specified in "Construction Area Traffic Control Devices" of these Special Provisions.

The Contractor shall maintain accurate information on construction area signs. Signs that are no longer required shall be immediately covered or removed. Signs that convey inaccurate information shall be immediately replaced or the information shall be corrected. Covers shall be replaced when they no longer cover the signs properly. The Contractor shall immediately restore to the original position and location any sign that is displaced or overturned, from any cause, during the progress of work.

The Contractor may be required to cover certain signs during the progress of the work. Signs that are no longer required or that convey inaccurate information to the public shall be immediately covered or removed or the information shall be corrected. Covers for construction area signs shall be of sufficient size and density to completely block out the complete face of the signs. The reflective face of the covered signs shall not be visible either during the day or at night. Covers shall be fastened securely so that the signs remain covered during inclement weather. Covers shall be replaced when they no longer cover the signs properly.

Construction Area Signs shown on the Contractor's accepted Traffic Control Plan, or as directed by the Engineer, shall be included in the Contract price paid for, "Traffic Control System," and shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in furnishing construction area signs required for the direction of public traffic through or around the work and for erecting or placing, maintaining (including covering and uncovering as needed) and, when no longer required, removing construction area signs.

#### **10-1.15 TEMPORARY OBJECT MARKERS**

Object markers shall be stationary mounted on wood or metal posts in conformance with the details shown on the plans and the provisions in "Markings," of the Standard Specifications.

Marker panels for Type P object markers shall conform to the provisions for sign panels for stationary mounted signs.

Full compensation for furnishing, placing, maintaining, and removing temporary object markers, including but not limited to for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in Temporary Object Markers, complete in place, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, as required per the Contractor's accepted Traffic Control Plan, and as directed by the Engineer shall be considered as included in the Contract prices paid for the various items of work and no separate payment will be made.

#### **10-1.16 MAINTAINING TRAFFIC**

Attention is directed to Sections 7-1.03, "Public Convenience," 7-1.04, "Public Safety," and 12, "Temporary Traffic Control," of the Standard Specifications and these Special Provisions. Nothing in these Special Provisions shall be construed as relieving the Contractor from the responsibilities specified in Section 7-1.04, "Public Safety."

Lane closures shall conform to the provisions in "Closure Requirements and Conditions," and "Traffic Control System" of these Special Provisions.

The full width of the travel way shall remain open for public use at all times unless otherwise specified in these Special Provisions or approved by the City Engineer.

Construction activity requiring lane closures shall conform to the following restrictions;

- **The travel way of primary residential streets may be reduced to one 11 foot lane of traffic with two way stop control between the hours of 7:00am to 7:00pm, as necessary and subject to the approval of the Engineer.**
- **The travel way of minor residential streets may be closed to through traffic between the hours of 7:00am to 7:00pm, as necessary and subject to the approval of the Engineer.**
- **The travel way of park access roads may be reduced to one 10 foot lane of traffic between the hours of 7:00am to 7:00pm, as necessary and subject to the approval of the Engineer.**

Five days advance notice shall be given to all residents, businesses and local authorities prior to beginning work involving full street closures and/or closures to one lane. The Contractor shall accommodate any special needs that arise that may require ingress and egress to a property.

The Contractor may request day and/or weekend hours of work, which do not significantly change the cost of the work may be permitted upon the written request of the Contractor if, in the opinion of the Engineer, public traffic will be better served and the work expedited. These deviations shall not be adopted by the Contractor until the Engineer has approved them in writing. All other modifications will be made by contract change order.

The Contractor shall provide access to parking lots, driveways, residences and businesses at all times unless otherwise specified in these Special Provisions or approved by the City Engineer. Access to parking lots, driveways, and businesses within the project area shall be detailed in the Contractor's Traffic Control Plan for review and acceptance by the Engineer. Five days advance notice shall be given to all residents, businesses and local authorities prior to beginning work involving temporary closures to driveways or parking lots.

Personal vehicles of the Contractor's employees shall not be parked on the traveled way or shoulders, including any section closed to public traffic.

The Contractor shall notify local authorities of the Contractor's intent to begin work at least 7 days before work is begun. The Contractor shall cooperate with local authorities relative to handling traffic through the area and shall make arrangements relative to keeping the working area clear of parked vehicles.

Whenever work vehicles or equipment are parked on the shoulder within 6 feet of a traffic lane, the shoulder area shall be closed with fluorescent orange traffic cones or portable delineators placed on a taper in advance of the parked vehicles or equipment and along the edge of the pavement at 25-foot intervals to a point not less than 25 feet past the last vehicle or piece of equipment. A minimum of 9 traffic cones or portable delineators shall be used for the taper. A W20-1 (ROAD WORK AHEAD) or W21-5b (RIGHT/LEFT SHOULDER CLOSED AHEAD) or C24(CA) (SHOULDER WORK AHEAD) sign shall be mounted on a portable sign stand with flags. The sign shall be placed where designated by the Engineer and/or as required as part of the Contractor's accepted Traffic Control Plan. The sign shall be a minimum of 48" x 48" in size. The Contractor shall immediately restore to the original position and location a traffic cone or delineator that is displaced or overturned, during the progress of work.

Minor deviations from the requirements of this section concerning hours of work which do not significantly change the cost of the work may be permitted upon the written request of the Contractor if, in the opinion of the Engineer, public traffic will be better served and the work expedited. These deviations shall not be adopted by the Contractor until the Engineer has approved them in writing. All other modifications will be made by contract change order.

When traffic cones or delineators are used to delineate a temporary edge of traffic lane, the line of cones or delineators shall be considered to be the edge of the traffic lane. The lane closure provisions of this section shall not apply if the work area is protected by a temporary railing or barrier.

Pedestrian and bicycle access facilities shall be provided through construction areas within the right of way, unless otherwise approved by the Engineer, and included in the Contractor's Traffic Control Plan for review and acceptance by the Engineer.

Full compensation for all flagging costs required for contract items and work within the Project Limits shall be included in the contract price paid for "Traffic Control System" and no additional compensation will be allowed.

Full compensation for furnishing all signs, pedestrian and bicycle access facilities, posting signs, detours, lane closures, materials, tools, equipment, and incidentals and for doing all work involved in "Maintaining Traffic" complete in place as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer will be included in the Contract lump sum price paid for "Traffic Control System" and no additional compensation will be allowed.

#### **10-1.17 CLOSURE REQUIREMENTS AND CONDITIONS**

Lane closures shall conform to the provisions in "Maintaining Traffic" of the Standard Specifications and these Special Provisions.

The term closure, as used herein, is defined as the closure of a traffic lane or lanes, including ramp or connector lanes, within a single traffic control system.

##### **10-1.17.1 CLOSURE SCHEDULE**

By noon Monday, the Contractor shall submit a written schedule of planned closures for the following week period, defined as Friday noon through the following Friday noon.

The Closure Schedule shall show the locations and times when the proposed closures are to be in effect. The Contractor shall submit the Closure Schedule request in a form acceptable to the City for approval. Closure Schedules submitted to the Engineer with incomplete, unintelligible or inaccurate information will be returned for correction and resubmittal. The Contractor will be notified of disapproved closures or closures that require coordination with other parties as a condition of approval.

Amendments to the Closure Schedule, including adding additional closures, shall be submitted to the Engineer, in writing, at least 3 working days in advance of a planned closure. Approval of amendments to the Closure Schedule will be at the discretion of the Engineer.

The Contractor shall confirm, in writing, all scheduled closures by no later than 8:00 a.m. 3 working days prior to the date on which the closure is to be made. Approval or denial of scheduled closures will be made no later than 4:00 p.m. 2 working days prior to the date on which the closure is to be made. Closures not confirmed or approved will not be allowed.

Confirmed closures that are cancelled due to unsuitable weather may be rescheduled at the discretion of the Engineer for the following working day.

##### **10-1.17.2 CONTINGENCY PLAN**

The Contractor shall prepare a contingency plan for reopening closures to public traffic. The Contractor shall submit the contingency plan for a given operation to the Engineer within one working day of the Engineer's request.

### **10-1.17.3 LATE REOPENING OF CLOSURES**

If a closure is not reopened to public traffic by the specified time, work shall be suspended in conformance with the provisions in Section 8-1.06, "Suspensions," of the Standard Specifications. The Contractor shall not make any further closures until the Engineer has accepted a work plan, submitted by the Contractor, that will insure that future closures will be reopened to public traffic at the specified time. The Engineer will have 2 working days to accept or reject the Contractor's proposed work plan. The Contractor will not be entitled to any compensation for the suspension of work resulting from the late reopening of closures.

For each 30-minute interval, or fraction thereof past the time specified to reopen the closure, the City will deduct \$200 per interval from moneys due or that may become due the Contractor under the Contract.

### **10-1.17.4 PAYMENT**

The Contractor shall notify the Engineer of any delay in the Contractor's operations due to the following conditions, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of those conditions, and the Contractor's loss due to that delay could not have been avoided by rescheduling the affected closure or by judicious handling of forces, equipment and plant, time or payment adjustments shall be determined in conformance with the provisions in Section 8-1.07 "Delays" of the Standard Specifications:

- A. The Contractor's proposed Closure Schedule is denied and his planned closures are within the time frame allowed for closures in "Maintaining Traffic" of these Special Provisions, except that the Contractor will not be entitled to any compensation for amendments to the Closure Schedule that are not approved.
- B. The Contractor is denied a confirmed closure.

Should the Engineer direct the Contractor to remove a closure prior to the time designated in the approved Closure Schedule, any delay to the Contractor's schedule due to removal of the closure will be considered a delay and time or payment adjustments shall be determined in conformance with the provisions in Section 8-1.07 "Delays" of the Standard Specifications.

Full compensation for conforming to the provisions of this section shall be considered as included in the Contract lump sum price paid for "Traffic Control System," and no additional compensation will be allowed.

### **10-1.18 FLAGGING COSTS**

The first paragraph of Section 12-1.03, "Construction," of the Standard Specifications is amended in its entirety to read as follows:

Full compensation for furnishing all flaggers, including transporting flaggers, and providing stands, towers, or lights for use of flaggers to provide for passage of public traffic through the work under the provisions in Sections 7-1.03, "Public Convenience," and 7-1.04, "Public Safety," of the Standard Specifications shall be considered as included in the Contract lump sum price paid for "Traffic Control System" and no additional compensation will be allowed.

### **10-1.19 PARK DEMOLITION AND REMOVAL**

This work shall consist of removing existing facilities and structures which interfere with construction in the specified work area as shown on the plans and as specified in these Special Provisions. Attention is directed to Section 15, "Existing Facilities" of the Standard Specifications and these Special Provisions.

#### **10-1.19.1 REMOVE ASPHALT CONCRETE**

Existing asphalt concrete surfacing, and underlying base material shall be removed as needed, as shown on the plans and in conformance with these Special Provisions.

Attention is directed to the provisions in "Park Demolition and Removal," and "Buried Man-Made Objects," of the Standard Specifications and these Special Provisions.

That portion of the asphalt concrete area to be removed abutting asphalt concrete to remain in place shall be cut on neat lines with a power-driven saw before removing the surfacing, unless approved by the Engineer.

Surfacing and base shall be removed without damage to surfacing that is to remain in place. Damage to pavement which is to remain in place shall be repaired to a condition satisfactory to the Engineer or the damaged pavement shall be removed and replaced with new asphalt concrete if ordered by the Engineer. Repairing or removing and replacing pavement damaged outside the limits of pavement to be replaced shall be at the Contractor's expense and will not be measured nor paid for.

Removed materials shall be disposed of outside the highway right of way.

The material remaining in place, after removing surfacing and base to the required depth, shall be graded to a plane, watered, and compacted as deemed necessary by the Engineer.

Areas of the base material which are low as a result of over excavation shall be filled, at the Contractor's expense, with asphalt concrete.

The exact limits of asphalt concrete surfacing to be removed and replaced, as shown on the plans, will be determined by the Engineer.

Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in removing asphalt concrete, including, but not limited to, sawcutting, disposal, excavation and backfill as shown on the plans, as specified in the Standard Specifications and these Special Provisions and as directed by the Engineer, shall be included in the contract lump sum paid for "Park Demolition and Removal" and no additional compensation will be allowed.

#### **10-1.19.2 REMOVE CONCRETE**

Existing concrete, shown on the plans to be removed shall be completely removed and disposed of in accordance with "Removing Concrete" of the Standard Specifications and these Special Provisions.

Attention is directed to the provisions in "Clearing and Grubbing," and "Buried Man-Made Objects," of the Standard Specifications and these Special Provisions.

Adjacent facilities damaged during concrete removal shall be repaired to a condition satisfactory to the Engineer or shall be removed and replaced if ordered by the Engineer. Repairing or removing and replacing damaged facilities shall be at the Contractor's expense and no additional compensation will be allowed. Attention is directed to hand stacked granite walls that may abut portions of the concrete to be removed. Care shall be taken in sawcutting and working next these walls and any damage to the walls shall be repaired at the Contractor's expense.

Where concrete adjacent to stone retaining walls is to be removed, the concrete must be saw cut 6 inches from the wall or the base of the curb perpendicular to the street. The concrete can then be removed using hand tools in order to eliminate the potential for damage to the stone retaining walls.

Concrete shall be completely removed and disposed of outside the highway right of way.

Depressions left after concrete removal shall be immediately backfilled with sand cement slurry or Class 2 Aggregate Base and compacted sufficiently to obtain an unyielding surface.

Removal of concrete shall include removal of sidewalks, curbs, gutters, driveways and miscellaneous concrete curbs as shown on the plans to be removed.

Reinforcing or other steel may be encountered in portions of the concrete. No additional compensation will be allowed for the removal of concrete containing reinforcing or steel.

Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved including, but not limited to, sawcutting, disposal, excavation and backfill as shown on the plans, as specified the Standard Specifications and these Special Provisions and as directed by the Engineer, shall be included in the contract lump sum paid for "Park Demolition and Removal" and no additional compensation will be allowed.

#### **10-1.19.3 REMOVE STRUCTURE**

Existing structures, shown on the plans to be removed shall be completely removed and disposed of including all structural members, non-structural members, architectural components and any utilities present.

Adjacent facilities damaged during structure removal shall be repaired to a condition satisfactory to the Engineer or shall be removed and replaced if ordered by the Engineer. Repairing or removing and replacing damaged facilities shall be at the Contractor's expense and no additional compensation will be allowed.

Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved including, but not limited to, removal and disposal of existing structures, as shown on the plans, as specified the Standard Specifications and these Special Provisions and as directed by the Engineer, shall be included in the contract lump sum paid for "Park Demolition and Removal" and no additional compensation will be allowed.

#### **10-1.19.4 REMOVE POST**

Existing posts shown on the plans and corresponding overhead powerlines to be removed shall be completely removed and disposed of outside the highway right of way in accordance with the provisions of the Standard Specifications, the project plans and these Special Provisions. Removal of posts shall include complete removal of the concrete footings. Depressions left after concrete removal shall be backfilled with sand cement slurry or Class 2 Aggregate Base and compacted sufficiently to obtain an unyielding surface.

The Contractor's attention is directed to the requirements of "PGE Electrical Coordination", of these Special Provisions for payment details regarding correspondence with PGE regarding the removal of overhead lines.

Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in post removal, including, but not limited to removal, excavation, hauling and disposal, and backfilling, as shown on the plans, as specified in the Standard Specifications and these Special Provisions and as

directed by the Engineer, shall be included in the contract lump sum paid for “Park Demolition and Removal” and no additional compensation will be allowed.

#### **10-1.19.5 RELOCATE DRAINAGE INLET**

This work includes removing and installing existing storm drainage inlets in a new location as shown on the plans including reconnecting adjacent drainage pipe and replacing concrete collars of the drainage inlet as necessary, and shall conform to the provisions of the Standard Specifications and these Special Provisions.

Full compensation for furnishing all labor, materials, including pipe, tools, equipment, and incidentals, and for doing all the work involved in the relocation of drainage inlets, including, but not limited to excavation, backfill, compaction, and installation, shall be included in the contract unit price paid per for “Park Demolition and Removal” and no additional compensation will be allowed.

#### **10-1.19.6 REMOVE SIGN**

Existing signs, posts and sign hardware, shown on the plans to be removed shall be removed and disposed of in accordance with the requirements of the Standard Specifications and these Special Provisions.

Concrete footings for signs, and sign posts deemed unusable by the Engineer, shall be removed and disposed of outside the highway right of way in accordance with the provisions of the Standard Specifications, the project plans and these Special Provisions.

Signs, sign hardware and salvageable posts shall be delivered to the City’s corporation yard at 556 Freeman Lane.

Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in sign removal, including, but not limited to removal, excavation, hauling and disposal, and backfilling, as shown on the plans, as specified in the Standard Specifications and these Special Provisions and as directed by the Engineer, shall be included in the contract lump sum paid for “Park Demolition and Removal” and no additional compensation will be allowed.

#### **10-1.19.7 REMOVE AND SALVAGE SIGN**

Existing signs, posts, sign hardware, and decorative artifacts shown on the plans to be removed shall be carefully removed and salvaged in accordance with the requirements of the Standard Specifications and these Special Provisions.

Concrete footings for signs, and sign posts deemed unusable by the Engineer, shall be removed and disposed of outside the highway right of way in accordance with the provisions of the Standard Specifications, the project plans and these Special Provisions.

Signs, sign hardware and salvageable posts shall be delivered to the City’s corporation yard at 556 Freeman Lane.

Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in sign removal, including, but not limited to removal, salvaging, excavation, hauling and disposal, and backfilling, as shown on the plans, as specified in the Standard Specifications and these Special Provisions and as directed by the Engineer, shall be included in the contract lump sum paid for “Park Demolition and Removal” and no additional compensation will be allowed.

#### **10-1.19.8 REMOVE FENCE**

Existing fence shown on the plans to be removed shall be removed and disposed of in accordance with the requirements of the Standard Specifications and these Special Provisions.

Concrete footings, posts, fabric and appurtenances shall be removed and disposed of outside the highway right of way in accordance with the provisions of the Standard Specifications, the project plans and these Special Provisions.

Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in removal, including, but not limited to removal, excavation, hauling and disposal, and backfilling, as shown on the plans, as specified in the Standard Specifications and these Special Provisions and as directed by the Engineer, shall be included in the contract lump sum paid for “Park Demolition and Removal” and no additional compensation will be allowed.

#### **10-1.19.9 REMOVE AND/OR SALVAGE MISCELLANEOUS ITEMS**

Miscellaneous items shown on the plans to be removed or salvaged, including, but not limited to valve boxes, irrigation systems, sprinklers, posts and signs will be completely removed and disposed of or salvaged for re-use as directed by the Engineer. No separate payment shall be made for the miscellaneous items to be removed unless



specified and listed in the Bid Schedule. Such items shall be included in the contract lump sum price paid for "Park Demolition and Removal" and no additional compensation will be allowed.

#### **10-1.19.10 CLEARING AND GRUBBING**

This work shall consist of clearing, grubbing and removing existing vegetation, gravel, dirt, sod and other objectionable material, as necessary to prepare the work area for further excavation, grading or resurfacing.

Clearing and grubbing work shall conform to the provisions in "Clearing and Grubbing," of the Standard Specifications and these Special Provisions. Clearing and grubbing shall be performed only within the excavation limits and embankment slope lines. Existing vegetation, outside the areas to be cleared and grubbed, shall be protected from the Contractor's operations unless specifically shown on the plans to be removed.

Attention is directed to "Existing Facilities" and "Tree Removal" of these Special Provisions regarding removal of existing surfacing, obstructions, objects and Trees.

Nothing herein shall be construed as relieving the Contractor of his responsibility for final cleanup of the highway as provided in "Cleanup," of the Standard Specifications.

This work shall consist of removing objectionable material, including existing miscellaneous concrete and asphalt areas, gravel, dirt, sod and planter materials, from within the limits of the project as specified. The limits of clearing and grubbing shall be of sufficient area and depth to complete the work as shown on the plans or described in these Special Provisions, and may include excavation and grading as necessary to complete the work.

Work shall also include removal and disposal of existing weeds, brush and other unsuitable material within and along the edge of pavement, and trimming of trees as needed for operation of equipment. Contractor shall allow seven (7) days after spray of weeds within or at edges of pavement to ensure successful eradication prior to chip, scrub and/or cape scrub seal operations. If unsuccessful, Contractor shall respray.

Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in clearing and removal, including, but not limited to, cutting, uprooting, sawcutting, excavation, disposal and backfill as shown on the plans, as specified in the Standard Specifications and these Special Provisions and as directed by the Engineer, shall be included in the contract lump sum paid for "Park Demolition and Removal" and no additional compensation will be allowed.

#### **10-1.20 TREE REMOVAL**

Existing trees shown on the plans to be removed shall be completely removed and disposed of outside the highway right of way. Attention is directed to the provisions in "Clearing and Grubbing," of the Standard Specifications and these Special Provisions.

Tree trunks, stumps and roots shall be removed by sawing, grinding and excavating as necessary to completely remove all objectionable vegetative material to a minimum depth of 18" below the top of the finished surfacing.

Branches and suitable brush material may be reduced to chips with a maximum thickness of ½ inch and evenly spread in landscape areas at park locations as directed by the Engineer.

Existing trees shown on the plans to be pruned shall be removed of limbs and branches to a height of fifteen feet above finish grade or as appropriate and approved or directed by the Engineer

Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in tree removal, including, but not limited to, pruning cutting, sawing, uprooting, grinding, chipping, excavation, disposal and backfill as shown on the plans, as specified in the Standard Specifications and these Special Provisions and as directed by the Engineer, shall be included in the contract unit price paid for "Tree Removal" and no additional compensation will be allowed.

#### **10-1.21 WATERING**

Watering shall conform to the provisions in Section 17, "Watering," of the Standard Specifications and these Special Provisions.

Full compensation for conforming to the provisions of this section shall be considered as included in the prices paid for the various Contract items of work involved and no additional compensation will be allowed.

#### **10-1.22 EARTHWORK**

Earthwork shall conform to the provisions in Section 19, "Earthwork," of the Standard Specifications and these Special Provisions.

Surplus excavated material shall become the property of the Contractor and shall be disposed of in conformance with the provisions in "Contractor-Property Owner Agreement," of the Standard Specifications.

The Contractor's attention is directed to "Surplus Material," and "Deficiency Material," of the Standard Specifications.

Where a portion of the existing pavement surfacing is to be removed, the outline of the area to be removed shall be cut on a neat line with a power-driven saw to a minimum depth of 0.25-foot before removing the surfacing. If sawcut pavement

is damaged before paving, it is the Contractor's responsibility, at his expense, to re-cut and remove any damaged portion before paving. Full compensation for cutting the existing surfacing shall be considered as included in the various contract items of work involved and no additional compensation will be allowed.

Graded areas shall be watered and compacted in accordance with the Standard Specifications, City Improvement Standards and as directed by the Engineer. Subbase sections for sidewalk, curb ramps, curb and gutter, driveways, roadway shoulders and asphalt concrete pavement shall be compacted to 95% relative compaction to a minimum depth of six inches.

#### **10-1.22.1 ROADWAY EXCAVATION**

Roadway excavation shall conform to the provisions in Section 19-2, "Roadway Excavation," of the Standard Specifications and shall include all work associated with grading for the roadway improvements, grading for sidewalk, curb, gutter and curb ramps, grading earth ditches, and the grading to provide smooth transitions for conform areas.

In addition to the provisions of the Standard Specifications, roadway excavation shall include excavation, grading, and embankment construction necessary to construct roadway widening and sidewalk subgrades, vegetated swales, and slopes, in accordance with the requirements of Section 19, "Earthwork," of the Standard Specifications and these Special Provisions..

Relative compaction of subgrade shall conform to all the provisions in Section 19-5 "Compaction" of the Standard Specifications. Payment for compaction of earthwork shall be considered as included in the various items of work requiring compaction and no additional compensation will be allowed.

If the Contractor elects to excavate and replace subgrade/base material to facilitate compaction, full compensation for that work will be considered as included in the contract item of work requiring the compaction of earthwork and no separate payment will be made.

Removed materials shall be properly disposed of outside the highway right of way unless otherwise designated on the plans or approved by the Engineer.

The material remaining in place, after removing surfacing and base to the required depth, shall be graded to a plane, watered, and compacted.

Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved including, but not limited to, excavation, stockpiling, loading, transporting, compacting, disposal, and all grading as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer shall be considered as included in the prices paid for the various Contract items of work involved and no additional compensation will be allowed.

#### **10-1.22.2 TEMPORARY SHORING**

Temporary shoring will be necessary for any work required where the required excavation/trenching exceeds 5 feet in depth. If excavation/trenching exceeds 5 feet in depth, the Contractor shall be responsible for the design, installation, and maintenance of the temporary shoring system. The temporary shoring system shall be prepared and signed by an engineer who is registered as a Civil Engineer with the State of California.

Attention is directed to Section 7-1.02K(6)(b), "Excavation Safety," of the Standard Specifications, and "Excavation Safety Plans," of these Special Provisions.

All bracing and shoring shall comply with rules, orders and regulations of the California Division of Industrial Safety (D.I.S.). Trenching less than 5 feet in depth will require the Contractor to secure the appropriate D.I.S. permit and evidence of said permit shall be provided to the Engineer upon request.

The Contractor shall submit three (3) copies of the proposed temporary shoring system plan to the engineer a minimum of five (5) working days prior to the pre-construction conference. If excavation/trenching exceeds 5 feet in depth, the contractor shall not start construction of items of work requiring shoring before the temporary shoring plan has been reviewed and accepted by the Engineer.

The Contractor shall allow five (5) working days for the Engineer's review. If revisions are required, as determined by the Engineer, the Contractor shall revise and resubmit the temporary shoring system plan within five (5) calendar days of receipt of the Engineer's comments and shall allow five (5) working days for the Engineer to review the revisions. Upon acceptance of the temporary shoring system plan by the Engineer, three (3) additional copies of the temporary shoring system plan, incorporating all the required changes, shall be submitted to the Engineer. Failure to submit an acceptable temporary shoring system plan shall not in any way delay the start of the contract working days. If the Contractor makes significant changes to the accepted temporary shoring system plan, these changes must also be prepared and stamped by a licensed Civil Engineer.

Full compensation for temporary shoring, temporary shoring plans, for furnishing all labor, materials, tools, equipment and incidentals, and for doing all work involved in "Temporary Shoring," complete in place, as shown on the Contractor's accepted temporary shoring system, as shown on the plans, as specified in these Special Provisions

and as directed by the Engineer shall be considered as included in the various contract items of work requiring the excavation or trenching exceeding 5 feet and no additional compensation will be allowed.

#### **10-1.23 UTILITY TRENCH BEDDING AND BACKFILL**

Attention is directed to “Earthwork,” and “Aggregate Bases” of the Standard Specifications and these Special Provisions for requirements regarding utility line bedding and trench backfill.

Bedding material for water, sewer, storm drain, and electrical facilities shall be sand in conformance with “Sand Beddings” of the Standard Specifications and shall be installed in accordance with the plans and City Improvement Standards.

Trench backfill shall be aggregate base installed in accordance with the requirements of “Compaction” of the Standard Specifications and the plans and City Improvement Standards, unless the use of native fill is approved by the Engineer. Attention is directed to “Aggregate Base” for payment details of backfill material.

A sand cement slurry backfill may be permitted for trench backfill in certain areas as requested by the Contractor and as approved by the Engineer.

All backfill shall be compacted to a minimum 95% of relative compaction, unless otherwise specified by the Engineer. Sufficient effort shall be extended by the contractor to meet relative compaction levels as specified on the plans and these Special Provisions. The City may choose to perform geo-technical nuclear gage compaction testing to confirm acceptability of work, or may choose to evaluate using a means and methods approach. One follow up test after a failed result may be performed at the City’s expense if sufficient effort was expended by the Contractor to reasonably expect a passing result. The Contractor will become responsible to provide confirmatory compaction testing results if repeated or added testing is required due to substandard compaction efforts.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in utility trench bedding and backfill as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer shall be considered as included in the various contract items of work requiring bedding and backfill and no additional compensation will be allowed.

#### **10-1.24 WATER DISTRIBUTION SYSTEM FACILITIES**

This work includes but is not limited to: installation of new water distribution main lines and connection to existing water mains, water valves, fire hydrants, temporary bypasses, new water service lines, reconnection to existing water meters, excavation and backfill of utility trenches, and flushing, disinfecting and testing of all water systems prior to placing into service.

Domestic water system improvements and abandonments shall be in accordance with the City Improvement Standards and these Special Provisions and as shown on the plans.

Water shutoffs shall be coordinated with the Engineer and the Contractor shall provide a minimum of 48 hours advance notice to all affected residents and businesses prior to beginning work involving water shutoffs. Attention is directed to “Notification and Scheduling” of these Special Provisions for notification requirements and sample notifications forms

The City requires as few water outages for as short a time as possible and with the fewest water customers and fire hydrants out of service at any one time when converting over areas to the new water system. In no case shall any customers be out of service longer than six hours unless approved by the City Engineer.

##### **10-1.24.1 UTILITY TRENCH BEDDING AND BACKFILL**

Attention is directed to “Earthwork,” and “Aggregate Bases” of the Standard Specifications and these Special Provisions for requirements regarding utility line bedding and trench backfill.

Bedding material for water facilities shall be sand in conformance with “Sand Beddings” of the Standard Specifications and shall be installed in accordance with the plans and City Improvement Standards.

Trench backfill shall be aggregate base or slurry cement backfill at the Contractor’s discretion. Backfill shall be installed in accordance with the requirements of “Compaction” of the Standard Specifications and the plans and City Improvement Standards.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in utility trench bedding and backfill as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer shall be considered as included in the various contract items of work requiring bedding and backfill and no additional compensation will be allowed.

##### **10-1.24.2 WATER MAIN LINE**

This work shall consist of placing, polyvinyl chloride (PVC) water pipe and removing existing PVC water pipe as shown on the plans and as directed by the Engineer.

The Contractor’s attention is directed to “Water Supply System” of the City Improvement Standards for required water line installation procedures, including flushing, disinfection and testing.

PVC pipe shall conform to AWWA standards for PVC pressure pipe, C-900 Class 200.

Water main pipe shall be installed at the locations and alignments shown on the plans and shall include all pipe, fittings, bends, reducers, adapters, connectors, restraints, nuts, bolts, thrust blocks and appurtenances as needed to construct a fully operational, safe and secure water distribution system.

The Contractor's attention is directed to the requirements of "Gate Valve", "Water Main Tee Assembly" and "Water Main Connection to Existing" of these Special Provisions for payment details of the respective water main line components to that will be paid for separately.

Bedding material shall be provided as shown on the plans and shall be sand or clean crushed rock as approved by the Engineer. Pipe shall be carefully placed onto a prepared and compacted bedding layer, accurately connected and adjusted before covering with bedding material to restrain and protect in place.

Attention is directed to Section 19, "Earthwork," of the Standard Specifications for requirements regarding structure excavation, trenching and shoring, and backfill. Backfill must conform to "Aggregate Base" of these Special Provisions unless the use of native fill is approved by the Engineer and will be paid for in accordance with the payment details of "Aggregate Base". All backfill shall be compacted to a minimum 95% of relative compaction, unless otherwise specified by the Engineer.

Full compensation for furnishing all labor, materials tools, equipment, and incidentals (including tracing wire, backfill marking tape, thrust blocks) and for doing all the work involved in the installation of water main line, including, but not limited to, excavating, placing and joining pipe, bedding, backfill, flushing, disinfecting and testing, complete in place, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer, shall be included in the contract price paid per linear foot for "Water Main Line (Size and Type)" and no additional compensation will be allowed.

#### **10-1.24.3 WATER MAIN CONNECTION TO EXISTING**

This work shall consist of connecting new water main lines to existing main lines by way of a Series 2000PV Mechanical Restraint Joint(s), or approved equal, as shown on the plans and as directed by the Engineer.

Connections to existing water main lines and water service lines shall comply with "Water Supply System", "Connection to Existing Facilities", and "Tying Into The City System" of the City Improvement Standards and as noted and modified as follows:

- The Contractor shall make all system taps and tie-in connections to existing main lines and service lines.
- No nighttime work will be permitted unless otherwise approved by the Engineer.
- Prior to scheduling any tie-in connections involving outages, the Contractor shall have on hand all fittings, valves, gaskets, bolts, adapters, and incidentals necessary to complete the connection.
- A minimum of 5 days prior to any scheduled shutoff, the Contractor shall submit to the Engineer a water outage schedule including the dates, times and customers affected by the outages. Once approved by the Engineer, notice shall be provided by the Contractor to all affected customers a minimum of 48 hours in advance of the outage, in accordance with "Notification and Scheduling" of these Special Provisions.
- If a portion of road is needed to be closed to accomplish the water tie-in, the road closure and notice shall be as provided in "Closure Requirements and Conditions" of these Special Provisions.

Full compensation for furnishing all labor, materials (including mechanical joints, associated fittings and thrust block concrete as needed), tools, equipment and incidentals, and for doing all the work involved, including, but not limited to, excavating, placing and connecting mechanical joint to existing and new main line pipe, bedding, thrust block construction, backfill, flushing, disinfecting and testing, complete in place, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer, shall be considered as included in the various contract items of work requiring the connection to existing mainlines and no additional compensation will be allowed.

#### **10-1.24.4 WATER MAIN TEE ASSEMBLY**

This work shall consist of installing a water main line tee fitting and associated components as shown on the plans and as directed by the Engineer.

The Contractor's attention is directed to "Water Supply System" of the City Improvement Standards for required water line installation procedures, including flushing, disinfection and testing.

Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved, including, but not limited to, excavating, placing and connecting tee to adjoining fittings, bedding, thrust block construction, backfill, flushing, disinfecting and testing, complete in place, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer, shall be included in the contract unit price paid for "Water Main Tee Assembly (Size)" and no additional compensation will be allowed.

#### **10-1.24.5 GATE VALVE AND BOX**

This work shall consist of constructing a complete gate valve assembly on water mains and fire hydrant lines, as shown on the plans and as directed by the Engineer.

The Contractor's attention is directed to "Water Supply System" of the City Improvement Standards for required water line installation procedures, including flushing, disinfection and testing.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in the installation of gate valve, including, but not limited to, excavating, placing and joining, backfill, blocking, concrete collar construction, valve box setting, flushing, disinfecting and testing, complete in place, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer, shall be included in the contract unit price paid for "Gate Valve and Box (Size)" and no additional compensation will be allowed.

#### **10-1.24.6 BACKFLOW PREVENTER**

This work shall consist of installing a reduced pressure backflow device as shown on the plans and installing water meters as directed by the Engineer.

The Contractor's attention is directed to "Water Supply System" of the City Improvement Standards for required water line installation procedures.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in the installation reduced pressure backflow devices shall be included in the contract unit price paid for "Backflow Preventer (Size)" and no additional compensation will be allowed.

#### **10-1.24.7 WATER SERVICE LINE**

This work shall consist of installing polyethylene (poly) water pipe, from the water main line to water meter assemblies, as well as removing and disposing of existing service lines as shown on the plans and installing water meters as directed by the Engineer.

The Contractor's attention is directed to "Water Supply System" of the City Improvement Standards for required water line installation procedures, including flushing, disinfection and testing.

Bedding material shall be provided as shown on the plans and shall be sand or clean crushed rock as approved by the Engineer. Pipe shall be carefully placed onto a prepared and compacted bedding layer, accurately connected and adjusted before covering with bedding material to restrain and protect in place.

Attention is directed to Section 19, "Earthwork," of the Standard Specifications for requirements regarding structure excavation, trenching and shoring, and backfill. Backfill must conform to "Aggregate Base" of these Special Provisions unless the use of native fill is approved by the Engineer and will paid for in accordance with the payment details of "Aggregate Base". All backfill shall be compacted to a minimum 95% of relative compaction, unless otherwise specified by the Engineer.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in the installation of water service line, including, but not limited to, excavating, placing and joining pipe, bedding, backfill, flushing, disinfecting and testing, complete in place, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer, shall be included in the contract price paid per linear foot for "Water Service Line (Size)" and no additional compensation will be allowed.

#### **10-1.24.8 FIRE HYDRANT LINE**

This work shall consist of installing a fire hydrant assembly with ductile iron pipe (DIP), from the main line tee to the fire hydrant assembly as shown on the plans and as directed by the Engineer.

The Contractor's attention is directed to "Water Supply System" of the City Improvement Standards for required water line installation procedures, including flushing, disinfection and testing.

Bedding material shall be provided as shown on the plans and shall be sand or clean crushed rock as approved by the Engineer. Pipe shall be carefully placed onto a prepared and compacted bedding layer, accurately connected and adjusted before covering with bedding material to restrain and protect in place.

Attention is directed to Section 19, "Earthwork," of the Standard Specifications for requirements regarding structure excavation, trenching and shoring, and backfill. Backfill must conform to "Aggregate Base" of these Special Provisions unless the use of native fill is approved by the Engineer and will paid for in accordance with the payment details of "Aggregate Base". All backfill shall be compacted to a minimum 95% of relative compaction, unless otherwise specified by the Engineer.

Full compensation for furnishing all labor, tools, equipment, and incidentals, and for doing all the work involved in the installation of fire hydrant line, including, but not limited to, excavating, placing and joining pipe,

bedding, thrust block construction, backfill, flushing, disinfecting and testing, complete in place, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer, shall be included in the contract price paid per linear foot for "Fire Hydrant Line" and no additional compensation will be allowed.

#### **10-1.24.9 WATER MAIN TAP AND SADDLE**

This work shall consist of tapping the water main line and installing a saddle connection for water service lines, as shown on the plans and as directed by the Engineer.

The Contractor's attention is directed to "Water Supply System" of the City Improvement Standards for required water line installation procedures, including flushing, disinfection and testing.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in the installation of a saddle tap on water main lines, including, but not limited to, excavating, water main line tap and saddle installation, bedding, backfill, flushing, disinfecting and testing, complete in place, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer, shall be included in the contract unit price paid for each "Water Main Tap and Saddle" and no additional compensation will be allowed.

#### **10-1.24.10 ABANDON EXISTING WATER LINES**

This work shall consist of abandoning existing water main lines, water service lines, and fire hydrant lines by removing those portions of water lines that are in conflict with proposed water lines, capping open ends of water lines to be abandoned in place, and removing boxes and corresponding equipment as shown on the plans and as directed by the Engineer.

Abandoned water lines shall be plugged with a tight fitting cap or closed by a wall of minor concrete not less than 0.5-foot thick. Minor concrete shall conform to the provisions in "Minor Concrete" of the Standard Specifications. Fire hydrant lines shall be plugged a minimum of 12" below the surrounding grade.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in abandoning existing water lines including, but not limited to, excavation, disconnection and removal as needed, plugging of open ends with concrete or capping with approved end cap and backfill, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer shall be included in the contract lump sum price paid for "Abandon Existing Water Lines" and no additional compensation will be allowed.

### **10-1.25 LANDSCAPE IRRIGATION**

Landscape irrigation includes all valves, boxes, sprinklers, emitters, bubblers, piping, joints, trenching, backfill, and all items required for the construction of irrigation for the planting areas and grass fields as shown on the plans.

All irrigation system work shall be furnished and installed using commonly accepted industry practices and shall conform to the provisions in "Irrigation Systems," of the Standard Specifications.

Sprinklers and emitters shall consist of pop up spray heads set in a pattern as determined by the contractor and subject to approval of the Engineer such that water exposure to impermeable surfaces is minimized and that grass fields are sufficiently saturated utilizing a 1' minimum to 5' maximum overlap of throw.

#### **10-1.25.1 IRRIGATION SYSTEM WIRING**

Wiring for irrigation system is to be connected to an irrigation controller to be located at the restroom. Contractor shall coordinate with the Engineer for final wiring layout. If suitable conduit or existing wiring connections points are not found in proximity to the work area, significant additional trenching work or wiring installation is not expected of the Contractor. City will assist Contractor with wiring connections to City irrigation controller.

#### **10-1.25.2 IRRIGATION SYSTEM PLASTIC PIPE**

Plastic pipe supply lines shall be polyvinyl chloride (PVC) schedule 40 pressure rated pipe. Plastic pipe supply lines shall have solvent cemented type joints. Primers shall be used on the solvent cemented type joints.

Plastic pipe supply lines (main) shall have a minimum cover of 15 inches. Plastic pipe (irrigation lines) shall be installed not less than 8 inches below the finished grade, measured to the top of the pipe.

#### **10-1.25.3 IRRIGATION SYSTEMS FUNCTIONAL TEST**

Functional tests for the irrigation controllers and associated automatic irrigation systems shall conform to the provisions in Section 20 5.027J, "Testing," of the Standard Specifications and these special provisions.

Tests shall demonstrate to the Engineer, through one complete cycle of the irrigation controllers in the automatic mode, that the associated automatic components of the irrigation systems operate properly. If automatic components of the irrigation systems fail a functional test, these components shall be repaired at the Contractor's expense and the testing repeated until satisfactory operation is obtained.

#### **10-1.25.4 PAYMENT**

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for performing all the work involved Landscape Irrigation, including removal and replacement of irrigation systems as specified in these Special Provisions, and as directed by the Engineer, shall be included in the contract lump sum price paid for "Landscape Irrigation" and no additional compensation will be allowed.

#### **10-1.26 AREA DRAIN INLET**

This work includes constructing and installing a new drainage inlet, complete in place with inlet grate as shown on the plans, and shall conform to the provisions of the Standard Specifications and these Special Provisions.

The drainage inlet grate shall be ductile iron conforming to the improvement plans, provisions in Section 75, "Miscellaneous Metal," of the Standard Specifications and these Special Provisions.

The drainage inlet shall be custom fabricated to the dimensions shown on the plans or as directed by the Engineer. The drainage inlet shall be a 8" PVC basin with water tight connections (Nyloplast 2808AG or approved equal). Height shall be as needed for the invert of the proposed drainage pipes.

Attention is directed to Section 19, "Earthwork," of the Standard Specifications for requirements regarding structure excavation, trenching and shoring, and backfill. Backfill must conform to "Aggregate Base" of these Special Provisions unless the use of native fill is approved by the Engineer. All backfill shall be compacted to a minimum 95% of relative compaction, unless otherwise specified by the Engineer.

Surplus excavated material shall become the property of the Contractor and shall be removed and disposed of outside of the highway right of way in accordance with the provisions in Section 7-1.13, "Disposal Of Material Outside The Highway Right Of Way," of the Standard Specifications and in accordance with these Special Provisions.

Full compensation for furnishing all labor, materials, including pipe, tools, equipment, and incidentals, and for doing all the work involved in the installation of drainage inlets, including, but not limited to excavation, disposal, backfill, compaction, forming, reinforcement, construction, finishing and installation of frames, grates and collars as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer shall be included in the contract unit price paid for each "Area Drain Inlet" and no additional compensation will be allowed.

#### **10-1.27 DRAINAGE INLET**

This work includes constructing and installing a new drainage inlet, complete in place with inlet grate as shown on the plans, and shall conform to the provisions of the Standard Specifications and these Special Provisions.

The drainage inlet grate shall conform to the improvement plans, provisions in Section 75, "Miscellaneous Metal," of the Standard Specifications and these Special Provisions. The drainage inlet grate shall be bicycle safe type 18-9X conforming to the specifications of the Standard Plans, or as approved by the Engineer.

The drainage inlet shall be constructed of Portland cement concrete conforming to the provisions in Section 90 "Portland Cement Concrete" of the Standard Specification and these Special Provisions.

The drainage inlet shall be constructed to the dimensions shown on the plans or as directed by the Engineer. The drainage inlet shall be a type G5 inlet conforming to the specifications of the Standard Plans. Height shall be as needed for the invert of the existing drainage culvert.

Attention is directed to Section 19, "Earthwork," of the Standard Specifications for requirements regarding structure excavation, trenching and shoring, and backfill.

Surplus excavated material shall become the property of the Contractor and shall be removed and disposed of outside of the highway right of way in conformance with the provisions in "Surplus Material," of the Standard Specifications.

Full compensation for furnishing all labor, materials, including pipe, tools, equipment, and incidentals, and for doing all the work involved in the installation of drainage inlets, including, but not limited to excavation, disposal, backfill, compaction, forming, reinforcement, construction, finishing and installation of frames, grates and collars as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer shall be included in the contract unit price paid for each "Drainage Inlet" and no additional compensation will be allowed.

#### **10-1.28 DRAINAGE PIPE**

Drainage pipe shall be either high density polyethylene pipe (HDPE) or poly vinyl chloride (PVC) pipe as shown on the plans or as directed by the Engineer.

Drainage pipe shall be furnished and installed in conformance with the provisions of Section 64 "Plastic Pipe" of the Standard Specifications and these Special Provisions.

HDPE and PVC pipe shall be circular, with smooth interior walls and a diameter as shown on the plans. HDPE pipe shall be Type S with corrugated exterior walls.

Bedding material shall be provided as shown on the plans and shall be sand or clean crushed rock as approved by the Engineer. Drainage pipe shall be carefully placed onto a prepared and compacted bedding layer, accurately connected and adjusted before covering with bedding material to restrain and protect in place.

Attention is directed to Section 19, "Earthwork," of the Standard Specifications for requirements regarding structure excavation, trenching and shoring, and backfill. Backfill must conform to "Aggregate Base" of these Special Provisions unless the use of native fill is approved by the Engineer and will be paid for in accordance with the payment details of "Aggregate Base". All backfill shall be compacted to a minimum 95% of relative compaction, unless otherwise specified by the Engineer.

PVC pipe to be imbedded in concrete shall be wrapped with a flexible polyethylene foam pipe wrap tape with a minimum thickness of 3/32".

Full compensation for furnishing all labor, materials (including pipe and bedding material), tools, equipment, and incidentals, and for doing all the work involved in the installation of drainage pipe, including, but not limited to excavating, placing, joining, backfilling, and slurry cement backfill, complete in place, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer shall be included in the contract price paid per linear foot for "Drainage Pipe (Size, Type)" and no additional compensation will be allowed.

#### **10-1.29 ELECTRICAL CONDUIT**

Electrical conduit shall be furnished and installed in conformance with the provisions of Section 64 "Plastic Pipe", Section 86, "Electrical Systems" of the Standard Specifications, CA Electrical Codes and these Special Provisions.

Below grade electrical conduit shall be Schedule 40 poly vinyl chloride (PVC) pipe as shown on the plans or as directed by the Engineer. Above grade conduit shall be Schedule 80 PVC.

Bedding material shall be provided as shown on the plans and shall be sand or clean crushed rock as approved by the Engineer. Electrical conduit shall be carefully placed onto a prepared and compacted bedding layer, accurately connected and adjusted before covering with bedding material to restrain and protect in place.

Attention is directed to Section 19, "Earthwork," of the Standard Specifications for requirements regarding structure excavation, trenching and shoring, and backfill. Backfill must conform to "Aggregate Base" of these Special Provisions unless the use of native fill is approved by the Engineer and will be paid for in accordance with the payment details of "Aggregate Base". All backfill shall be compacted to a minimum 95% of relative compaction, unless otherwise specified by the Engineer.

Full compensation for furnishing all labor, materials (including pipe and bedding material), tools, equipment, and incidentals, and for doing all the work involved in the installation of electrical conduit, including, but not limited to excavating, placing, joining, and backfilling, complete in place, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer shall be included in the contract price paid per linear foot for "Electrical Conduit (Size, Type)" and no additional compensation will be allowed.

#### **10-1.30 PULL BOX**

Electrical pull box shall be Christy N09, Jensen HN1017, or approved equal as shown on the plans or as directed by the Engineer.

Electrical pull box shall be reinforced concrete box with polymer concrete bolt down lid, furnished and installed in conformance with the provisions of Section 86, "Electrical Systems" of the Standard Specifications, CA Electrical Codes and these Special Provisions.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in the installation of electrical pull box, including, but not limited to excavating, placing, and backfilling, complete in place, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer shall be included in the contract unit price paid for each "Pull Box" and no additional compensation will be allowed.

#### **10-1.31 RECONNECT EXISTING ELECTRICAL SYSTEM**

This work shall consist of reconnecting existing electrical equipment to the new electrical panelboard at the mechanical building as shown on the plans and as directed by the Engineer. Electrical equipment served by the existing panel in the mechanical building includes tennis court lighting, pickleball court lighting and restroom subpanel. Existing electrical equipment shall be safely disconnected during mechanical building demolition work.

Existing electrical lateral lines shall be intercepted at a common junction point with a new pull box and new conduit placed to connect with the new panelboard as shown on the plans. All new wire shall be pulled to tennis court lighting and restroom building connection points. Wire to the pickleball lights may be spliced at the pull box at the Contractor's discretion.



Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in the reconnecting existing electrical equipment, including, but not limited to, protecting equipment to be salvaged, locating, excavating, splicing, wiring, start up and testing, complete in place, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer shall be included in the contract lump sum price paid for "Reconnect Existing Electrical Equipment" and no additional compensation will be allowed..

### **10-1.32 PG&E COORDINATION**

This work shall consist of all coordination and correspondence with Pacific Gas and Electric (PG&E) for existing and proposed electrical and gas facilities.

The Contractor's attention is directed to contract items requiring coordination with PG&E including, but are not limited to "Park Demolition and Removal", "Electrical Meter Pedestal", and "Relocate Gas Meter Assembly".

The City has initiated the permit process with PG&E for gas meter relocation, disconnection of the existing mechanical building service drop and new meter pedestal work. Coordination would include sequencing of work for disconnection or energizing of facilities, requesting inspections, complying with permit conditions, and finalizing permits. All application, engineering and construction fees will be paid by the City

Coordination in general involves timing and satisfying requirements of overhead line disconnection and removal, new service connection and startup and gas meter relocation.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all work involved in coordinating with PG&E for electrical and gas service connection, transfer and relocation shall be included in the contract lump sum price paid for "PG&E Coordination" and no additional compensation will be allowed.

### **10-1.33 ELECTRICAL METER PEDESTAL**

This work shall consist of the installation of a new electrical meter pedestal, complete with all required circuit breakers to supply electrical power to parking lot lighting, restroom and future/bid alternate recreation building.

The Contractor's attention is directed "PG&E Coordination" and "Electrical Systems" of the Standard Specifications, CA Electrical Codes and these Special Provisions.

Electrical power is to be served by a new service drop connection from the existing utility pole. For bidding purposes, it is assumed that the meter pedestal will require a minimum 120V/200A main breaker.

Pedestal rating and circuit breaker sizing shall be predicated on the load requirements of the lighting, restroom and rec building circuits proposed. The Contractor shall propose circuit breaker sizes and layout and submit for approval by the Engineer.

The meter pedestal shall be Tesco Controls 27-000 Single Meter TescoFlex with separate lighting, restroom and rec building circuit breakers and integral photo cell control for parking lot lighting.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in the installation of an electrical meter pedestal including, but not limited to, pouring footing, mounting pedestal, configuring circuits, assembling, installing breakers, wiring, labeling and securing a fully functional electrical meter pedestal, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer shall be included in the contract lump sum price paid for "Electrical Meter Pedestal" and no additional compensation will be allowed.

### **10-1.34 ELECTRICAL PANELBOARD AND CIRCUIT BREAKERS**

This work shall consist of the installation of a new electrical panelboard, complete with all required circuit breakers to supply electrical power to pool equipment, pool and court lighting, maintenance building and miscellaneous circuits.

Included in this work is all wiring and appurtenances necessary to connect and supply power to the panelboard from the existing main park switch board. A new minimum 300A breaker at the switch board shall be assumed to be required.

The Contractor's attention is directed to "Pool – Final Design, Engineering and Inspection" of these provisions. Final panel sizing, breaker count, and circuit design, including equipment served, load rating, conductor sizing, and circuit breaker sizing shall be as proposed by the Contractor's Designer and as approved by the Engineer.

Electrical power is to be served by a new connection to the main park switch board providing 120/208V 3 phase power as shown on the plans. For bidding purposes, it is assumed that the panelboard will require a minimum 300A main breaker and a 3 phase 400A, rated panel.

The panelboard shall be mounted in a NEMA 12/3R waterproof enclosure.

The Contractor shall secure and comply with the conditions of a no-cost City Building Permit for electrical inspections.

It is assumed PGE will approve of the proposed electrical meter location. If an alternate location is required by PGE in added costs or deductions will be determined through change order negotiations.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in the installation of an electrical panelboard including, but not limited to, mounting, configuring circuits, assembling, installing breakers, wiring, labeling and securing a fully functional electrical supply panel, as specified in the

Standard Specifications and these Special Provisions, and as directed by the Engineer shall be included in the contract lump sum price paid for "Electrical Panelboard and Circuit Breakers" and no additional compensation will be allowed.

#### **10-1.35 PARKING LOT LIGHTING**

This work shall consist of installing a LED parking lot area lighting system as shown on the plans and in conformance with these Special Provisions.

The Contractor's attention is directed to "Concrete", "PG&E Coordination", "Electrical Systems" "Electrical Conduit" and "Electrical Meter Pedestal" of the Standard Specifications and these Special Provisions.

Light footing and pole shall consist of the complete installation of a 4" diameter, 20' tall steel pole on a concrete footing, as shown on the plans or as directed by the Engineer. High strength anchor bolts shall be wet set into concrete footings to the proper embedment and exposed height as necessary to mount pole base plate, as shown on the plans, as recommended by the manufacturer, and as directed by the Engineer. Electrical conduit shall be installed in concrete footings as shown on the plans and as specified in "Electrical Conduit" of these Special Provisions. Footing location and base plate cover exposure shall be carefully located and adjusted to ensure optimum placement in relation to pedestrian walkways for safety and accessibility.

Included in this work is all wiring and appurtenances necessary to connect and supply power to each light from the new electrical meter pedestal installed as part of this project.

Steel pole shall conform to the provisions in "Overhead Sign Structures, Standards and Poles," of the Standard Specifications, and these special provisions. Pole shall be black to match associated light assemblies of these Special Provisions. Approved hardware, connectors, base plate, and base plate cover shall be installed as shown on the plans, as recommended by the manufacturer, and as directed by the Engineer.

LED lights shall be cool white, die-formed black powder coated aluminum housing, single fixture with matching pole top hub and bracket, installed with stainless steel hardware on top of steel poles.

LED lighting system shall be LSI Industries, 232W Mirada Medium Outdoor LED Area Light (MRM) on 4" diameter steel, straight round pole (4RP) or approved equals.

Parking lot lighting shall be connected in series, in appropriately sized conduit, routed to the electrical pedestal. Suitable switches, photo cells and timers shall be installed to enable proper control.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in the installation of parking lot lighting, including, but not limited to excavation, conduit placement, backfill, footing construction, anchoring, assembly, wiring, testing and adjustment shall be included in the contract unit price paid for each "Parking Lot Lighting" and no additional compensation will be allowed.

#### **10-1.36 RELOCATE GAS METER ASSEMBLY**

This work shall consist of relocation and replacement of the existing gas meter assembly serving the pool mechanical building.

The Contractor's attention is directed to "Coordination" and "PGE Coordination" of these provisions.

A new gas meter trench and service line shall be constructed to the new meter location shown on the plans. The existing service line shall be removed or abandoned in place as appropriate. All existing mounting components, appurtenances and wall penetrations shall be neatly removed, abandoned, and finished to an unspoiled condition.

The contractor shall coordinate with PGE for construction, inspection, and equipment requirements, including determination of those components of the existing meter assembly that are salvageable and suited for reuse.

It is assumed PGE will approve of the proposed gas meter location. If an alternate location is required by PGE in added costs or deductions will be determined through change order negotiations.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in the relocation of the gas meter, including, but not limited to, trenching, placing and connecting new service line, bedding backfill and compaction and construction, assembly, mounting and securing of the meter assembly as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer shall be included in the contract lump sum price paid for "Relocate Gas Meter Assembly" and no additional compensation will be allowed.

#### **10-1.37 SANITARY SEWER FACILITIES**

This work includes but is not limited to: installation of new sanitary sewer main lines, services, manholes, connection to existing sanitary sewer mains, temporary bypasses, excavation and backfill of utility trenches, and flushing, and testing of all sanitary sewer systems prior to placing into service.

Sanitary sewer system improvements and abandonments shall be in accordance with the Construction Standards and these Special Provisions and as shown on the plans.

Sewer bypasses shall be coordinated with the Engineer and the Contractor shall provide a minimum of 48 hours advance notice to all affected residents and businesses prior to beginning work involving sewer bypass. Attention is directed to "Notification and Scheduling" of these Special Provisions for notification requirements and sample notification forms.

### **10-1.37.1 SEWER SERVICE LINE**

This work shall consist of placing, SDR 26 polyvinyl chloride (PVC) pipe as shown on the plans and as directed by the Engineer.

The Contractor's attention is directed to "Sanitary Sewer System" of the Construction Standards for required sanitary sewer main line and sanitary sewer service line material, fittings, joints, including installation procedures and testing.

Sanitary Sewer service pipe shall be installed at the locations and alignments shown on the plans and shall include all pipe, fittings, bends, reducers, adapters, connectors, restraints, nuts, concrete cradles, arches, encasements and appurtenances as needed to construct a fully operational, safe and secure sanitary sewer collection system.

Connections to existing sanitary sewer main lines and sanitary service lines shall comply with "Connection to Existing Facilities", of the City of Grass Valley Construction Standards and as noted and If a portion of road is needed to be closed to accomplish the tie-in, the road closure and notice shall be as provided in "Closure Requirements and Conditions" of these Special Provisions.

Full compensation for furnishing all labor, materials tools, equipment, and incidentals (including tracing wire, backfill marking tape, thrust blocks) and for doing all the work involved in the installation of sanitary sewer service line, including, but not limited to, excavating, placing and joining pipe, bedding, backfill, and testing, complete in place, as shown on the plans, as specified in the Standard Specifications, the Construction Standards, and these Special Provisions, and as directed by the Engineer, shall be included in the contract price paid per linear foot for "Sewer Service Line (Size and Type)" and no additional compensation will be allowed.

### **10-1.37.2 CLEANOUT AND BACKFLOW PREVENTER**

This work shall consist of installing a new sewer cleanout and backflow preventer, per the City of Grass Valley Construction Standards Section 5, Sanitary Sewer (SS) and Standard Detail SS-4 "Sewer Service Cleanout".

Attention is directed to "Sewer Lateral Video Inspection" of these Special Provisions, regarding access for the sewer lateral video inspections.

The exact locations of the new sewer cleanouts and backflow preventers shall be coordinated with the Engineer and the affected property owner(s).

The Contractor shall maintain the sewage flow in the affected portions of the sewer system during installation of the new sewer cleanouts and backflow preventers, unless otherwise approved by the Engineer.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing new sewer cleanouts and backflow preventers, as specified in the Standard Specifications and these Special Provisions and as directed by the Engineer shall be included in the contract unit price paid for each "Cleanout and Backflow Preventer" and no additional compensation will be allowed.

### **10-1.37.3 SEWER CONNECTIONS TO EXISTING FACILITIES**

Connections to existing sanitary sewer main lines and sanitary service lines shall comply with "Sanitary Sewer System", and "Connection to Existing Facilities", of the City Construction Standards and as noted and modified as follows:

- The Contractor shall construct all connections to existing main lines and service lines.
- No nighttime work will be permitted unless otherwise approved by the Engineer.
- Prior to scheduling any connections involving outages, the Contractor shall have on hand all fittings, gaskets, bolts, adapters, and incidentals necessary to complete the connection.
- For connections requiring bypasses or service interruptions, the Contractor shall contact and coordinate all affected customers a minimum of 48 hours ahead of the interruption.
- Service interruption duration is 12 hours maximum.

Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all work involved in connecting new sewer piping to existing main and service lines, as shown on the plans, as specified in these Special Provisions and as directed by the Engineer shall be included in the contract unit price paid for the various contract work items involved and no additional compensation will be allowed.

### **10-1.38 AGGREGATE BASE**

Aggregate base shall be Class 2, (3/4 inch) maximum grading, and shall conform to the provisions in Section 26, "Aggregate Bases," of the Standard Specifications and these Special Provisions. Aggregate base shall be processed to 95% relative compaction.

Do not store reclaimed asphalt concrete or aggregate base with reclaimed asphalt concrete within 100 feet measured horizontally of any culvert, watercourse, or bridge.

Aggregate base shall not contain volcanic cinder material.

Aggregate base shall have at least 80% of the rock having two or more fractured surfaces evident.

Aggregate base shall be placed to the lines, dimensions, and grades shown on the Plans or as directed by the Engineer.

Where existing aggregate base is shown on the plans to be remain in place, the material shall be sufficiently watered and compacted to obtain an unyielding surface, to the relative compaction as shown on the plans. If the existing base material is found to be unsuitable, in the opinion of the Engineer, it shall be replaced with new aggregate base in conformance with the provisions and payment details of this section. Payment for compaction of existing base to remain in place shall be considered as included in the various contract items of work requiring the compaction and no additional compensation will be allowed.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in the installation of aggregate base, including, but not limited to, placing, grading, excavating, and compacting aggregate base as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer shall be included in the contract price paid per cubic yard for "Aggregate Base" and no additional compensation will be allowed.

#### **10-1.39 DETECTABLE WARNING SURFACE**

Detectable warning surfaces shall be installed at the curb ramp locations shown on the plans and as directed by the Engineer, in accordance with the Standard Specifications and these Special Provisions. Curb ramp detectable warning surface shall consist of raised truncated domes in conformance with the details shown on the plans and the Standard Plans.

The detectable warning surface shall be prefabricated. The color of the detectable warning surface shall be yellow conforming to Federal Standard 595B, Color No. 33538. Prefabricated detectable warning surface shall be in conformance with the requirements established by the Department of General Services, Division of State Architect and be attached in conformance with the manufacturer's recommendations.

The finished surfaces of the detectable warning surface shall be free from blemishes. The manufacturer shall provide a written 5-year warranty for prefabricated detectable warning surfaces, guaranteeing replacement when there is defect in the dome shape, color fastness, sound-on-cane acoustic quality, resilience, or attachment. The warranty period shall begin upon acceptance of the contract.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in the installation of detectable warning surfaces including, but not limited to; setting prefabricated warning surface into wet concrete, finishing and grooving concrete around warning surface border, and protecting the surface during construction operations shall be included in the contract price paid for each "Detectable Warning Surface" and no additional compensation will be allowed.

#### **10-1.40 REINFORCEMENT**

Reinforcement shall be ASTM A615 Grade 60 Rebar. All reinforcement shall conform to section 52 "Reinforcement" of the standards specifications. Lap splices when required shall be staggered.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in the installation of reinforcement shall be included in the prices paid for the various Contract items of work involved and no additional compensation will be allowed.

#### **10-1.41 MINOR CONCRETE**

Concrete sidewalk, curb, gutters, valley gutters, curb ramps, stairs and other minor concrete shown on the plans shall conform to the provisions in Section 73, "Concrete Curbs and Sidewalk," and Section 90 "Concrete" of the Standard Specifications and these Special Provisions. The Contractor's attention is directed to Section 52 "Reinforcement" of the Standard Specifications and these Special Provisions for requirements regarding reinforcement bars as shown on the plans.

Aggregate for minor concrete shall be 1" maximum grading unless otherwise specified and shall conform to the combined aggregate grading limits in "Combined Aggregate Gradation," of the Standard Specifications.

Concrete for all minor concrete work shall be "six sack" concrete properly prepared at a mixing plant.

Concrete shall be placed at the locations shown on the plans, struck off and compacted until a layer of mortar is brought to the surface. The concrete shall be screeded to the required grade and cross section and floated to a uniform surface.

Whenever new concrete curb, gutter and sidewalk adjoins existing, the existing concrete vertical face shall be doweled 4-inches deep with 12 inch long, grade 60, #4 rebar. Abutting sidewalk shall be doweled mid-section with a minimum of two dowels. Abutting curb and gutter ends shall be doweled twice, 18 inches apart, centered on the curb and gutter section. If the dowels were not set with the existing concrete, the penetrating portion of the dowel shall be coated with two-part epoxy in conformance with Caltrans Standard Specifications Section 95-1.

All concrete surfaces shall be broom finished unless specified as stamped or textured concrete. Surfaces to be used by pedestrian traffic shall be broomed transversely to the line of traffic. All other surfaces shall be broomed longitudinally unless otherwise specified.

The contract price paid per square foot for “Minor Concrete (Court, Sidewalk, Curb Ramp, Slab, Valley Gutter) shall include all the work involved in constructing sidewalks, walkways, curb ramps, court surfaces, valley gutters and miscellaneous concrete slabs, complete in place, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer. For payment purposes, Sidewalk/Curb Ramp work shall include all that walkable portion of the curb ramp behind the back of curb. Attached curb and combination curb and gutter shall be paid separately, as described herein.

The contract price paid per linear foot for “Minor Concrete (Curb, Retaining Curb) shall include all the work involved in constructing concrete curbing, and combination curb and gutters, complete in place, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer. For payment purposes retaining curb shall refer to any curbing over 10 inches above finish grade or any curbing with reinforcing steel as required by the plans or as directed by the Engineer.

The contract lump sum price for “Minor Concrete (Stairs) shall include all the work involved in constructing concrete stairs, complete in place, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in the installation of minor concrete including, but not limited to: subgrade preparation, rebar placement, and forming, placing, finishing, and grooving, concrete, shall be included in the contract price paid for “Minor Concrete (Type)” and no additional compensation will be allowed.

#### **10-1.42 CMU RETAINING WALL**

This work shall consist of constructing concrete masonry unit (CMU) retaining wall and the reinforced concrete wall foundations as shown on the plans and in conformance with the provisions in “Earth Retaining Systems” and “Sound Walls” of the Standard Specifications and these Special Provisions.

The Contractors attention is directed to Section 90 “Concrete” and Section 52 “Reinforcement” of the Standard Specifications and these Special Provisions.

Aggregate for minor concrete shall conform to section 90-1.02C of the Standard Specifications unless otherwise specified and shall conform to the combined aggregate grading limits in "Combined Aggregate Gradation," of the Standard Specifications.

Concrete shall be placed at the locations shown on the plans, struck off and compacted until a layer of mortar is brought to the surface. The concrete shall be screeded to the required grade and cross section and floated to a uniform surface.

CMU units shall be 8”x16” hollow type as shown on the plans, stacked and fully grouted, with finished top cap pieces, and reinforcing bars drilled and dowelled into existing structures.

Measurement of CMU retaining wall shall be per square foot of wall face installed. The face of wall is defined as the wall from the top of footing to the top of wall cap.

Full compensation for furnishing all labor, materials (including concrete), tools, equipment, and incidentals and for doing all the work involved in the installation of CMU walls and concrete wall foundations including, but not limited to, subgrade preparation; forming, constructing and finishing concrete footings, and constructing masonry walls shall be included in the contract price paid per square foot of wall face for “CMU Retaining Wall” and no additional compensation will be allowed.

#### **10-1.43 LANDSCAPE BLOCK WALL**

This work includes constructing and installing new block walls, complete in place as shown on the plans, and shall conform to the provisions of the Standard Specifications and these Special Provisions.

Blocks walls shall be composed of Keystone Compac III, Tri-plane Retaining Wall Units, or approved equal, constructed as shown on the plans, and in conformance with the manufacturer’s recommendations. The Contractor shall reference manufacturer’s resources, including specifications, design and construction manuals and shall construct walls in full compliance with manufacturer’s documentation, unless otherwise approved.

Measurement for payment of the block wall will be square footage of the front vertical face of the actual wall whether above or below finished grade.

Full compensation for furnishing all labor, materials (including base leveling pad rock, drain rock, geotextile fabric and perforated drain pipe), tools, equipment, and incidentals, and for doing all the work involved in the block wall construction including, but not limited to excavation, disposal, base placement, leveling and compaction, block wall construction, subdrain placement, drain rock backfill and wrapping as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer shall be included in the contract price paid per square foot of wall face for “Landscape Block Wall” and no additional compensation will be allowed.

#### **10-1.44 TRASH ENCLOSURE**

This work consists of constructing and installing a park trash enclosure including CMU walls, painted steel gates with posts, concrete slab, concrete approach and post foundations complete in place as shown on the plans, and shall conform to the provisions of the Standard Specifications and these Special Provisions.

The Contractors attention is directed to Section 90 "Concrete" and Section 52 "Reinforcement" of the Standard Specifications and these Special Provisions.

Aggregate for minor concrete shall conform to section 90-1.02C of the Standard Specifications unless otherwise specified and shall conform to the combined aggregate grading limits in "Combined Aggregate Gradation," of the Standard Specifications.

Full compensation for furnishing all labor, materials (including concrete), tools, equipment, and incidentals and for doing all the work involved in the installation of the trash enclosure, but not limited to, excavation, subgrade preparation, forming, constructing and finishing concrete footings and slabs, constructing masonry walls and installation of painted steel gates shall be included in the contract lump sum price for "Trash Enclosure" and no additional compensation will be allowed.

#### **10-1.45 REMOVE AND REPLACE HMA**

This work shall consist of removing existing asphalt concrete surfacing, and underlying base material as needed, and replacing the removed structural section with new asphalt concrete as shown on the plans and in conformance with these special provisions.

Existing asphalt concrete surfacing and underlying base material removed during a work period shall be replaced before the time the lane is to be opened to public traffic in conformance with the provisions in "Maintaining Traffic" of these special provisions, unless approved by the Engineer.

The outline of the asphalt concrete area to be removed shall be cut on neat lines with a power-driven saw to a depth matching the depth of the replacement section, before removing the surfacing, unless approved by the Engineer. If the asphalt concrete surface is to be totally removed by cold planning, the Engineer may eliminate the saw-cutting before removing the surface.

Surfacing and base shall be removed without damage to surfacing that is to remain in place. Damage to pavement which is to remain in place shall be repaired to a condition satisfactory to the Engineer or the damaged pavement shall be removed and replaced with new asphalt concrete if ordered by the Engineer. Repairing or removing and replacing pavement damaged outside the limits of pavement to be replaced shall be at the Contractor's expense and will not be measured nor paid for.

Removed materials shall disposed of outside the right-of-way.

The material remaining in place, after removing surfacing and base to the required depth, shall be graded to a plane, watered, and compacted. The finished surface of the remaining material shall not extend above the grade established by the Engineer.

Hot Mix Asphalt shall be placed over the prepared base material or underlying asphalt concrete pavement not removed and shall conform to the provisions in "Hot Mix Asphalt (HMA)" of these Special Provisions, except for payment.

All paved trench edges and joints shall be sealed with asphaltic emulsion seal coat and sand screenings as shown on the plans and in conformance with the provisions in "Seal Coats", of the Standard Specifications and these Special Provisions.

The exact limits of asphalt concrete surfacing to be removed and replaced, as shown on the plans, will be determined by the Engineer. The quantity of asphalt concrete removal and replacement to be paid for will be calculated on the basis of the dimensions shown on the plans adjusted by the amount of any change ordered by the Engineer.

Full compensation for furnishing all labor, materials (including asphaltic emulsions, liquid asphalts, asphalts, and aggregate), tools, equipment, and incidentals, and for performing all the work involved in removing and replacing hot mix asphalt, complete in place including sawcutting existing asphalt concrete, application of prime coat of paint binder (tack coat), and compacting the existing base, as shown on the Plans, as specified in these Special Provisions, and as directed by the Engineer, shall be included in the contract price paid per square yard for "Remove and Replace HMA (Depth of Removal)" and no additional compensation will be allowed.

If the aggregates for the HMA did not meet the "Contract Compliance" requirements for Sand Equivalent or gradation and if the Contractor requests the material be accepted on the basis of a penalty, in conformance with the provisions in the Section 39 2.02, "Materials," of the Standard Specifications, and the Engineer approves the request, the penalty shall be \$3.50 per cubic yard.

#### **10-1.46 HOT MIX ASPHALT (HMA)**

Hot Mix Asphalt (HMA) shall be Type A, installed using the Standard Construction Process, and shall conform to the provisions in "Hot Mix Asphalt," of the Standard Specifications and these Special Provisions.

The grade of asphalt binder to be mixed with aggregate for Type A HMA shall be Grade PG 64-16 conforming to the provisions in "Asphalt Binders," of the Standard Specifications.

Aggregate used for Type A HMA shall conform to the 1/2 inch maximum grading specified in Section 39-2.02B(4), "Aggregates," of the Standard Specifications for all structural section replacement areas, as designated on the plans.

The asphalt content of the asphalt mixture will be determined in conformance with the requirements in California Test 379, or in conformance with the requirements in California Test 382.

Paint binder (tack coat) shall be applied to existing surfaces to be surfaced and between layers of HMA, except when eliminated by the Engineer, and shall be applied to all vertical surfaces of existing pavement, curb and gutter, and construction joints in the surfacing against which additional material is to be placed and to other surfaces as designated by the Engineer.

Paint binder (tack coat) shall be paving asphalt conforming to the provisions in Section 39-1.02B, "Tack Coat," and Section 92, "Asphalts," of the Standard Specifications. The grade of paving asphalt to be used as paint binder will be determined by the Engineer.

Paint binder (tack coat) shall be applied in the gallon per square yard range limits specified for the surfaces to receive asphalt concrete in the tables below. The exact application rate within the range will be determined by the Engineer.

Application Rates for Paint Binder (Tack Coat) on HMA	
Type of surface to receive paint binder (tack coat)	Paving Asphalt gal/sq yd
Dense, compact surfaces, between layers, and on PCCP	0.01 – 0.02
Open textured, or dry, aged surfaces	0.02 – 0.06

HMA shall be spread and compacted in the number of layers of the thicknesses indicated in the following table:

Total Thickness Shown on Plans <sup>a</sup>	No. of Layers	Top Layer Thickness (foot)		Next Lower Layer Thickness (foot)		All Other Lower Layer Thickness (foot)	
		Min.	Max.	Min.	Max.	Min.	Max.
0.20-foot or less	1	—	—	—	—	—	—
0.25-foot	2 <sup>b</sup>	0.12	0.13	0.12	0.13	—	—
0.30-0.40 foot	2	0.15	0.20	0.15	0.25	—	—
0.45-foot or more	c	0.15	0.20	0.15	0.25	0.15	0.40

- a. When pavement reinforcing fabric is shown to be placed between layers of HMA, the thickness of asphalt concrete above the pavement reinforcing fabric shall be considered to be the "Total Thickness Shown on Plans" for the purpose of spreading and compacting the HMA above the pavement reinforcing fabric.
- b. At the option of the Contractor, one layer 0.25-foot thick may be placed.
- c. At least 2 layers shall be placed if total thickness is 0.45-foot. At least 3 layers shall be placed if total thickness is more than 0.45-foot and less than 0.90-foot. At least 4 layers shall be placed if total thickness is 0.90-foot or more.

HMA base shall be spread and compacted in one or more layers. Each layer of HMA base shall be not less than 0.20-foot nor more than 0.40-foot in compacted thickness, except that where the total thickness of HMA to be placed over HMA base is 0.20-foot or less, the layer of HMA base below the HMA shall not exceed 0.25-foot.

A layer shall not be placed over a layer which exceeds 0.25-foot in compacted thickness until the temperature of the layer which exceeds 0.25-foot in compacted thickness is less than 160° F at mid depth.

HMA shall be placed to the lines, dimensions, and grades shown on the plans or as directed by the Engineer. No allowance will be made for HMA placed outside those dimensions unless otherwise ordered by the Engineer. Areas of the base material which are low as a result of over excavation shall be filled, at the Contractor's expense, with HMA.

Full compensation for furnishing all labor, materials (including asphaltic emulsions, liquid asphalts, asphalts, and aggregate), tools, equipment, and incidentals, and for performing all the work involved in placing hot mix asphalt, complete in place including application of a prime coat or paint binder (tack coat) as shown on the Plans, as specified in these Special Provisions, and as directed by the Engineer, shall be included in the contract price paid per square yard for "Hot Mix Asphalt (Thickness)" and no additional compensation will be allowed.

#### 10-1.47 FINISHING ROADWAY

Finishing roadway shall conform to the provisions in Section 22, "Finishing Roadway," of the Standard Specifications except for the method of payment.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in finishing roadway, complete in place, as shown on the plans, as specified in the Standard Specifications and these Special Provisions and as directed by the Engineer will be considered as included in the Contract prices for various items of work requiring roadway finishing and no additional compensation will be allowed.

#### **10-1.48 ADJUST UTILITY COVER TO GRADE**

Frames and covers of existing valve boxes and manholes shall be salvaged and reused or replaced as indicated on the plans or as directed by the Engineer. Enclosure boxes will be adjusted to grade in accordance with "Frames, Covers, Grates, and Manholes" of the Standard Specifications, the City of Grass Valley Standard Detail ST-28 "Adjust Utility Cover/Manhole to Grade" and these Special Provisions.

The Contractor shall accurately locate and record the location of all covers to be adjusted to grade and shall furnish the Engineer a copy of said record prior to paving. Contractor is responsible for protecting utilities per Section 5-1.36 "Property and Facility Preservation" of the Standard Specifications. Utilities include but are not limited to electrical vaults, telephone boxes, water meters, water valves sewer cleanouts and manholes.

For utilities within asphalt concrete replacement areas, adjustment may not be necessary if the existing cover is properly set to the proposed finish grade and the Engineer and Contractor agree that conforming to the existing cover would result in a better end product. Contractor shall protect the existing utility during resurfacing operations.

For utilities in areas of concrete improvements to be reconstructed, care shall be taken to protect the utility during construction and adjust the utility to finished grade (if different from existing grade).

Each of the respective utility companies shall retain the ability to decrease the amount of a contract item of work or eliminate in its entirety.

Contractor shall provide at least 48 hours advance notice to each respective owner of castings to be adjusted to grade.

Prior to removal of an existing manhole frame, a platform shall be placed in the manhole above the top of the sewer or storm drain. The platform shall remain in place until all work on the manhole has been completed and the asphalt concrete has been placed around the manhole. Once adjustment of the manhole is complete, all dirt and debris shall be removed from the platform and the invert of the manhole.

Trimming of manhole cones (tapered section) will not be permitted.

All sections of the manhole grade rings shall be set in cement mortar and all joints smoothly grouted inside and out. The top of the completed manhole shall contain at least one 3-inch grade adjustment ring.

All manhole frames and covers shall be adjusted to grade after placement of the finish course of asphalt concrete.

Existing grade adjustment rings removed in the adjustment of manhole frames shall become the property of the Contractor and, if undamaged and thoroughly cleaned of mortar, may be reused in the work.

Waste materials generated while adjusting the water valve box frame and cover to grade shall be completely removed and disposed of in accordance with "Surplus Material" of the Standard Specifications.

Concrete used for collars shall conform to the provisions in "Minor Concrete" of the Standard Specifications. Portland Cement Concrete shall be Class A, conforming to the provisions of "Concrete" of the Standard Specifications.

Valve and manhole frames and covers adjusted to grade will be measured and paid for as units from actual count, complete and in place. Only those utility covers that require excavation and readjustment after asphalt concrete paving shall be paid for. Payment for covers that are conformed to or simply reset to grade in advance of concrete replacement shall be considered as included in prices paid for the various contract items of work involved and no additional compensation will be allowed.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved including, but not limited to, excavation, lowering, raising to grade, backfill, concrete and hot mix asphalt shall be included in the contract unit price for "Adjust Utility Cover to Grade" as shown on the plans, as specified in these Special Provisions and as directed by the Engineer and no additional compensation will be allowed.

#### **10-1.49 CHAIN LINK FENCE AND GATE**

Installation of chain link fence and gate shall conform to the provisions in Section 80, "Fences," of the Standard Specifications and these Special Provisions. All ferrous materials shall be protected by galvanizing or other specified coatings. Imperfectly galvanized or coated material or material with serious abrasions shall not be used.

##### **10-1.49.1 POSTS**

The base metal for the manufacture of posts and braces shall be commercial quality, or better, weldable steel. Posts and braces shall be galvanized in conformance with the provisions in Section 75-1.05, "Galvanizing," of the Standard Specifications.

The material of which posts, and braces are fabricated shall have a nominal thickness, before galvanizing, of not less than 0.105-inch for posts and 0.075-inch for braces.

Gate posts shall be fabricated from schedule 40 pipe conforming to the requirements shown on the plans.

The length of posts, exclusive of fitted top fixtures or other methods of supporting the top tension wire which are integral with the post, shall not be less than the depth of the concrete footings shown on the plans plus the height of the fabric as shown on the plans or specified in the special provisions, less 4 inches.

All posts shall be fitted with rainproof tops.



Post tops, extension arms, stretcher bars and other required fittings and hardware shall be steel or malleable iron or wrought iron and shall be galvanized after fabrication. All required fittings and hardware shall be fastened to the posts in the proper manner.

#### **10-1.49.2 FABRIC**

Chain link fabric shall conform to the requirements in AASHTO Designation: M 181 for Type I zinc coated fabric with a Class C coating. The wire used in the manufacture of the fabric shall be 9 gage.

Chain link fence fabric shall be woven into approximately 2 inch mesh such that there shall be at least 7 meshes in a vertical dimension of 23 inches along the diagonals of the openings. Chain link fence fabric shall have knuckled finish on top and bottom edges.

#### **10-1.49.3 MISCELLANEOUS**

Between posts, chain link fabric shall be fastened to a top and bottom tension wire or horizontal rails as shown on the plans. Tension wire shall be at least 7-gage (0.177-inch dia.) coil spring steel of good commercial quality and shall be galvanized in conformance with the requirements in ASTM Designation: A 116, Coating Class 3.

Tie wires and hog rings shall be at least 9-gage (0.148-inch dia.) steel and post clips shall be at least 6-gage (0.192-inch dia.) steel; all tie wires, hog rings and post clips shall be galvanized in conformance with the requirements in ASTM Designation: A 116, Coating Class 3.

Turnbuckles and truss tighteners shall be fabricated of commercial quality steel, malleable iron or wrought iron and shall be galvanized as provided in Section 75-1.05, "Galvanizing." The truss tighteners shall have a strap thickness of not less than 1/4 inch.

Portland cement concrete for metal post footings and for deadmen shall be produced from commercial quality aggregates and cement and shall contain not less than 470 pounds of cement per cubic yard.

#### **10-1.49.4 CONSTRUCTION**

Line posts shall be spaced at intervals as shown on the plans, measured from center to center of posts. In general, in determining the post spacing, measurement will be made parallel to the slope of the natural ground, and posts shall be placed in a vertical position, except in unusual locations where directed by the Engineer the posts shall be set perpendicular to the ground surface.

Posts shall be set in concrete footings conforming to the details shown on the plans and crowned at the top to shed water.

End, latch and corner posts shall be braced to the nearest line post. At the Contractor's option bracing shall be accomplished either with diagonal braces used as compression members or with horizontal braces used as compression members and steel truss rods having minimum diameters of 3/8 inch used as tension members. Each steel truss rod shall be equipped with a turnbuckle or truss tightener with tensile strength equal to the truss rod.

Chain link fabric shall be fastened on the side of the posts designated on the plans. The fabric shall be stretched and securely fastened to the posts, and horizontal rails.

The fabric shall be fastened to end, latch, corner and gate posts with stretcher bars having dimensions of not less than 1/4" x 3/4" and stretcher bar bands having dimensions of not less than 1/8" x 3/4" spaced at one foot intervals. The fabric shall be fastened to line posts with tie wires or post clips and to tension wires with tie wires or hog rings. The fasteners shall be spaced at approximately 12 inches on line posts and at approximately 18 inches on rails or tension wires. Wire ties shall be given at least one complete turn. Hog rings shall be closed with ends overlapping. The tension wires shall be wrapped around terminal posts. The distance from the top of the fabric to the top tension wire shall be 2 inches maximum.

In lieu of using stretcher bars and bar bands, the fabric may be fastened to the end and corner posts by threading through loops formed on the posts.

Surplus excavated material remaining after the fence has been constructed shall become the property of the Contractor and shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

#### **10-1.49.5 MEASUREMENT**

Quantities of chain link fence to be paid for will be determined by the linear foot from actual measurements, the measurements to be made parallel to the ground slope along the line of the completed fence, deducting the widths of openings.

Quantities of chain link gates to be paid for will be determined from actual unit count. A gate unit complete in place shall include one gate with all necessary fittings, hardware, and gate and latch posts with braces.

#### **10-1.49.6 PAYMENT**

Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in constructing a chain link fence, complete in place, including, but not limited to clearing the line of the fence and disposing of the resulting material, excavating high points in the existing ground between posts, excavating holes, disposing of surplus excavated material, furnishing and placing Portland cement concrete footings, installing fence posts, rails and fabric and connecting new fences to existing cross fences, shall be considered as included in the contract price paid per linear foot or per unit count for "Chain Link (Height, Type)" and no additional compensation will be allowed.

#### **10-1.50 CONCRETE BUMPER**

This work shall consist of placing concrete parking bumpers as shown on the plans or as directed by the Engineer. The Contractors attention is directed to "Minor Concrete" of these Special Provisions and Section 52 "Reinforcement" of the Standard Specifications.

Bumpers shall be precast concrete with 9 inch wide base dimension, beveled top edges, approximate 5 inch height and 6 foot length, or as approved by the Engineer. Two holes shall be precast on either end of the bumper to allow for rebar anchoring.

Bumpers shall be anchored to asphalt surfacing with 18 inch long, grade 60, #4 steel reinforcing bar driven flush with the top of the bumper.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in the installation of concrete bumpers including, but not limited to, layout, placement and anchoring of precast bumpers to asphalt surfacing as shown on the plans, as specified in the Standard Specifications, the Special Provisions, and as directed by the Engineer, shall be included in the contract unit price paid for each "Concrete Bumper" and no additional compensation will be allowed.

#### **10-1.51 THERMOPLASTIC TRAFFIC STRIPE AND PAVEMENT MARKING**

Thermoplastic traffic stripes (traffic lines) and pavement markings shall be applied in conformance with the provisions in Section 84, "Traffic Stripes and Pavement Markings," of the Standard Specifications and these Special Provisions.

Thermoplastic material shall be free of lead and chromium, and shall conform to the requirements in State Specification PTH-02ALKYD.

Retroreflectivity of the thermoplastic traffic stripes and pavement markings shall conform to the requirements in ASTM Designation: D 6359-99. White thermoplastic traffic stripes and pavement markings shall have a minimum initial retroreflectivity of  $250 \text{ mcd m}^{-2} \text{ lx}^{-1}$ . Yellow thermoplastic traffic stripes and pavement markings shall have a minimum initial retroreflectivity of  $150 \text{ mcd m}^{-2} \text{ lx}^{-1}$ .

Where striping joins existing striping, as shown on the plans, the Contractor shall begin and end the transition from the existing striping pattern into or from the new striping pattern a sufficient distance to ensure continuity of the striping pattern.

Thermoplastic material for traffic stripes shall be applied at a minimum rate of 0.20-lb/ft. The minimum application rate is based on a solid stripe of 4 inches in width. Thermoplastic traffic stripes shall be applied at the minimum thickness of 0.059-inch. Thermoplastic traffic stripes and pavement markings shall be free of runs, bubbles, craters, drag marks, stretch marks, and debris.

At the option of the Contractor, permanent traffic striping and pavement marking tape conforming to the provisions in "Pre-qualified and Tested Signing and Delineation Materials" of these Special Provisions may be placed instead of the thermoplastic traffic stripes and pavement markings specified herein. Permanent tape, if used, shall be installed in conformance with the manufacturer's specifications. If permanent tape is placed instead of thermoplastic traffic stripes and pavement markings, the tape will be measured and paid for by the linear foot as thermoplastic traffic stripe and by the square foot as thermoplastic pavement marking.

Thermoplastic traffic stripes will be measured by the linear foot along the line of the traffic stripes, without deductions for gaps in broken traffic stripes. Deductions will be made at cross streets and driveways as applicable. A double traffic stripe, consisting of two 4-inch wide yellow stripes, shall be measured and paid for as one traffic stripe. A striped median island or two-way left turn lane shall be measured and paid for as two separate double traffic stripes.

Where existing pavement delineation is to be covered or obliterated by the Contractor's work or where the existing striping alignment and marking placement is shown to be substantially modified, the Contractor shall demarcate the proposed layout prior to placement of permanent striping and marking. The Contractor shall notify the Engineer in advance of beginning layout work and shall spot, track or outline the proposed delineation for field acceptance by the Engineer.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in applying thermoplastic traffic stripes complete in place, including establishing alignment for stripes and layout work, as shown on the plans, as specified in the Standard Specifications and the Special Provisions, and as directed by the Engineer shall be included in the contract price paid per linear foot for "Thermoplastic Traffic Stripe," and no additional compensation will be allowed.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in applying thermoplastic traffic markings complete in place, as shown on the plans, as specified in the Standard Specifications and the Special Provisions, and as directed by the Engineer shall be included in the contract price paid per square foot for "Thermoplastic Traffic Markings," and no additional compensation will be allowed.

#### **10-1.52 ACRYLIC COATING SYSTEM**

This work shall consist of placement of a complete, multi-layer acrylic coating system over concrete pickleball and basketball courts, as shown on the plans, as recommended by the acrylic coating manufacturer and as directed by the Engineer.

The surface to which the coatings are to be applied must be dry, smooth, free of dirt, loose or flaking paint, oily materials or chemical residues, vegetation of any sort and any other debris or foreign material. Acrylic coating shall only be performed when the temperature is at least 50° F and rising and shall not be placed when rain is present or likely.

Each coat in the system must be allowed to completely dry before the next application. The entire surface shall be inspected in between each coat and any defects repaired and/or removed. All acrylic layers shall be manually applied using a wide blade, neoprene rubber squeegee.

Once new concrete court areas have cured, a concrete primer shall be applied to ensure proper bonding with acrylic coatings. The court area shall then be flooded to reveal any low or non-draining areas. A patch binder mix may be applied to level low areas as approved by the Engineer, otherwise significant low spots may be rejected in conformance with "Minor Concrete" of these Special Provisions.

Two coats of sand-textured acrylic filler material shall be applied over primed concrete surfaces per the manufacturer's recommendation, to give the surface one uniform texture. Sand gradation shall be 70 mesh.

Two coats of colored, textured acrylic latex shall be applied per the manufacturer's recommendation. Colored coats shall be light green, light blue and dark blue, as shown on the plans. The Contractor shall provide a color sample to the Engineer prior to ordering of the colored, acrylic resurfacing material.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for performing all the work involved in placing a complete acrylic coated playing surface, as specified in these Special Provisions, and as directed by the Engineer, shall be included in the contract unit price paid per square foot for "Acrylic Coating System" and no additional compensation will be allowed therefore.

#### **10-1.53 PAINTED COURT MARKINGS**

Painting of game lines shall be performed after curing of all color coatings and shall be applied in conformance with the provisions in "Traffic Stripes and Pavement Markings," of the Standard Specifications and these Special Provisions.

The surface to which the paint is to be applied must be dry, smooth, free of dirt, loose or flaking paint and any other debris or foreign material. Line painting shall only be performed when the temperature is at least 50° F and rising and shall not be placed when rain is present or likely.

Game lines shall be 2" wide, lightly textured acrylic latex paint, accurately located and marked in accordance with rules and recommendations of the USA Pickleball Association Tennis Association (USAPA) and the International Basketball Federation (FIBA). The Engineer shall approve the finished court surfacing and final layout prior to any line painting. Line painting shall be performed with a brush or roller, using masking tape to ensure crisp edges, in accordance with the manufacturer's recommendations. At no time should the playing lines or the line dimensions vary more than 1/4" from the exact measurement.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for performing all the work involved in painting of game lines, complete in place as specified in these Special Provisions, and as directed by the Engineer, shall be included in the contract lump sum price paid for "Painted Court Markings" and no additional compensation will be allowed therefore.

#### **10-1.54 PICKLEBALL NET ASSEMBLY**

This work shall consist of a complete permanent pickleball net assembly, including, posts, net, center strap anchor and center strap as shown on the plans or as directed by the Engineer. The posts and net, including a center strap, shall be set, installed and adjusted conforming to USAPA specifications.

Pickleball net assembly parts and components shall be "Premier" or "Deluxe" standard, manufactured for durability, weather resistance and suitable to withstand the rigors of a public outdoor environment.

Net posts shall be Douglas RD-36, or approved constructed of 3" heavy duty round steel with a thick, baked-on, green polyester powder coat finish. The posts shall be mounted in sleeves set in a minimum 3-foot deep concrete foundation, poured against stable undisturbed soil. The footing diameter shall be 2" circular at the top, extending to 2'-6" at the bottom. The top of the sleeve shall be set flush with the court surface and square with the playing area.

A center strap ground anchor shall be provided, made from non-corrosive metal pipe, not less than 9" in length and 1-1/2" in diameter. A non-corrosive 1/4" o.d. pin shall be centered through the pipe 1/4" to 3/8" below the opening for the

purposes of attaching a center strap hook. The center strap anchor shall be set in concrete footings measuring 1-foot in diameter by 1-foot deep. The cross pin in the ground anchor must be flush with the court and parallel to the net.

Pickleball nets shall be Douglas Deluxe, or approved equivalent, super-durable 3 mm net .

The center strap shall be water resistant white strap with conventional metal webbing slides.

Full compensation for furnishing all labor, materials (including nets, posts, sleeves and anchors) tools, equipment, and incidentals and for doing all the work involved in installing a complete net assembly shall be included in the price paid for each "Pickleball Net Assembly," and no additional compensation will be allowed therefore.

#### **10-1.55 BASKETBALL HOOP AND POST ASSEMBLY**

This work shall consist of the installation of a complete permanent basketball hoop and post assembly including, the following components; 18" diameter steel hoop painted orange with flex goal system and nylon net, 42" x 72" galvanized steel backboard, a 6-5/8" diameter galvanized steel post embedded in a 20" diameter, 48" deep concrete foundation.

The assembly shall meet or exceed the standards of the First Team Tyrant Excel Basketball Goal (72" Steel Model) and shall satisfy the geometry shown on the plans.

Full compensation for furnishing all labor, materials tools, equipment, and incidentals and for doing all the work involved in installing a complete hoop and post assembly shall be included in the price paid for each "Basketball Hoop and Post Assembly," and no additional compensation will be allowed therefore.

#### **10-1.56 LEAN-TO STORAGE ENCLOSURE**

This work shall consist of the construction and erection of a lean-to storage enclosure abutting the pool mechanical building.

The Contractor's attention is directed to "Chain Link Fence and Gate" and of these provisions.

The basic design and functionality of the enclosure shall be as shown on the plans, consisting of a steel frame, metal roof and siding, fenced enclosure. The contractor may propose alternate construction methods as needed to fit site conditions and simplify construction, including a pre-fab system as optional. The enclosure shall provide limited weather protection from above and on the sides, with a lockable gated access to store and secure pool equipment.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in the construction of a storage enclosure, including, but not limited to, grading, excavating, setting of posts and anchors, assembly, welding, construction and finishing as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer shall be included in the contract lump sum price paid for "Lean-To Storage Enclosure" and no additional compensation will be allowed.

#### **10-1.57 MAINTENANCE BUILDING**

This work shall include the production of shop drawings, construction and erection of a permanent maintenance building and concrete pad as shown on the plans and as directed by the Engineer.

The Contractors attention is directed to "Concrete", "Reinforcement", "Paint" and "Building Construction" of the Standard Specifications and these Special Provisions.

The basic design and layout of the enclosure shall be as shown on the plans, consisting of a roughly 12' by 20' wood framed structure. The contractor may propose alternate construction methods as needed to fit site conditions and simplify construction, including a pre-fab unit as optional. Light frame construction methods shall be followed per California Building Code and the contractor shall submit simple construction plans to be followed or a manufacturer provided certification of pre-fab unit.

Interior wall height shall be 7'-4" minimum. The roof shall be simple gable style, metal panels with a minimum pitch of 4/12. Exterior finishing shall include painted, engineered smart siding and trim. The structure shall be permanently anchored into a concrete pad using wet set galvanized anchor and washers.

A subpanel shall be installed to provide a minimum of one 20amp plugs and lights circuit, and one 20amp equipment circuit. Switch controlled LED lighting with motion sensing shall be provided and electrical receptacles shall be provided throughout.

Included in this work is all wiring and appurtenances necessary to connect and supply power to the subpanel from the new electrical panelboard at the mechanical building installed as part of this project.

Interior walls and ceilings need not be covered or finished unless necessary for bracing requirements and may be exposed stud walls/rafters.

Full compensation for furnishing all labor, materials (including concrete), tools, equipment, and incidentals and for doing all the work involved in the installation of the maintenance shed, including, but not limited to, excavation, subgrade preparation, forming, constructing and finishing concrete slab, and installation of shed and metal roof shall be included in the contract lump sum price paid for "Maintenance Building" and no additional compensation will be allowed.

### **10-1.58 RESTROOM BUILDING**

This work shall include the production of shop drawings, construction and erection of a public restroom building as shown on the plans. The contractor shall obtain all necessary building permits and adhere to all local building, fire, and Title 24 codes. All work shall be furnished and installed using commonly accepted industry practices. Prefabricated construction methods are preferred although the contractor may propose alternate construction methods as needed to fit site conditions and simplify construction.

The restroom building shall include 24 GA. corrugated metal roofs supported by HSS trusses. Steel trusses shall include steel vent frame screens at the exteriors. Floors shall be broom finished concrete. Framing and walls shall be reinforced concrete masonry unit walls (CMU 4" x 8" x 16" ) fully grouted, anchored to the concrete foundation and with exterior decorative sidings and painted interiors. All decorative sidings, exterior finishes, textures, and color schemes, including wood lap siding, wood trim, manufactured stone wainscot and corrugate metal, shall be of similar style as existing park restrooms facilities to remain. All proposed finishes, textures, and colors shall be submitted to and approved by the engineer before construction. Restroom exteriors shall include two stainless steel drinking fountains and one bottle filler in the exterior building alcove.

The restroom building shall include an electric water heater capable of supplying hot water to all interior sinks and shall include interior and exterior LED lighting adhering to Title 24 requirements. The restroom building will have two unisex bathrooms as shown on the plans. Doors shall be stainless steel units with deadbolt locking systems and appropriate Title 24 restroom signage. Plumbing fixtures shall be wall mounted, Penal grade, 14G 316-Stainless Steel. Each unisex restroom shall include one toilet, one handwashing sink with mirror, soap dispenser, electric hand dryer. They shall also include and a baby changing table and a wall mounted stainless steel waste bin. All toilets shall ADA stainless steel grab bars and have three roll stainless steel wall mounted toilet paper holders adjacent to them. Toilets shall meet or exceed the specifications of the Penal-Ware 1675 Series off floor toilets. Lavatories shall meet or exceed the specifications of the Penal-Ware 1652FALRB Series 18" lavatories with rectangular bowls. All plumbing fixtures shall be submitted to and approved by the engineer prior to construction. Building utilities shall be installed via the utility chase identified on the plans. Each floor of the restroom shall include a floor drain with ADA compliant slopes directing water to the drainage system. The utility chase shall include a wall mounted hose and reel.

The final design is to be determined through consultation with the Engineer. All final designs shall be submitted to and approved by the Engineer prior to construction.

The Contractors attention is directed to "Concrete", "Reinforcement", "Paint" and "Building Construction" of the Standard Specifications and these Special Provisions.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals and furnishing and doing all the work involved in the design and construction of the restroom building including, but not limited to: structural and architectural drawing production, subgrade preparation and leveling, aggregate installation and compaction, utility hookups, forming and constructing concrete, constructing steel frames and CMU walls. Installing all lighting and plumbing, concrete finishing, grooving and stamping, shall be included in the contract lump sum price for "Restroom Building" and no additional compensation will be allowed.

### **10-1.59 REHABILITATE LAWN**

This work shall consist of rehabilitating existing lawn areas through resodding as shown on the plans or as directed by the Engineer.

The Contractors attention is directed to "Park Demolition and Removal", "Landscape Irrigation", and "Landscape" of the Standard Specifications and these Special Provisions.

Lawn irrigation system shall be installed, tested and adjusted prior to sod placement.

Resodding fields shall consist of removing existing vegetation, rotary tilling, amending, fertilizing, grading conforms to new installations as necessary, leveling, compacting, moistening the prepared areas, laying new sod, and rolling the newly sodded areas. All sod shall match existing.

All landscaping work shall be performed using commonly accepted industry practices and shall conform to the provisions in "Landscape" of the Standard Specifications. Landscaping includes all work necessary for the successful establishment and long term health of the sodded areas.

Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved including, but not limited to, soil preparation, placing sod and maintaining sod through initial establishment, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer shall be included in the contract price paid per square foot for "Rehabilitate Lawn" and no additional compensation will be allowed.

### **10-1.60 LANDSCAPING**

This work shall consist of placing wood chip mulch material or ground cover plantings in all uncovered disturbed areas as shown on the plans or as directed by the Engineer.

Mulch shall be woody material in conformance with the requirements of “Mulch,” of the Standard Specifications. Woody materials shall consist of shredded cedar or redwood materials or clean processed cedar or redwood wood products. Deleterious materials such as rocks, glass, plastics, metals, clods, weeds, weed seeds, coarse objects, sticks larger than the specified particle size, salts, paint, petroleum products, pesticides or other chemical residues that would be harmful to plant or animal life shall not exceed 0.1 percent of the mulch volume.

At least 95% by volume of mulch material shall equal State Standard Specification particle size or 0.5 – 3 inches in length and not less than 0.5 inches in width and 0.125 inches in thickness.

Mulch shall be placed and spread from the outside of the proposed plant basin to the adjacent edges of shoulders, curbs, sidewalks, fences, plastic header board, and existing plantings to a uniform depth of approximately 3 inches.

Ground cover plantings shall be Vinca Minor “Dwarf Periwinkle”. Planter areas to receive ground cover shall be prepared by first removing all weeds and objectional material. Planting holes shall be selected at approximately 12” spacing, loosened 3-4” deep and amended with compost. Periwinkle plugs shall be planted in prepared holes, backfilled with amended soil and thoroughly watered.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in the installation of mulch, including, but not limited to placing, leveling, and spreading mulch in planter areas, as shown on the plans, as specified in the Standard Specifications, the Special Provisions, and as directed by the Engineer shall be included in the contract lump sum price paid for “Landscaping” and no additional compensation will be allowed therefore.

**10-1.61 SOFTBALL FIELD ARTIFICIAL TURF INSTALLATION**

This work consists of the installation of complete artificial turf softball ball field system as shown on the plans or as directed by the Engineer.

The Contractor’s attention is directed to “Park Demolition and Removal” of these provisions for details regarding the removal of existing vegetation and irrigation systems.

The construction plans show the overall layouts, general schematics and basic elements of the artificial turf facility desired by the City. The contractor shall employ the services of a professional Designer to confirm and finalize all aspects of the artificial turf system design, layout, and specifications.

Installation of the turf softball field includes all earthwork, drainage system construction, geotextile placement, installation of base courses, installation of shock pad and synthetic turf. All work shall be furnished and installed using commonly accepted industry practices.

Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in artificial turf field installation shall be included in the contract lump sum price for “Softball Field Artificial Turf Installation” and no additional compensation will be allowed. Section 9-1.06 “Changed Quantity Payment Adjustments” of the Standard Specifications shall not apply to this Bid Item. The Contractor is made aware that this item is subject to deletion if bid alternate item “Softball Field Restoration” is accepted as the preferred contract work, or if no softball field work is directed to be done under this contract. It is understood that direction to proceed with the bid alternate “Softball Field Restoration” would include deletion of this “Softball Field Artificial Turf Installation” bid item.

**10-1.61.1 TURF FIELD DEMOLITION AND EARTHWORK**

Turf field demolition and earthwork includes, but is not limited to removal of existing irrigation system, removal and disposal of existing grass surfacing, topsoil stripping, excavating, stockpiling, and replacement, rough grading, filling, leveling, final grading and compacting, and preparing the subgrade suitably to install synthetic turf.

The Contractor’s attention is directed “Earthwork” of these provisions.

Areas identified on the plan to receive turf shall have the top 12” layer compacted to at least 95 percent relative compaction and shall be non-yielding to construction traffic. Removal and subsequent replacement of some material (i.e. areas of excessively wet materials, unstable subgrade, or pumping soils) may be required to obtain the minimum 95 percent compaction

Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in turf field earthwork shall be included in the contract lump sum price for “Softball Field Artificial Turf Installation” and no additional compensation will be allowed.

**10-1.61.2 TURF FIELD GEOTEXTILE FILTER FABRIC**

The contractor shall provide geotextile fabric as shown on the plans. Fabric shall conform with the following minimum specifications.

Property	Test Method	Value
Grab Strength	ASTM D 4632	80 lb
Puncture Strength	ASTM D 4833	25 lb
Burst Strength	ASTM D 3786	130 In

Trapezoid Tear	ASTM D 4533	25 lb
Permeability	ASTM D 4491	0.1 cm/sec
Apparent Opening Size	ASTM D 4751	#50 Sieve Size
Permittivity	ASTM D 4491	

Geotextile filter fabric shall be installed with 6” overlap and stapled 6’ on-center along seams. Staples are to be 6” staples

Full compensation for furnishing all labor, materials (including pipe and backfill material), tools, equipment, and incidentals, and for doing all the work involved in the installation of turf field geotextile filter fabric as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer shall be included in the contract lump sum price for “Softball Field Artificial Turf Installation” and no additional compensation will be allowed.

**10-1.61.3 TURF FIELD DRAINAGE SYSTEM**

The contractor is to propose and construct a drainage system capable of adequately draining the entire softball field leaving no areas of standing water. The drainage system shall include softball field grades with a minimum of 1% slope in all directions, perforated subdrain lines and solid wall storm drain lines as required. All drainage shall be directed into the existing drainage infrastructure identified on the plans.

Perforated subdrain drainage pipe shall be high density polyethylene pipe (HDPE) 12” ADS pipe or as otherwise approved by the Engineer.

Solid wall storm drain drainage pipe shall be either high density polyethylene pipe (HDPE) or poly vinyl chloride (PVC) pipe and shall be circular, with smooth interior walls and a diameter as shown on the plans. HDPE pipe shall be Type S with corrugated exterior walls, as shown on the plans or as directed by the Engineer.

Drainage pipe shall be furnished and installed in conformance with the provisions of Section 64 “Plastic Pipe” of the Standard Specifications and these Special Provisions.

Subdrain trench drain rock Shall be ¾” x ½” crushed virgin (i.e. un-recycled) rock, and shall meet the following general graduation requirements.

Sieve Size	% Passing
1”	100
¾”	90-100
½”	10-40
3/8”	0-15
#4	0-5

The subdrain rock profile will extend from the bottom of the trench to the top of both sides of the subdrain trench, and to the top of rock elevation. For planarity purposes, a clean uniform 3/8” minus crushed stone material may be installed over the subdrain trench profile (max thickness one inch for this stone layer)

Attention is directed to Section 19, “Earthwork,” of the Standard Specifications for requirements regarding structure excavation, trenching and shoring, and backfill.

Full compensation for furnishing all labor, materials (including pipe and backfill material), tools, equipment, and incidentals, and for doing all the work involved in the installation of drainage pipe, including, but not limited to excavating, placing, joining, backfilling, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer shall be included in the contract lump sum price for “Softball Field Artificial Turf Installation” and no additional compensation will be allowed.

**10-1.61.4 TURF FIELD AGGREGATE BASE**

This work shall include the placement and compaction of aggregate base in areas identified on the plan to receive turf that are outside the area of the subdrain trenches. The permeable base rock shall not be installed over the subdrain trench rock. Material shall be placed in 6” maximum lifts unless otherwise stated and compaction shall be at least 90-92% relative compaction.

Aggregate base shall be Class 2, (3/4 inch) maximum grading, and shall conform to the provisions in Section 26, "Aggregate Bases," of the Standard Specifications and these Special Provisions. Aggregate base shall be processed to 95% relative compaction.

Do not store reclaimed asphalt concrete or aggregate base with reclaimed asphalt concrete within 100 feet measured horizontally of any culvert, watercourse, or bridge.

Aggregate base shall not contain volcanic cinder material.

Aggregate base shall have at least 80% of the rock having two or more fractured surfaces evident.

If the required compacted depth of the base course exceeds 6", the base stone course shall be constructed in 2 or more layers or lifts of approximate equal thickness. Each layer must achieve a uniform 90% relative compaction. No compaction of greater than 93% relative compaction should be achieved.

Top of rock elevations shall be verified using laser-operation survey instruments. Refer to Conformance Surveying specifications for requirements. Contractor shall manually screed the top stone surface to ensure tolerances are met. Finish surface planarity shall be verified, and if necessary adjusted, by the Contractor using string line method. A mason's line held taught between two workmen separated by a distance of approximately 40 feet, shall be placed directly on the finished surface, parallel to the direction of greatest slope. A third workman shall check for separations between the mason's line and the finished surface that are equal to or greater than the specified tolerances. Areas of separation shall be outlined with marking paint and the depth of separation indicated. Entire finished surface shall be "walked" with mason's line in increments of approximately 3 feet. The final finished surface planarity shall be approved by the City Inspector and the Synthetic Turf Installer.

Once the top of the permeable rock base is installed and compacted, the Contractor shall conduct field permeability testing which will consist of a minimum of four controlled field permeability tests per synthetic turf field. Tests shall be by a single ring infiltrometer or equivalent test method. If the test does not achieve a minimum of 20 inches per hour, the Contractor shall provide within 48 hours a written repair procedure to correct the permeability deficiency. All repair work, including any associated delays, shall be the Contractor's sole responsibility. Any fine tuning of the field base due to the testing operations is the responsibility of the Contractor.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in the installation of turf field aggregate base, including, but not limited to, placing, grading and compacting aggregate base as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer shall be included in the contract lump sum price for "Softball Field Artificial Turf Installation" and no additional compensation will be allowed.

#### **10-1.61.5 TURF FIELD SHOCK PAD AND SYNTHETIC TURF**

This work includes the installation of the manufactured shock pad, synthetic turf and infill material. All material specs shall be submitted to and approved by the engineer prior to installation.

The manufactured shock pad shall be a Thermagreen 20mm thick shock pad a Hinged Versatile shock pad or an engineer approved equal. The contractor shall take measures to insure that the product is not exposed to the outdoor elements longer than the manufacturer's recommendations. Any product that exceeds this time duration shall be removed from the project site immediately at the contractor's expense. All sections of the shock pad shall be interlocked and/or connected to adjacent pieces in strict conformance with the manufacturer's recommendations.

Synthetic turf shall be polypropylene, or polyethylene fiber blends tufted into a polypropylene backing. Durability, resilience and feel shall meet accepted industry standards and specs for all material shall be submitted to and approved by the engineer.

Synthetic turf infill shall be granular pure cork system or a Corkonut (Coconut Fiber and Cork) and sand infill. Cork particle size shall be 0.8mm to 2.5mm with bulk densities of 8-12.5 LB/CF unless otherwise approved by the engineer.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in the installation of turf field shock pad and synthetic turf, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer shall be included in the contract lump sum price for "Softball Field Artificial Turf Installation" and no additional compensation will be allowed.

#### **10-1.62 PERMIT COORDINATION**

This work shall consist of required permit coordination for building and pool construction permits. Building permits will be required from the City of Grass Valley Building Department for the major structural and electrical installations including the Pool Mechanical Building, the Maintenance Building and the Restroom. Permitting of the Community Pool construction will be processed through Nevada County Environmental Health Department.

The City of Grass Valley will waive all City building permit fees. The City will pay all Nevada County permit fees.

The Contractor is responsible for the submittal of all shop drawings, plans, specifications, diagrams and calculations necessary to gain permit approval. Revisions, response to comments and follow up submittals may be required.

The Contractor's attention is directed to Section 4, "Beginning of Work, Time of Completion and Liquidated Damages" Approximately fifty working days are allocated into the project schedule for preparation of permit submittals and building permit approval. If the permit approval process continues beyond fifty days for reasons outside of the Contractor's control, the working days may be suspended or additional days added to the contract at no cost, as agreed upon by the Engineer and the Contractor.

The Engineer will coordinate with the City Building Department regarding items for which inspection may be delegated to Engineering and those items requiring inspection by the Building Official. For building construction inspection, particularly for the proposed pre-fab structures, the primary inspection by the Building Official will be electrical inspections.



The Contractor will coordinate with Environmental Health Department for those items requiring inspection by the County Official and for complying with all conditions of permit approval.

Full compensation for furnishing all labor, materials, and incidentals and for doing all the work involved in coordinating all aspects of the permitting process with City of Grass Valley and Nevada County Departments, as necessary for permit submittal, revision, resubmittal, approval, inspection and otherwise complying with all conditions of approval, shall be considered as included in the contract prices paid for the various items of work requiring permitting and no additional compensation will be allowed.

#### **10-1.63 POOL – FINAL DESIGN, ENGINEERING AND INSPECTION**

This work shall consist of the final design, engineering, and specification, as well as the coordination and scheduling of any special inspections for all pool equipment, components, and appurtenances.

The construction plans show the overall layouts, general schematics and basic equipment and functionality of the commercial aquatic facility desired by the City. The contractor shall employ the services of a Professional Engineer/Pool Designer to confirm and finalize all aspects of the pool facility design, included, but not limited to, equipment sizing and specification, treatment methods, chemical storage, control systems, heating system, electrical wiring and interconnection, valving, pipe sizing, pipe layout, inlet and return fitting sizing and placement, surge chamber sizing, and all miscellaneous pool components and appurtenances.

The Designer shall prepare proposed load diagrams, sizing calculations, flow controls, operating methods and a final equipment list and submit to the City for approval by the Engineer. A complete permit ready, pool construction plan set shall be prepared by the Contractor's Designer and submitted for approval, in compliance with Nevada County Environmental Health guidelines and in accordance with California Health and Safety Code, Building Code and Electrical Code. The Contractor's Engineer/Designer shall be the Engineer of Record for Public Swimming Pool design.

Final design of the mechanical building shall include a complete electrical design of all equipment, general electrical circuits (plugs and lights), panelboard, and all required subpanels and shutoffs.

No geo-technical report is currently available for the existing pool facility. The contractor may assume a worst case scenario or decide to perform a geo-technical evaluation as part of the design process in order to more precisely specify pool structural components and details.

If specific backfill compaction levels are specified in the design for structural components, the Contractor shall be responsible for special inspection and compaction testing needed to verify proper compaction results are achieved.

Full compensation for furnishing all labor, materials, and incidentals and for doing all the work involved in finalizing all aspects of the pool design, as necessary for a complete, safe, efficient and fully functional commercial aquatic facility shall be included in the contract lump sum price paid for "Pool – Final Design, Engineering, and Inspection" and no additional compensation will be allowed.

#### **10-1.64 POOL – MECHANICAL BUILDING EXTERIOR RESTORATION**

This work shall consist of the restoration of the exterior of the existing pool mechanical building as shown on the plans and as directed by the Engineer.

The Contractors attention is directed to "Paint" "Miscellaneous Metal" and "Building Construction" of the Standard Specifications and these Special Provisions.

The existing structure construction is CMU wall, wood framed roof with composite shingle roofing. Restoration work includes replacement of rotted and peeling fascia and trim boards with new Engineered Smart Trim; replacement of rusted grates and vents with new fixtures; caulking of trim and fixtures as necessary; patching of all abandoned wall and roof penetrations; flashing or sealing of all new penetrations; replacement of the roof material with new 30year composite shingles; and repainting of the entire exterior with two coats of exterior paint, two color contrasting tones to coordinate with other park buildings

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in the restoration of the pool mechanical building, including, but not limited to fixture replacement, fascia replacement, roofing, sealing, cleaning, preparing, painting and finishing, shall be included in the contract lump sum price paid for "Pool – Mechanical Building Exterior Restoration" and no additional compensation will be allowed.

#### **10-1.65 POOL – MECHANICAL BUILDING DEMOLITION AND STRUCTURAL**

This work shall consist of demolition and removal work and structural improvements to the existing pool mechanical building as shown on the plans and as directed by the Engineer.

The Contractors attention is directed to "Concrete", "Paint" "Miscellaneous Metal" and "Building Construction" of the Standard Specifications and these Special Provisions.

The existing structure construction is CMU wall, concrete slab with metal access doors and a large roll up equipment door. Equipment is mounted on various pads, brackets, railing and directly anchored to the floor and walls.

All existing equipment, piping, conduit, equipment pads, brackets, anchors, hangers, doors, grates, vents, and appurtenances shall be demolished and removed or salvaged as shown on the plans.

Existing solar heating system and components shall be salvaged to the extent practical as approved by the Engineer. The two existing solar arrays heating the existing pool are expected to remain in place undisturbed throughout construction and be reconnected for use as supplemental heating for the new lap pool only. The supply and return pipes shall be capped during demolition work, as they leave the mechanical building and reconnected during equipment installation work.

Structural improvements include new dividing wall and ceiling construction, construction of new sections of CMU wall, removal of sections of CMU wall, patching of existing wall penetrations, coring of new wall penetrations installation of new commercial metal doors, vents, and a window, and construction of concrete equipment pads. Also included is saw cutting and removal of existing floor, trenching and excavation as necessary to install new floor drain and sink sewer system and new water service piping.

After demolition and structural improvements all concrete floor and wall surfaces shall be patched to cover and seal all holes, cracks, and spalls. Two coats of a thoro seal or equal coating shall be applied to walls and the floor shall be skim coated with a cementitious, polymer modified micro topping.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in the demolition and structural improvements of the pool mechanical building, including, but not limited to equipment removal, demolition and construction, trenching and backfill, and surface preparation, coating, sealing and finishing, shall be included in the contract lump sum price paid for "Pool – Mechanical Building Demolition and Structural" and no additional compensation will be allowed.

#### **10-1.66 POOL – MECHANICAL BUILDING AND EQUIPMENT**

This work shall consist of installation of new and salvaged equipment in the pool mechanical building as shown on the plans and as directed by the Engineer.

The Contractor's attention is directed to "Pool – Final Design, Engineering and Inspection" of these provisions. Final equipment selection, layout, functionality, interconnection, and installation methods shall be as proposed by the Contractor's Designer and as approved by the Engineer.

General mechanical building work includes all shelves, mounts, brackets, piping, conduit and miscellaneous components as well as floor drains, drain lines, water lines, sewer lines, hose bibbs, valves, fittings and appurtenances. Also included is the complete in place electrical and wiring work for new lights and plug circuits, fans, including switches, sensors, timers and miscellaneous control components.

Mechanical equipment work shall include installation of all pumps, filters, UV treatment, gas heaters, solar heating, chemical storage, chemical feeds, water testing, chemical controls, pump controls and all electrical, gas, and piping work, along with all associated valves, gages and appurtenances necessary for a complete fully-functional, and efficient commercial pool mechanical system.

Solar heating components salvaged for reuse shall be installed along with all necessary piping, isolation valves, sensors, controller and circulation pump necessary for proper and efficient solar heating system operation for the new lap pool.

Once installation is complete and equipment is started up, tested, and adjusted, a demonstration and training day shall be scheduled with City maintenance staff to discuss and explain all standard equipment operating methods, maintenance, and troubleshooting.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in the installation of pool mechanical equipment, including, but not limited to placing, mounting, anchoring, connecting, plumbing, wiring, testing, adjusting and training, shall be included in the contract lump sum price paid for "Pool – Mechanical Building and Equipment" and no additional compensation will be allowed.

#### **10-1.67 POOL – DECK AND POOL DEMOLITION AND EXCAVATION**

This work shall consist of demolition and removal work and excavation of the existing pool and deck area as shown on the plans and as directed by the Engineer.

The existing concrete pool and deck shall be completely removed and disposed of to the limits shown on the plans and as needed to construct the improvements shown. All existing piping, drains, anchors, footings, lights, poles, and miscellaneous components with the pool area shall be removed. Concrete thickness of the existing pool floor and footings is unknown and may require hammering in places to reduce to manageable sizes.

Excavation shall be accurately executed to the limits and depths shown, as needed to construct the two new pools and avoid extraneous concrete. Suitable material that can be salvaged for use as fill and grading in other areas of the pool facility or within the park may be reused as approved by the Engineer. Ground water may be encountered at depths below four feet and dewatering may be required in some areas and at certain times of the year.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in the demolition and excavation for the new pools shall be included in the contract lump sum price paid for "Pool – Deck and Pool Demolition and Excavation" and no additional compensation will be allowed.

#### **10-1.68 POOL – PIPING, CONDUIT AND UTILITIES**

This work shall consist of trenching and installation of all pool water pipes, electrical conduits, drainage pipes, and drainage grates as shown on the plans and as directed by the Engineer.

The Contractor's attention is directed to "Pool – Final Design, Engineering and Inspection" of these provisions. Final pipe sizing, layout, functionality, and interconnection shall be as proposed by the Contractor's Designer and as approved by the Engineer.

The Contractor's attention is directed to "Plastic Pipe", "Miscellaneous Drainage Facilities" and "Miscellaneous Metal" of the Standard Specifications and these Special Provisions.

Trench excavation shall be accurately executed to the limits and depths necessary to install the improvements shown. Suitable material that can be salvaged for use as fill and grading in other areas of the pool facility or within the park may be reused as approved by the Engineer. Ground water may be encountered at depths below four feet and dewatering may be required in some areas and at certain times of the year.

All below grade piping and conduit shall be Schedule 40 PVC. Above grade piping and conduit shall be Schedule 80 PVC.

Drainage boxes shall be Christy V05 with cast iron grate or approved equal.

Full compensation for furnishing all labor, materials (including all pipe, fittings, grates, glue and appurtenances), tools, equipment, and incidentals and for doing all the work involved in underground pool piping and conduit installation including, but not limited to trenching, placing, fitting, connecting, backfill, testing, shall be included in the contract lump sum price paid for "Pool – Piping Conduit and Utilities" and no additional compensation will be allowed.

#### **10-1.69 POOL – SURGE CHAMBER**

This work shall consist of installing a pool underground surge chamber tank as shown on the plans and as directed by the Engineer.

The Contractor's attention is directed to "Pool – Final Design, Engineering and Inspection" of these provisions. Final tank sizing, layout, functionality, and interconnection shall be as proposed by the Contractor's Designer and as approved by the Engineer.

Tank excavation shall be accurately executed to the limits and depths necessary to install the improvements shown. Suitable material that can be salvaged for use as fill and grading in other areas of the pool facility or within the park may be reused as approved by the Engineer. Ground water may be encountered at depths below four feet and dewatering may be required in some areas and at certain times of the year.

Pool surge chamber shall be food grade, high-density polyethylene, potable water type underground tank designed for complete burial. The contractor may propose alternate fiberglass or concrete tanks as an option.

Inlet and outlet pipes shall be attached with watertight connections. The number and size of pipes shall be as proposed by the Contractor's Designer to include gutter outlets, main drain suction, filter supply and autofill system.

Suitable valves, sensors and float valves shall be installed to provide system feedback, control, and isolation.

A manway access hatch/cover shall be set flush with pool deck finish grade.

Full compensation for furnishing all labor, materials (including all pipe, fittings, sensors and appurtenances), tools, equipment, and incidentals and for doing all the work involved in surge chamber installation including, but not limited to excavation, bedding, placing, fitting, connecting, backfill, testing, and adjustment shall be included in the contract lump sum price paid for "Pool – Surge Chamber (Type)" and no additional compensation will be allowed.

#### **10-1.70 POOL – RETAINING WALL FOOTING**

This work shall consist of installing the reinforced concrete foundation and seat wall for the CMU retaining wall abutting the pool deck, as shown on the plans and in conformance with these Special Provisions.

The Contractor's attention is directed to "Concrete" and "Reinforcement" of the Standard Specifications and these Special Provisions.

Aggregate for minor concrete shall conform to the Standard Specifications unless otherwise specified and shall conform to the combined aggregate grading limits in "Combined Aggregate Gradation," of the Standard Specifications.

Concrete shall be placed at the locations shown on the plans, struck off and compacted until a layer of mortar is brought to the surface. The concrete shall be screeded to the required grade and cross section and floated to a uniform surface. Surfaces to remain exposed shall be troweled and cleanly finished to eliminate bubbles, exposed aggregate, streaks, spots, and blemishes.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in the installation of concrete retaining wall footings including, but not limited to: subgrade preparation; forming, constructing and finishing concrete footings and walls, shall be included in the contract price paid per lineal foot for "Pool - Retaining Wall Footing" and no additional compensation will be allowed.

#### **10-1.71 POOL – WALL STAIRS AND FLOOR**

This work shall consist of construction of the new concrete pool walls, stairs, floor, and surge gutters for both the lap and activity pool as shown on the plans and as directed by the Engineer.

The Contractor's attention is directed to "Concrete", "Reinforcement" and "Miscellaneous Metal" and of the Standard Specifications and these Special Provisions.

The Contractor's attention is directed to "Pool – Final Design, Engineering and Inspection" of these provisions. Final return and inlet fittings and drain sizing, layout, and interconnection shall be as proposed by the Contractor's Designer and as approved by the Engineer.

Reinforcing bars shall be placed to the dimensions shown on the plans and suitably tied off and secured. Rebar inspection shall be scheduled 3 days in advance of shotcrete application.

Construction of the concrete pool shall include placement and wet setting of all drains, return and inlet fittings, anchors, brackets, lights, and equipment.

Concrete shall be placed using shotcrete application to the limits and profiles shown on the plans including all contours, cutouts, and conforms necessary.

Following proper finishing and curing, and once all mechanical equipment is fully operational, concrete pool surfaces shall be finished with white plaster topcoat or tiling as shown on the plans. Plaster shall be comprised of white Portland cement and Georgia marble pool aggregate or approved equal. Float plaster to a uniform plane and trowel to a smooth, dense, impervious surface using care to avoid stains. Accurately conform to all tiles, fittings, lights, and anchors to provide a clean, seamless, leak proof seal.

After the plaster has sufficiently dried and before drying to a damaging point, cure the plaster by gradually filling the pool with water. Continue filling and monitoring pool water level and keeping all plaster surfaces damp during warm periods. For the first fourteen days after placement, monitor and brush plaster surfaces daily.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in the construction of concrete pools, including, but not limited to equipment rebar placement and tying, forming, preparation, shotcrete application, plaster application, finishing, curing, monitoring and maintaining, shall be included in the contract lump sum price paid for "Pool – Walls, Stairs, and Floor" and no additional compensation will be allowed.

#### **10-1.72 POOL – DECK**

This work shall consist of construction of the new concrete pool deck surrounding the completed pools, as shown on the plans, and as directed by the Engineer.

The Contractor's attention is directed to "Concrete", "Reinforcement" and "Miscellaneous Metal" and of the Standard Specifications and these Special Provisions.

Reinforcing bars shall be placed to the dimensions shown on the plans and suitably tied off and secured. Rebar inspection shall be scheduled 3 days in advance of concrete placement.

Construction of the concrete pool deck shall include placement and wet setting of all drains, fittings, anchors, brackets, and equipment. Concrete shall be placed, struck off and compacted until a layer of mortar is brought to the surface. The concrete shall be screeded to the required grade and cross section and floated to a uniform surface, carefully finished, and cured.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in the construction of the concrete pool deck, including, but not limited to equipment rebar placement and tying, forming, preparation, concrete placement, finishing, and curing, shall be included in the contract lump sum price paid for "Pool – Deck" and no additional compensation will be allowed.

#### **10-1.73 POOL – RAIL**

This work shall consist of construction of the new handrail and grabrail surrounding and entering the completed pools and on concrete stairs adjacent to pool deck, as shown on the plans, and as directed by the Engineer.

The Contractor's attention is directed to "Pool – Deck", "Concrete", "Reinforcement" and "Miscellaneous Metal" of the Standard Specifications and these Special Provisions.

Pool handrail shall be Pentair Paragon 1.9" x 0.109" Stair Rail or approved equal. Pool grabrail shall be Pentair Paragon 30302 Grabrail or approved equal. Rail shall be installed in compliance with the manufacturer's recommendations and the details on the plans.

Stair handrail for perimeter pool deck access stairs shall be 1¼" tubular aluminum railing, custom fit to match stair dimensions and meet Building Code requirements. Handrail shall be mounted to vertical posts or anchored to concrete walls as appropriate.

Reinforcing bars shall be placed to the dimensions shown on the plans and suitably tied off and secured. Rebar inspection shall be scheduled 3 days in advance of concrete placement.

Rail anchors shall be placed per the manufacturer in a concrete footing, wet set as the pool deck or stairs are poured.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in the installation of pool rails shall be included in the contract unit price paid for each “Pool – Rail (Type)” and no additional compensation will be allowed.

#### **10-1.74 POOL – ACCESS LIFT**

This work shall consist of installing an ADA compliant pool access lift, as shown on the plans and in conformance with these Special Provisions.

The Contractors attention is directed to “Concrete” and “Pool – Deck” of the Standard Specifications and these Special Provisions.

Pool access lift shall be Pentair Aquatram, or approved equal, installed in compliance with the manufacturer’s recommendations

Lift anchors shall be placed per the manufacturer in a concrete footing, wet set as the pool deck is poured.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in the installation of ADA compliant pool access lift shall be included in the contract unit price paid for each “Pool – Access Lift” and no additional compensation will be allowed.

#### **10-1.75 POOL – STARTING BLOCK**

This work shall consist of installing a competitive swimming starting platform as shown on the plans and in conformance with these Special Provisions.

The Contractors attention is directed to “Concrete” and “Pool – Deck” of the Standard Specifications and these Special Provisions.

Pool starting platform shall be Pentair Paragon Long Reach Standard Competitor with Track Start top, or approved equal, installed in compliance with the manufacturer’s recommendations.

Lift anchors shall be placed per the manufacturer in a concrete footing, wet set as the pool deck is poured.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in the installation of pool starting blocks shall be included in the contract unit price paid for each “Pool – Starting Block” and no additional compensation will be allowed.

#### **10-1.76 POOL – STANCHION AND PENNANT LINES**

This work shall consist of installing a competitive swimming backstroke lines as shown on the plans and in conformance with these Special Provisions.

The Contractors attention is directed to “Concrete” and “Pool – Deck” of the Standard Specifications and these Special Provisions.

Pool stanchion anchors shall be Pentair Paragon Stanchion Socket, Stainless Steel. Pool stanchions shall be Pentair Paragon 8’ stainless steel Stanchion, Sliding Collar with Eye Bolt, or approved equal, installed in compliance with the manufacturer’s recommendations. Backstroke lines shall be Pentair Paragon Backstroke Line 12”x18” Pennants.

Post anchors shall be placed per the manufacturer in a concrete footing, wet set as the pool deck is poured.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in the installation of pool stanchions, anchors and pennant lines shall be included in the contract lump sum price paid for “Pool – Stanchion and Pennant Lines” and no additional compensation will be allowed.

#### **10-1.77 POOL – COVER AND REEL**

This work shall consist of providing pool covers and reel systems suitable to cover all exposed pool areas as shown on the plans and in conformance with these Special Provisions.

Pool covers shall be three-layer composite, laminated pool blanket, with woven high-density UV stabilized polyethylene outer layer with cross-linked polyethylene foam middle layer. Pool cover shall be Lincoln Aquatics 1212DLX ThermGard or approved equal.

Pool cover storage reel shall be stainless steel 1.9” OD tubing construction with 4” diameter winding tubes.

Storage reel for lap pool shall be triple shafted winder, 20’ wide (or as required), with triple-reel power drive system, as manufacturer by Lincoln Aquatics, or approved equal.

Storage reel for lap pool shall be double shafted winder, 13’ wide (or as required), as manufacturer by Lincoln Aquatics, or approved equal.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in the providing new pool cover systems, complete with appropriately sized covers and reels (with power drive system as described) shall be included in the contract lump sum price paid for “Pool – Cover and Reel (Pool Type)” and no additional compensation will be allowed.

#### **10-1.78 POOL – DECK LIGHTING**

This work shall consist of installing a LED pool deck area lighting system as shown on the plans and in conformance with these Special Provisions.

The Contractors attention is directed to “Concrete”, “Pool – Deck” and “Pool – Piping, Conduit & Utilities” of the Standard Specifications and these Special Provisions.

Light footing and pole shall consist of the complete installation of a 4” diameter, 16’ tall steel pole on a concrete footing, as shown on the plans or as directed by the Engineer. High strength anchor bolts shall be wet set into concrete footings to the proper embedment and exposed height as necessary to mount pole base plate, as shown on the plans, as recommended by the manufacturer, and as directed by the Engineer. Footing anchors shall be placed in concrete footing prior to or as the pool deck is poured. Electrical conduit shall be installed in concrete footings as shown on the plans and as specified in “Electrical Conduit” of these Special Provisions. Footing location and base plate cover exposure shall be carefully located and adjusted to ensure optimum placement in relation to final pool area for safety and accessibility.

Steel pole shall conform to the provisions in "Overhead Sign Structures, Standards and Poles," of the Standard Specifications, and these special provisions. Pole shall be black to match associated light assemblies of these Special Provisions. Approved hardware, connectors, base plate, and base plate cover shall be installed as shown on the plans, as recommended by the manufacturer, and as directed by the Engineer.

LED lights shall be cool white, die-formed black powder coated aluminum housing, single fixture with matching pole top hub and bracket, installed with stainless steel hardware on top of steel poles.

LED lighting system shall be LSI Industries, 165W Mirada Small Area Light (MRS) on 4” diameter steel, straight round pole (4RP) or approved equals.

Pool deck lighting shall be connected in series, in appropriately sized conduit, routed to the electrical panel at the pool mechanical building. Suitable switches, timers and motion sensors shall be installed to enable proper control.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in the installation of pool deck lighting, including, but not limited to excavation, conduit placement, backfill, footing construction, anchoring, assembly, wiring, testing and adjustment shall be included in the contract unit price paid for each “Pool – Deck Lighting” and no additional compensation will be allowed.

#### **10-1.79 NOTIFICATION AND SCHEDULING**

The Contractor shall deliver a “NOTICE” to all residents and businesses of properties adjacent to the project streets and those on connecting streets that have no other means of accessing their properties but through the project or are otherwise adversely affected by the scheduled project operations. The Contractor will provide a standard “NOTICE” form in sufficient numbers to permit distribution to all homes and businesses within a 500 foot radius of the project site. The Contractor will complete the “NOTICE” forms by entering the name of the firm, local and toll free telephone number, date of issuance, and shall indicate on the notice street closures, traffic control measure or outages that are expected to be in place.

“NOTICE” forms shall be issued to the affected properties no later than forty-eight (48) hours prior to the work. The Contractor shall be responsible for removing any “NOTICES” that were not removed by the resident or business after all work is completed by the Contractor or as directed by the Engineer. Any costs associated with towing of vehicles in the way of construction shall be borne by the Contractor. “NOTICE” shall not be left in mailboxes, per Section PO 11.2.1 of the Domestic Mail Manual (DMM). The Contractor shall be held liable for any fines.

The Contractor shall coordinate with the Engineer to notify the Police Department, Fire Department, Ambulance Service, Waste Management, Post Office, Durham Transportation, and Gold Country Stage forty-eight (48) hours prior to any lane closure. Notification may be in conjunction with the scheduling requirements of the “SCHEDULING” portion of the Standard Specifications. Particular attention shall be given to the construction of adequate facilities on any street to permit the passing of emergency vehicles.

None of the provisions specified herein shall be construed to restrict or prohibit, at any time, the prosecution of items of work which will not interfere with the use of existing streets.

Full compensation for all work associated with furnishing, distributing and removal, as required, of all notices; for contacting and coordinating with applicable agencies, schools, etc; and for all incidentals of work required within this “Notification and Scheduling” section will be considered as included in the contract prices paid for various items of work and no additional compensation will be allowed.

# NOTICE

Date Delivered: \_\_\_\_\_

Dear Property Owner:

In the interest of minimizing the inconvenience caused by the CDBG Memorial Park Facilities Improvement Project, we are providing you at least 48 hours' notice that the following work is proposed to be done in the vicinity of your property or affecting access to your property beginning on \_\_\_\_\_ from \_\_\_\_\_ a.m./p.m. to \_\_\_\_\_ a.m./p.m.:

\_\_\_\_\_ Underground Utilities

\_\_\_\_\_ Concrete Construction

\_\_\_\_\_ Street Paving

\_\_\_\_\_ Other:

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We appreciate your patience and cooperation while this work is underway.

Please call ( ) \_\_\_\_\_ - \_\_\_\_\_ to contact the Contractor if you have any questions or wish additional information regarding this work, or contact the City of Grass Valley Engineering Division at (530) 274-4373.

\_\_\_\_\_  
Contractor's Name

### **10-1.80 RECORD DRAWINGS**

The Contractor shall keep accurate records on a set of project prints (24" x 36") of all additions and deletions of the work, and all of the changes in location, elevation, and character of the work not otherwise shown or noted on the contract plans. The City will furnish three (3) sets of full size prints for the "Record Drawings" plans at no cost to the Contractor.

"Record Drawings" construction plans shall be provided to the City after completion of the project. Two (2) copies shall be provided with changes to the original contract work shown in red color. The Contractor shall transmit these "Record Drawings" plans to the Engineer for approval. Details to be shown on the "Record Drawings" plans shall include, but not be limited to, type, quantity, and location of pipe runs, location and elevations of facilities, and any other modifications, additions or adjustments to any other facilities in the project.

"Record Drawings" construction plans shall be signed and dated by the Contractor or the Subcontractor that actually constructed the facility. In addition, company names of the Contractor and Subcontractors shall be added to the title sheet.

The cost of record keeping to provide the information for these "Record Drawings" plans and all work associated with preparing accurate "Record Drawings" construction plans shall be considered as included in the prices paid for the various Contract items of work involved and no additional compensation will be allowed.

### **10-1.81 RECREATION BUILDING (BID ALTERNATE #1)**

This work shall include the production of shop drawings, construction and erection of a permanent recreation building on concrete pad, with surrounding concrete sidewalk, as shown on the plans and as directed by the Engineer.

The Contractors attention is directed to "Concrete", "Reinforcement", "Paint" and "Building Construction" of the Standard Specifications and these Special Provisions.

The contractor shall obtain all necessary building permits and adhere to all local building, fire, and Title 24 codes. All work shall be furnished and installed using commonly accepted industry practices. Prefabricated construction methods are preferred although the contractor may propose alternate construction methods as needed to fit site conditions and simplify construction.

The recreation building shall include a large recreation room, a utility and janitor's closet, one all gender restroom, an office space and a reception lobby as schematically shown on the plans.

The building foundation shall be a reinforced concrete mat foundation. Interior flooring shall be carpet in common areas and concrete in the bathroom, lobby, and janitor's closet. Building walls anchored into the foundation shall be timber framing with sheathing on both sides housing batt insulation. Decorative sidings shall be fiber reinforced concrete and manufactured stone sidings. Interior wall surfaces and ceilings shall be covered with gypsum board. The building roof shall be a timber truss system. The roof section shall have rigid insulation housed by oriented strand board sheathing on top and plywood sheathing on bottom. The roof fascia shall be wood. Exterior roof panels shall be 26 GA. metal panels.

All decorative sidings, exterior finishes, textures, styles, and color schemes, including wood lap siding, wood trim, wood fascia, manufactured stone wainscot and corrugate metal, shall be of similar style as the existing pool building to remain and shall be submitted to and approved by the engineer before construction.

The building shall include a water heater capable of supplying hot water to all interior sinks and shall include interior and exterior LED lighting adhering to Title 24 requirements.

Doors shall be stainless steel units with deadbolt locking systems and appropriate Title 24 restroom signage where applicable.

The restroom shall include one toilet, one handwashing sink with mirror, soap dispenser, electric hand dryer. The restroom shall also include a baby changing table and a wall mounted stainless steel waste bin. The toilet shall be ADA compliant with stainless steel grab bars and three roll stainless steel wall mounted toilet paper holders adjacent to it.

Building utilities shall be installed via the utility chase identified on the plans. All utility hook ups (water, sewer, electrical) shall considered as included in the alternate bid item work, unless otherwise shown on the plans to be installed with the primary project scope of work.

The final design is to be determined through consultation with the Engineer. All final designs shall be submitted to and approved by the Engineer prior to construction.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals and furnishing and doing all the work involved in the design and construction of the recreation building including, but not limited to: structural and architectural drawing production, subgrade preparation, leveling, and compaction, utility hookups, building construction, installing all lighting and plumbing, painting, caulking and finishing, startup and testing, as well as associated concrete sidewalk construction and finishing work surrounding the building, shall be included in the contract lump sum price for "Recreation Building" and no additional compensation will be allowed.

### **10-1.82 SOFTBALL FIELD RESTORATION (BID ALTERNATE #2)**

This work shall consist of the construction of a restored grass softball field in place of the artificial turf field installation bid item, as shown on the plans and as directed by the Engineer.



The contractor's attention is directed to "Landscape Irrigation," "Rehabilitate Lawn" and "Drainage Pipe" of these provisions. New field irrigation shall be installed in the softball field in accordance with "Landscape Irrigation". New sod surfacing shall be completed in softball field in accordance with "Rehabilitate Lawn".

The contractor shall properly grade the prepared subgrade and install a functional drainage system (French drain and/or area drains) in the field to relieve the buildup of surface and sub-surface water and eliminate standing water on the field, primarily as currently exists in the softball outfield area. Raising of the field elevation with native fill may be necessary in areas to achieve suitably sloped surfaces, necessary to shed water. Drainage systems shall be sloped to daylight to drain or shall be tied in to existing drainage infrastructure.

Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved including, but not limited to, grading, backfill and levelling, replacement of irrigation system, drainage system improvements, and soil preparation, levelling, compacting, placing sod, and watering as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer shall be included in the contract lump sum price paid for "Softball Field Restoration" and no additional compensation will be allowed.

At the City's discretion and as agreed upon with the contractor, the City may choose to proceed with either the included bid item for artificial turf installation "Softball Field Artificial Turf Installation", this bid alternate sod installation "Softball Field Restoration" or no softball field improvements at this time. It is understood that direction to proceed with "Softball Field Restoration" would include deletion of the "Softball Field Artificial Turf Installation" bid item.

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**APPENDIX A – CONSTRUCTION CONTRACT**

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CONTRACT NO. \_\_\_\_\_

**CITY OF GRASS VALLEY  
PUBLIC WORKS DEPARTMENT  
ENGINEERING DIVISION**

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**CONSTRUCTION CONTRACT**

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THIS CONTRACT is made on the date set forth below, by and between the CITY OF GRASS VALLEY, a municipal corporation within the State of California (hereinafter "CITY"), and \_\_\_\_\_, a type in business form and state of license i.e. California Corporation, (hereinafter "CONTRACTOR"). The CITY and CONTRACTOR for the consideration hereinafter mentioned agree as follows:

**ARTICLE 1: SCOPE OF WORK**

- 1.1. CONTRACTOR agrees to furnish all work, labor, tools, materials, transportation, equipment, services, and other means of construction necessary to perform and complete in a good and workmanlike manner, those certain improvements as called for, and in the manner designated in, and in strict conformity with Contract No. \_\_\_\_\_ entitled: CDBG MEMORIAL PARK FACILITIES IMPROVEMENT PROJECT, PROJECT NO. 20-05, hereafter "PROJECT", in compliance with the Contract Documents as described in Article 3.
- 1.2. CONTRACTOR understands and agrees that the work, labor, tools, materials, transportation, equipment, incidentals, services and other means of construction for the Project shall be furnished and the work performed as required in the Contract Documents under the sole direction and control of CONTRACTOR, and subject to the inspection and approval of the CITY, or its representatives.

**ARTICLE 2: CONTRACT PRICE**

- 2.1. The CITY agrees to pay and the CONTRACTOR agrees to accept, in full payment for the work above agreed to be done, the sum of \_\_\_\_\_ (\$ \_\_\_\_\_) subject to additions and deductions as provided in the Contract Documents.

**ARTICLE 3: CONTRACT DOCUMENTS**

- 3.1. The complete Contract consists of the following documents, to wit:
  - Notice to Contractors
  - Executed Proposal, including the Bidder's Bond
  - Construction Contract
  - Project Plans for this Project
  - Special Provisions for this Project
  - City of Grass Valley Improvement Standards (latest edition)
  - Caltrans Standard Specifications (latest edition)
  - Caltrans Standard Plans (latest edition)
  - Manual on Uniform Traffic Control Devices and California Supplement
  - Equipment Rental Rates and General Prevailing Wage Rates of the State of California, Department of Transportation, and where applicable, Federal wage rates and Section 14 Federal Fund S enclosures
  - Executed Performance Bond
  - Executed Labor and Materials Bond
  - Certification Labor Code Section 1861
  - List of Subcontractors
  - HUD-92554N Supplementary Conditions
  - Weekly Payroll Certification Form
  - Standard Equal Opportunity Clause
  - Equal Opportunity Specifications
  - Section 3 Clause

- 3.2. Any and all obligations of the CITY and the CONTRACTOR are fully set forth and described in the above documents. All of the above documents are intended to cooperate so that any work called for in one and not mentioned in the other or vice versa is to be executed the same as if mentioned in all said documents. The documents comprising the complete Contract are sometimes collectively referred to as the Contract Documents.

#### **ARTICLE 4: TIME FOR PERFORMANCE - LIQUIDATED DAMAGES**

- 4.1. The Commencement date of the Contract for determination of the time for completion shall be the date CONTRACTOR is directed to proceed by the City Engineer, as stated in the Notice to Proceed. The CONTRACTOR shall complete all work required by the Contract within **two hundred fifty working days** after said commencement date, as adjusted and provided for in the Contract Documents.
- 4.2. In the event CONTRACTOR does not complete all work required by the Contract within the time specified above, liquidated damages shall be imposed upon the CONTRACTOR. CONTRACTOR agrees that if all the work called for under this Contract in all parts and requirements is not completed within the performance time period set forth above, damage will be sustained by CITY. As it is and will be impracticable to ascertain and determine the actual damage the CITY will sustain, CONTRACTOR agrees to pay to CITY five hundred dollars (\$500.00) per calendar day for each and every day(s) delay in finishing the work in excess of the working days described. Time is of the essence in this contract. CONTRACTOR further agrees that CITY may deduct the amount of these damages from any moneys due or that may become due the CONTRACTOR under this Contract. To the extent appropriate, as determined by CITY in its sole discretion, CITY shall administer this Article in accordance with the California Department of Transportation Standard Specifications Section 8-1.10 Liquidated Damages, dated 2015.

#### **ARTICLE 5: INDEMNITY & HOLD HARMLESS**

- 5.1. The CITY, and all officers, agents, employees, outside parties hired to inspect and/or design the work, and volunteers thereof connected with the work, including but not limited to, the City Engineer and the Engineer, shall not be answerable or accountable in any manner for the loss or damage to any of the materials or other things used or employed in performing the work; for injury to or death of any person, either worker or the public; or damage to property from any cause which may have been prevented by CONTRACTOR or his or her workers or anyone employed by him/her.
- 5.2. CONTRACTOR shall be responsible for any liability imposed by law and for injuries to or death of any person including, but not limited to, workers and the public, or damage to property resulting from defects or obstructions or from any cause whatsoever during the progress of the work or at any time prior to its acceptance.
- 5.3. The CONTRACTOR shall indemnify and save harmless the CITY, and its officials, officers, agents, employees, or consultants and volunteers thereof connected with the work, including but not limited to, the City Engineer and the Engineer, from all claims, suits, or actions of every name, kind, and description, whether actual or alleged, brought forth on or on account of injuries to or death of any person, including but not limited to, workers or the public or damage to property resulting from the performance of the contract except where caused by the sole and active negligence or willful misconduct of the City, its officials, officers, agents, employees, consultants and volunteers. The duty of CONTRACTOR to indemnify and save harmless include the duties to defend as set forth in Civil Code Section 2778.
- 5.4. With respect to third party claims against the CONTRACTOR, the CONTRACTOR waives any and all rights to any type of express or implied indemnity against the CITY, its officials, officers, employees, agents, consultants, or volunteers.
- 5.5. It is the intent of the parties that the CONTRACTOR will indemnify and hold harmless the CITY, its officers, employees, agents and volunteers, from any and all claims, suits, or actions as set forth

above, regardless of the existence or degree of fault or negligence on the part of the CITY, the CONTRACTOR, the subcontractors or employees of any of these, other than the sole or gross negligence of the CITY, its officials, officers, employees, agents, consultants, or volunteers.

## **ARTICLE 6: INSURANCE**

6.1. Throughout the period of this agreement, the CONTRACTOR shall provide the following minimum insurance coverage as listed below. CONTRACTOR shall file with CITY certificate(s) of Insurance and endorsements, in a form acceptable to CITY, and consistent with this agreement at the time of execution of this agreement. The insurance company must be acceptable to CITY, with a Best's Rating of no less than A:VII. Documentation of such rating acceptable to the CITY shall be provided at the same time Insurance Certificates are submitted. The Current evidence of coverage provided to the City shall be for the entire required period of insurance, including the one (1) year warranty period.

6.1.1 Any deductibles must be declared to, and approved by, the City.

6.2. In the event any of the required policies are canceled prior to the completion of the project and the CONTRACTOR does not furnish a new certificate(s) of insurance prior to cancellation, the CITY may obtain the required insurance and deduct the premium(s) from Contract monies due the CONTRACTOR.

### **6.3. WORKER'S COMPENSATION AND EMPLOYERS LIABILITY INSURANCE:**

6.3.a. The CONTRACTOR shall maintain adequate Workers' Compensation Insurance under the Laws of the State of California. CONTRACTOR shall fully comply with the provisions of Section 3700 of the Labor Code, which requires every employer to be insured against liability for Workers' Compensation or to undertake self insurance in accordance with the provisions of that Code, before commencing the performance of the work.

6.3.b. By CONTRACTOR'S signature hereunder, CONTRACTOR certifies that he/she is aware of the provisions of Section 3700 of the California Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that Code, and he/she will comply with such provisions before commencing the performance of this Contract.

6.3.c. If such insurance is underwritten by any agency other than State Compensation Fund, such agency shall be a company authorized to do business in the State of California.

6.3.d. CONTRACTOR shall require all subcontractors to maintain adequate Workers' Compensation Insurance. Certificates of such Workers' Compensation shall be filed forthwith with the CITY upon demand.

6.3.e. Worker's Compensation Insurance shall be provided as required by any applicable law or regulation. Employer's liability insurance shall be provided in amounts not less than the following:

- One Million dollars (\$1,000,000) each accident for bodily injury by accident
- One Million dollars (\$1,000,000) policy limit for bodily injury by disease
- One Million dollars (\$1,000,000) each employee for bodily injury by disease

6.3.f. If there is an exposure of injury to CONTRACTOR'S employees under the U.S. Longshoremen's and Harbor Worker's Compensation Act, the Jones Act, or under laws, regulations, or statutes applicable to maritime employees, coverage shall be included for such injuries or claims.

6.3.g. Each Worker's Compensation policy shall be endorsed with the following specific language:

**Cancellation Notice:** "This policy shall not be canceled or materially changed

without first giving thirty (30) days prior written notice to the City of Grass Valley."

**Waiver of Subrogation:** "The Insurance Company agrees to waive all rights of subrogation against the Entity, its elected or appointed officials, agents, employees and volunteers for losses paid under the terms of this policy which arise from the work performed by the Named Insured for the Entity.

#### 6.4. GENERAL LIABILITY INSURANCE:

6.4.a. Commercial General Liability insurance no less broad than ISO form CG 00 01, covering all operations by or on behalf of CONTRACTOR, providing insurance for bodily injury liability and property damage liability for the limits of liability indicated below and including coverage for: premises, operations; products and completed operations; contractual liability insuring the obligations assumed by CONTRACTOR in this Agreement; broad form property damage (including completed operations); explosion, collapse, and underground hazards; personal injury liability.

6.4.b. Except with respect to bodily injury and property damage included within the products and completed operations hazards, the aggregate limits, where applicable, shall apply separately to CONTRACTOR'S work under the Contract. One of the following forms is required: Commercial General Liability (Occurrence); or Commercial General Liability (Claims Made).

6.4.c. If CONTRACTOR carries a Commercial General Liability (Occurrence) policy:

1. The limits of liability shall not be less than:

- One Million dollars (\$1,000,000) each occurrence (combined single limit for bodily injury and property damage)
- One Million dollars (\$1,000,000) for Personal Injury Liability
- Two Million dollars (\$2,000,000) for Products-Completed Operations
- Two Million dollars (\$2,000,000) General Aggregate

2. If the policy does not have an endorsement providing that the General Aggregate Limit applies separately, or if defense costs are included in the aggregate limits, then the required aggregate limits shall be Two Million dollars (\$2,000,000).

3. If CONTRACTOR maintains higher limits than the specified minimum limits above, the City shall be entitled to coverage for the higher limits maintained by CONTRACTOR.

6.4.d. Special Claims Made Policy Form Provisions:

CONTRACTOR shall not provide a Commercial General Liability (Claims Made) policy without the express prior written consent of CITY, which consent, if given, shall be subject to the following conditions:

1. The limits of liability shall not be less than:

- One Million dollars (\$1,000,000) each Occurrence (combined single limit for bodily injury and property damage)
- One Million dollars (\$1,000,000) for Personal Injury Liability
- Two Million dollars (\$2,000,000) Aggregate for Products Completed Operations
- Two Million dollars (\$2,000,000) General Aggregate

2. The insurance coverage provided by CONTRACTOR shall contain language providing coverage up to one (1) year following the completion of the Contract in

order to provide insurance coverage for the hold harmless provisions herein if the policy is a Claims Made Policy.

**6.5. CONFORMITY OF COVERAGES:**

6.5.a. If more than one policy is used to meet the required coverages, such as a separate umbrella policy, such policies shall be consistent with all other applicable policies used to meet these minimum requirements. For example, all policies shall be Occurrence Liability policies, or all shall be Claims Made Liability policies if approved by the CITY as noted above. In no case shall the types of coverages be different.

**6.6. ADDITIONAL REQUIREMENTS:**

6.6.a. Premium Payments: The insurance companies shall have no recourse against the CITY and funding agencies, its officers and employees or any of them for payment of any premiums or assessments under any policy issued by a mutual insurance company.

6.6.b. Policy Deductibles: The CONTRACTOR shall be responsible for all deductibles in all of CONTRACTOR'S insurance policies. The amount of deductibles for insurance coverage required herein should be reasonable and subject to CITY'S approval.

6.6.c. CONTRACTOR'S Obligations: CONTRACTOR'S indemnity and other obligations shall not be limited by the foregoing insurance requirements and shall survive the expiration of this agreement.

6.6.d. Material Breach: Failure of the CONTRACTOR to maintain the insurance required by this agreement, or to comply with any of the requirements of this section, shall constitute a material breach of the entire agreement.

6.6.e. Duration of Coverage: City must be an additional insured for completed operations for a period of one (1) year after completion of the work.

6.6.f. Project Reference: The Commercial General Certificate of Insurance must reference the project specifically by project title.

**6.7. ENDORSEMENTS:**

6.7.a. Each Commercial General Liability policy shall be endorsed with the following specific language:

**Cancellation Notice:** "Contractor shall provide immediate written notice if (1) any of the required insurance policies is terminated; (2) the limits of any of the required policies are reduced; (3) or the deductible or self insured retention is increased. In the event of any cancellation or reduction in coverage or limits of any insurance, Contractor shall forthwith obtain and submit proof of substitute insurance. Should Contractor fail to immediately procure other insurance, as specified, to substitute for any canceled policy, the City may procure such insurance at Contractor's sole cost and expense.

**Waiver of Subrogation:** "The Insurance Company agrees to waive all rights of subrogation against the City of Grass Valley, its elected or appointed officials, agents, employees and volunteers for losses paid under the terms of this policy which arise from the work performed by the Named Insured for the City of Grass Valley.

"Provisions Regarding the Insured's Duties: Any failure to comply with reporting provisions of the policy or breaches or violations of warranties shall not affect coverage provided to the Entity, its elected or appointed officers, officials, employees or volunteers."

"Except as stated above, nothing herein shall be held to waive, alter or extend any of the limits, conditions, agreements or exclusions of the policy to which this endorsement is attached."

"The City, its officers, officials, employees, agents and volunteers shall be endorsed as an additional insured for liability arising out of ongoing and completed operations by or on behalf of the contractor. The City shall continue to be an additional insured for completed operations for (1) year after completion of the work.

The policy definition of "insured contract" shall include assumptions of liability arising out of both ongoing operations and the products-completed operations hazard ("f" definition of insured contract in ISO form CG 00 01, or equivalent).

The insurance provided to the additional insureds shall be primary to, and non-contributory with, any insurance or self-insurance program maintained by them.

The policy shall cover inter-insured suits and include a "Separation of Insureds" or "severability" clause which treats each insured separately.

The policy shall not contain a Contractors' Warranty or other similar language which eliminates or restricts insurance because of a subcontractor's failure to carry specific insurance or to supply evidence of such insurance.

#### **6.8. AUTOMOBILE LIABILITY INSURANCE:**

6.8.a. CONTRACTOR shall provide Automobile Liability insurance covering bodily injury and property damage in an amount no less than One Million dollars (\$1,000,000) combined single limit for each occurrence.

6.8.b. Covered vehicles shall include owned, non-owned, and hired automobiles/trucks.

6.8 c. Endorsements: The City shall be named additional insured.

6.8 d. Required Evidence of Coverage: Properly completed Certificate of Insurance.

#### **ARTICLE 7: PRECEDENCE IN CONFLICTING DOCUMENTS**

7.1. It is further expressly agreed by and between the parties hereto that should there be any conflict between the terms of this instrument and the bid or proposal of said CONTRACTOR, then this instrument shall control and nothing herein shall be considered as acceptance of the said terms of said proposal conflicting herewith.

#### **ARTICLE 8: BOND REQUIREMENTS**

8.1. CONTRACTOR shall furnish both a Faithful Performance Bond and a Payment Bond (hereinafter collectively "Bonds") in the full amount of the Contract on the forms provided by the CITY. CITY shall retain the Performance Bond for a one-year guarantee period from the date of the CITY'S acceptance of the work.

8.2. The bonds shall be obtained from a California admitted surety that is licensed by the State of California to act as surety upon bonds and undertakings and which maintains in this State at least one office for the conduct of its business. The surety shall furnish reports as to its financial condition from time to time upon request by CITY.

8.3. In case of any conflict between the terms of the Contract and the terms of the Bonds, the terms of the Contract shall control and the Bonds shall be deemed to be amended thereby.

8.4. CONTRACTOR agrees to obtain the consent of the surety, if required, to any change, extension of time, alteration, or addition to any of the terms of the Contract Documents.

#### **ARTICLE 9: COMPLIANCE WITH LAWS**



- 9.1. CONTRACTOR is an independent contractor and shall, at its sole cost and expense comply with all laws, rules, ordinances and regulations of all governing bodies having jurisdiction over the work, obtain all necessary permits (unless specifically stated elsewhere in the Contract Documents to be obtained by CITY) and licenses therefore, pay all manufacturers' taxes, sales taxes, use taxes, processing taxes, and all Federal and State taxes, insurance and contributions for social security and unemployment which are measured by wages, salaries or any remuneration paid to CONTRACTOR'S employees, whether levied under existing or subsequently enacted laws, rules or regulations. CONTRACTOR shall also pay all property tax assessments on materials or equipment used until acceptance by CITY. If any discrepancy or inconsistency is discovered in any of the Contract Documents in relation to any such law, rule, ordinance, regulation, order, or decree, the CONTRACTOR shall forthwith report the same to the CITY in writing.
- 9.2. Without limitation, materials furnished and performance by CONTRACTOR hereunder shall comply with Safety Orders of the Division of Industrial Safety, State of California, Federal Safety regulations of the Bureau of Labor, Department of Labor; and any other applicable state or federal regulations.
- 9.3. CONTRACTOR, upon request, shall furnish evidence satisfactory to CITY that any or all of the foregoing obligations have been or are being fulfilled. CONTRACTOR warrants to CITY that it is licensed by all applicable governmental bodies to perform this Contract and will remain so licensed throughout the progress of the work, and that it has, or will have, throughout the progress of the work, the necessary experience, skill, and financial resources to enable it to perform this Contract.
- 9.4. CONTRACTOR is required to ensure that material safety data sheets (MSDS's) for any material requiring a MSDS pursuant to any federal or state law are available in a readily accessible place on the Project premises. CONTRACTOR is also required to ensure (a) the proper labeling of any substance brought onto the Project premises by CONTRACTOR or any subcontractors or material suppliers, and (b) that the person(s) working with the material, or within the general area of the material, are appropriately informed about the hazards of the substance and follow proper handling and protection procedures.
- 9.5. CONTRACTOR is required to comply with Health & Safety Sections 25249 et seq. (Prop. 65), which requires the posting and giving of notice to persons who may be exposed to any chemical known to the State of California to cause cancer.
- 9.6. CONTRACTOR shall comply with Title VI of the Civil Rights Act of 1964 (PL 88-352) and all regulations or other requirements issued pursuant to that Act, including, without limitation, United States Department of Agriculture nondiscrimination regulations found at 7 CFR Part 15.

#### **ARTICLE 10: PROGRESS SCHEDULE**

- 10.1. The CONTRACTOR shall submit within ten (10) days (or as specified in the Special Provisions for this Project) after execution of the Contract a detailed work schedule or schedules that details the actions of the CONTRACTOR and Subcontractors working at the Site in accordance with the requirements specified in Special Provisions. This schedule(s) shall show the dates at which the CONTRACTOR will start and complete the several parts of the work and shall conform to the completion time specified in the Contract. The CITY may submit comments on the work schedule. Acceptance of the schedule by CITY shall not constitute approval of the Plan by CONTRACTOR for completion of the work.
- 10.2. The CONTRACTOR shall review and, if necessary, revise the progress schedule at least once a month or as specified in the Special Provisions for this Project. In any event, the CONTRACTOR shall submit a current schedule to the Engineer at the Engineer's request at any time during the Contract period.
- 10.3. No progress payments will be made for any work performed until a satisfactory schedule has been submitted and approved by the Engineer. An updated schedule shall be required from the CONTRACTOR if the project falls ten (10) working days behind schedule. For delays or portions of delays for which the CONTRACTOR is responsible, no payment will be made or time extension allowed for increase in work force, equipment, and working hours needed to put the Project on

schedule.

#### **ARTICLE 11: PROMPT PAYMENT PROVISIONS**

- 11.1. Prompt payment provisions in accordance with Section 20104.50 of the Public Contract Code shall apply to this contract.
- 11.2. If CITY fails to make a progress payment within thirty (30) days after receipt of an undisputed and properly submitted payment request from CONTRACTOR, CITY shall pay interest to CONTRACTOR equivalent to 0.833% per month (10% per annum).
- 11.3. CITY shall review each payment request as soon as practicable after receipt to determine whether the payment request is proper. Any payment request determined to be an improper payment request shall be returned to CONTRACTOR as soon as practicable, but not later than seven (7) days, after receipt. A request returned pursuant to this paragraph shall be accompanied by a document setting forth in writing the reasons why the payment request is not proper.

#### **ARTICLE 12: ANTITRUST CLAIM ASSIGNMENT**

- 12.1. In entering into a Public Works contract or a subcontract to supply goods, services, or materials pursuant to this Contract, the CONTRACTOR and all subcontractors shall offer and agree to assign to CITY all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2 [commencing with Section 16700] of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, services, or materials pursuant to the Contract or any subcontract. This assignment shall be made and become effective at the time the CITY tenders final payment to CONTRACTOR, without further acknowledgment by the parties.

#### **ARTICLE 13: PREVAILING WAGES**

- 13.1. CONTRACTOR acknowledges that it has examined the prevailing rate of per diem wages as established by the California Director of Industrial Relations. The CONTRACTOR agrees to pay workers not less than the applicable prevailing rate of per diem wages, as set forth in these requirements and Labor Code section 1770 et seq. CONTRACTOR agrees specifically to comply with the provisions of Labor Code sections 1720, 1773.3, 1776, and 1777.5, as well as Section 7 of the Department of Transportation Standard Specifications and these Contract Documents.

#### **ARTICLE 14: SEVERABILITY.**

- 14.1. Nothing contained in the Contract Documents shall be construed to require the commission of any act contrary to law. Should a conflict arise between any provisions contained herein and any present or future statute, law, ordinance, or regulation contrary to which the parties have no legal right to contract or act, the latter shall be curtailed and limited but only to the extent necessary to bring it within the requirements of the law. If such curtailment or limitation is not possible, the affected provision shall be of no force and effect. Except as previously mentioned, such illegality shall not affect the validity of this Contract.

#### **ARTICLE 15: COMPLETE AGREEMENT**

- 15.1. These Contract Documents supersede any and all agreements, either oral or in writing, between the parties with respect to the subject matter herein. Each party to this Contract acknowledges that no representation by any party, which is not embodied herein, or any other agreement, statement, or promise not contained in these Contract Documents shall be valid and binding.

#### **ARTICLE 16: INTERPRETATION**

- 16.1. The parties hereto acknowledge and agree that each has been given the opportunity to independently review this Contract with legal counsel, and/or has the requisite experience and sophistication to understand, interpret and agree to the particular language of the provisions of the

Contract.

- 16.2.** In case of a controversy or dispute between the parties concerning the provisions herein, this document shall be interpreted according to the provisions herein and no presumption shall arise concerning the draftsmanship of such provision.

**ARTICLE 17: GOVERNING LAW**

- 17.1.** This Contract is subject to the laws and jurisdiction of the State of California. Venue for any legal proceeding brought in conjunction with this Contract shall be the Superior Court of the County of Nevada, State of California. Contractor waives any federal court removal rights it may have pursuant to any applicable law.

**ARTICLE 18: BID ITEMS**

ITEM NO.	DESCRIPTION	UNIT OF MEAS.	EST. QTY.	UNIT PRICE	TOTAL COST
1	Mobilization	LS	1		
2	Traffic Control System	LS	1		
3	Park Demolition and Removal	LS	1		
4	Tree Removal	EA	6		
5	Water Main Line (6" PVC)	LF	840		
6	Water Main Tee Assembly (6")	EA	4		
7	Gate Valve and Box (6")	EA	5		
8	Backflow Preventer (2")	EA	2		
9	Water Service Line (2")	LF	230		
10	Water Service Line (1")	LF	55		
11	Fire Hydrant Line	LF	10		
12	Water Main Tap and Saddle	EA	5		
13	Abandon Existing Water Lines	LS	1		
14	Landscape Irrigation	LS	1		
15	Area Drain Inlet	EA	9		
16	Drainage Inlet	EA	1		
17	Drainage Pipe (6" HDPE)	LF	303		
18	Drainage Pipe (3" PVC)	LF	10		
19	Electrical Conduit (1" PVC)	LF	380		
20	Electrical Conduit (2" PVC)	LF	240		
21	Electrical Conduit (3" PVC)	LF	1000		
22	Pull Box	EA	12		
23	Reconnect Existing Electrical Equipment	LS	1		
24	PGE Coordination	LS	1		
25	Electrical Meter Pedestal	EA	1		
26	Electrical Panelboard and Circuit Breakers	LS	1		
27	Parking Lot Lighting	EA	5		
28	Relocate Gas Meter Assembly	LS	1		
29	Sewer Service Line (4" PVC)	LF	25		
30	Sewer Cleanout and Backflow Preventer	EA	2		
31	Aggregate Base	CY	420		
32	Detectable Warning Surface	EA	4		
33	Minor Concrete - Sidewalk, Slab, Curb Ramp	SF	6905		
34	Minor Concrete - Playing Court	SF	9125		
35	Minor Concrete - Curb	LF	525		
36	Minor Concrete - Retaining Curb	LF	80		

37	Minor Concrete - Valley Gutter	SF	72		
38	Minor Concrete - Stairs	LS	1		
39	CMU Retaining Wall	SF	750		
40	Landscape Block Wall	SF	65		
41	Trash Enclosure	EA	1		
42	Remove and Replace HMA (2" Depth)	SY	3215		
43	Hot Mix Asphalt (3" Depth)	SY	655		
44	Adjust Utility Cover to Grade	EA	11		
45	Chain Link (10' Perimeter Fence)	LF	290		
46	Chain Link (6' Perimeter Fence)	LF	110		
47	Chain Link (6' Privacy Fence w/ slats)	LF	425		
48	Chain Link (5' Dividing Fence)	LF	30		
49	Chain Link (4' Access Gate)	EA	4		
50	Chain Link (12' Double Gate)	EA	1		
51	Concrete Bumper	EA	20		
52	Thermoplastic Traffic Stripes	LF	1630		
53	Thermoplastic Traffic Markings	SF	350		
54	Acrylic Coating System	SF	8980		
55	Painted Court Markings	LS	1		
56	Pickleball Net Assembly	EA	2		
57	Basketball Hoop and Post Assembly	EA	2		
58	Lean-to Storage Enclosure	LS	1		
59	Maintenance Building	LS	1		
60	Restroom Building	LS	1		
61	Rehabilitate Lawn	SF	14000		
62	Landscaping	LS	1		
63	Softball Field Artificial Turf Installation	LS	1		
64	Pool - Final Design, Engineering & Inspection	LS	1		
65	Pool - Mechanical Building Exterior Restoration	LS	1		
66	Pool - Mechanical Building Demolition & Structural	LS	1		
67	Pool - Mechanical Building and Equipment	LS	1		
68	Pool - Deck & Pool Demolition, Excavation	LS	1		
69	Pool - Piping, Conduit & Utilities	LS	1		
70	Pool - Surge Chamber (Lap Pool)	EA	1		
71	Pool - Surge Chamber (Activity Pool)	EA	1		
72	Pool - Retaining Wall Footing	LF	155		
73	Pool - Wall, Stairs & Floor	LS	1		
74	Pool - Deck	LS	1		
75	Pool - Rail (Hand)	EA	4		
76	Pool - Rail (Grab)	EA	8		

77	Pool - Rail (Stair)	EA	2		
78	Pool - Access Lift	EA	1		
79	Pool - Starting Block	EA	8		
80	Pool - Stanchion and Pennant Lines	LS	1		
81	Pool - Cover & Reel (Lap)	LS	1		
82	Pool - Cover & Reel (Activity)	LS	1		
83	Pool – Deck Lighting	EA	6		

**TOTAL COST: \$ \_\_\_\_\_**

**ARTICLE 19: ADDITIVE BID ITEMS**

ITEM NO.	DESCRIPTION	UNIT OF MEAS.	EST. QTY.	UNIT PRICE	TOTAL COST
A1	Recreation Building	LS	1		
A2	Softball Field Restoration	LS	1		

**TOTAL COST (BID ITEMS PLUS A1, A2): \$ \_\_\_\_\_**

\_\_\_\_\_  
**Name of Contractor/Company**

WITNESS WHEREOF, the parties have hereunto set their hands the year and date first above written.

**“CITY”  
CITY OF GRASS VALLEY**

By: \_\_\_\_\_  
Ben Aguilar, Mayor

Date: \_\_\_\_\_

**Award of Contract No.** \_\_\_\_\_  
By the City Council On:

Date: \_\_\_\_\_

**APPROVED AS TO PROCEDURE**

By: \_\_\_\_\_  
Bjorn P. Jones, PE  
Assistant City Engineer

Date: \_\_\_\_\_

**APPROVED AS TO FORM**

By: \_\_\_\_\_  
Michael G. Colantuono  
City Attorney

Date: \_\_\_\_\_

**ATTEST:**

By: \_\_\_\_\_  
Taylor Day  
Deputy City Clerk

Date: \_\_\_\_\_

**“CONTRACTOR”**  
(Type full legal name of contractor, entity type, state of organization here)

By: \_\_\_\_\_  
Officer Signature # 1  
(Signature Notarized)

By: \_\_\_\_\_  
Print Name and Title

Date: \_\_\_\_\_

By: \_\_\_\_\_  
Officer Signature # 2  
(Signature Notarized)

By: \_\_\_\_\_  
Print Name and Title

Date: \_\_\_\_\_

**Licensed in accordance with an act providing for the registration of Contractors,**

Contractor’s License Number: \_\_\_\_\_

"If Contractor is a corporation, contract must be signed by the following two corporate officers, one from each category: (1) Chairman of the Board, President or any Vice President, and (2), Corporate Secretary, any Assistant Corporate Secretary, Chief Financial Officer or any Treasurer or Assistant Treasurer, unless an authenticated copy of a resolution of the corporation which delegates to a single officer the authority to bind the corporation is attached to this contract.

If Contractor is another type of business entity, such as a partnership or limited liability company, contract must be signed by officer(s) possessing legal authority to bind the entity. An authenticated copy of a resolution, partnership agreement, operating agreement or other legal evidence of signature authority must be attached to this contract "

## **ATTACHMENTS**

1. Certification Labor Code Section 1861
2. Bond for Labor & Materials
3. Bond for Faithful Performance
4. List of Subcontractors



**CERTIFICATION**

**LABOR CODE SECTION 1861**

STATE OF CALIFORNIA  
CITY OF GRASS VALLEY

I, the undersigned, do hereby certify:

That I am aware of the provisions of Section 3700 of the Labor Code of the State of California, which requires every employer to be insured against liability for Workers' Compensation or to undertake self insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this contract.

Executed at : \_\_\_\_\_

On: \_\_\_\_\_

I certify under the penalty of perjury that the foregoing is true and correct.

**CONTRACTOR - EMPLOYER**

BY: \_\_\_\_\_

PRINT NAME: \_\_\_\_\_

TITLE: \_\_\_\_\_

## BOND FOR LABOR AND MATERIALS

KNOW ALL MEN BY THESE PRESENTS THAT WHEREAS, CITY OF GRASS VALLEY, STATE OF CALIFORNIA, hereinafter called the "Owner" has awarded to \_\_\_\_\_, as Principal, hereinafter designated as the "Contractor," a contract for the work described as follows:

**CDBG MEMORIAL PARK FACILITIES IMPROVEMENT PROJECT, PROJECT NO. 20-05**

AND, WHEREAS, the Contractor is required to furnish a bond in connection with said contract, to secure the payment of claims of laborers, mechanics, materialmen, and other persons as provided by law;

NOW, THEREFORE, we, the undersigned Contractor and \_\_\_\_\_ Surety, are held and firmly bound unto the Owner in the amount required by law, in the sum of \_\_\_\_\_ Dollars (\$\_\_\_\_\_) for which payment well and truly to be made we bind ourselves, our heirs, executors and administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION of this obligation is such, that if the Contractor, his or its heirs, executors, administrators, successors or assigns, or subcontractors shall fail to pay any of the persons referred to in Civil Code 9100, amounts due under the Unemployment Insurance Code with respect to work or labor performed by any such claimant, or amount due the Franchise Tax Board as provided in Civil Code 9554, that the surety or sureties herein will pay for the same, in amount not exceeding the sum specified in this bond, otherwise the above obligation shall be void. In case suit is brought in this bond, the said surety will pay reasonable attorneys' fee to be fixed by the court.

This bond shall insure to the benefit of any of the persons referred to in Civil Code 9100 so as to give a right of action to such persons or their assigns in any suit brought upon this bond. Any such right of action shall be subject to the provisions of Civil Code 8608 and 9566.

PROVIDED, FURTHER, that the said surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the work to be performed thereunder or the specifications accompanying the same shall in any way affect its obligation on this bond, and it does hereby waive notice of any change, extension of time, alteration or addition to the terms of the contract or to the work or to the specifications.

PROVIDED, FURTHER, that no settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

PROVIDED, FURTHER, that surety covenants that it is an Admitted Surety Insurer in the State of California as defined by California Code of Civil Procedures, Section 995.120.

\_\_\_\_\_  
\*SURETY Attorney-In-Fact  
(Signature must be notarized)  
Date: \_\_\_\_\_

\_\_\_\_\_  
CONTRACTOR  
(Signature must be notarized)  
Date: \_\_\_\_\_

Address of Surety: \_\_\_\_\_

\* ATTORNEY-IN-FACT MUST HAVE POWER OF ATTORNEY ON FILE WITH CITY CLERK OF CITY OF GRASS VALLEY OR INCLUDE A COPY OF POWER OF ATTORNEY WITH THIS BOND.

# BOND OF FAITHFUL PERFORMANCE

KNOW ALL MEN BY THESE PRESENTS THAT WE \_\_\_\_\_,  
the Contractor in the Contract hereto annexed, as principal, and \_\_\_\_\_  
as Surety are held and firmly bound unto the City of Grass Valley in the sum of  
\_\_\_\_\_ Dollars (\$\_\_\_\_\_) lawful money of the United  
States, for which payment, well and truly to be made, we bind ourselves, jointly and severally, firmly by  
these presents

The condition of the above obligation is that if said principal as Contractor in the contract hereto annexed shall faithfully perform each and all of the conditions of said contract to be performed by him, and shall furnish all tools, equipment, apparatus, facilities, transportation, labor, and material, other than material, if any, agreed to be furnished by the CITY, necessary to perform and complete, and to perform and complete in a good workmanlike manner, and to guarantee acceptable performance of the work for a period of one year following the acceptance of the project, the work of **CDBG MEMORIAL PARK FACILITIES IMPROVEMENT PROJECT, PROJECT NO. 20-05** in strict conformity with the terms and conditions set forth in the contract hereto annexed, and after a period of one year following the acceptance of the project, then this obligation shall be null and void, otherwise to remain in full force and effect; and the said surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the work to be performed thereunder or the specifications accompanying the same shall, in any wise, affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the work or to the specifications.

Surety further agrees in case suit is brought upon this bond that it will pay, in addition to the basic obligation herein, all court costs, expenses, and all reasonable attorney's fees to be awarded and fixed by the Court, and to be taxed as costs, and to be included in the judgment therein rendered.

\_\_\_\_\_  
\*SURETY Attorney-In-Fact  
(Signature must be notarized)  
Date: \_\_\_\_\_

\_\_\_\_\_  
CONTRACTOR  
(Signature must be notarized)  
Date: \_\_\_\_\_

Address of Surety: \_\_\_\_\_

**\*ATTORNEY-IN-FACT MUST HAVE POWER OF ATTORNEY ON FILE WITH CITY CLERK OF CITY OF GRASS VALLEY OR INCLUDE A COPY OF POWER OF ATTORNEY WITH THIS BOND.**

## LIST OF SUBCONTRACTORS

The Contractor shall list the name, address, and contractor’s license classification and number of each Subcontractor required to be listed by Section 2-1.054, “Required Listing of Proposed Subcontractors,” of the Standard Specifications, and the Special Provisions, and designate the portion and percentage of the work to be performed by the Subcontractor, to whom the bidder proposes to subcontract portions of the work. ***The California contractor license designation and number shall be included for all subcontractors doing work in excess of one half of one percent of the total Project bid price, or ten thousand dollars (\$10,000.00), whichever is greater.***

Subcontractor Name, Address & Email	License Designation Number	Description of Portion of Work Contracted With Applicable Bid Item(s)	% of Work per Bid Item	Dollar Amount of Work

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**APPENDIX B – PREVAILING WAGE DETERMINATIONS**

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"General Decision Number: CA20210007 04/23/2021

Superseded General Decision Number: CA20200007

State: California

Construction Types: Building, Heavy (Heavy and Dredging) and Highway

Counties: Alpine, Amador, Butte, Colusa, El Dorado, Glenn, Lassen, Marin, Modoc, Napa, Nevada, Placer, Plumas, Sacramento, Shasta, Sierra, Siskiyou, Solano, Sonoma, Sutter, Tehama, Trinity, Yolo and Yuba Counties in California.

BUILDING CONSTRUCTION PROJECTS (excluding Amador County only); DREDGING CONSTRUCTION PROJECTS (does not include hopper dredge work); HEAVY CONSTRUCTION PROJECTS (does not include water well drilling); AND HIGHWAY CONSTRUCTION PROJECTS

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.95 for calendar year 2021 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.95 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2021. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/01/2021
1	01/08/2021
2	01/15/2021
3	01/22/2021
4	02/05/2021
5	02/19/2021
6	02/26/2021
7	04/02/2021
8	04/23/2021

ASBE0016-001 01/01/2021

AREA 1: MARIN, NAPA, SAN BENITO, SAN FRANCISCO, SOLANO, & SONOMA COUNTIES

AREA 2: ALPINE, AMADOR, BUTTE, COLUSA, EL DORADO, GLENN, MODOC, NEVADA, PLACER, PLUMAS, SACRAMENTO, SHASTA, SIERRA, SISKIYOU, SUTTER, TEHEMA, TRINITY, YOLO, & YUBA COUNTIES

Rates Fringes

	Rates	Fringes
Asbestos Workers/Insulator (Includes the application of all insulating materials, Protective Coverings, Coatings, and Finishes to all types of mechanical systems)		
Area 1.....	\$ 74.16	23.58
Area 2.....	\$ 46.81	33.50

ASBE0016-007 01/01/2021

AREA 1 : ALPINE, AMADOR, BUTTE, COLUSA, EL DORADO, GLENN, LASSEN, MODOC, NEVADA, PLACER, PLUMAS, SACRAMENTO, SHASTA, SIERRA, SISKIYOU, SOLANO, SONOMA, SUTTER, TEHEMA, TRINITY, YOLO & YUBA COUNTIES

AREA 2: MARIN & NAPA COUNTIES

	Rates	Fringes
Asbestos Removal worker/hazardous material handler (Includes preparation, wetting, stripping, removal, scrapping, vacuuming, bagging and disposing of all insulation materials from mechanical systems, whether they contain asbestos or not)		
AREA 1.....	\$ 30.45	10.60
AREA 2.....	\$ 36.53	9.27

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BOIL0549-002 10/01/2016

	Rates	Fringes
BOILERMAKER		
(1) Marin & Solano Counties.....	\$ 43.28	37.91
(2) Remaining Counties.....	\$ 39.68	35.71

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BRCA0003-001 08/01/2020

	Rates	Fringes
MARBLE FINISHER.....	\$ 36.53	17.08

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BRCA0003-004 05/01/2019

AREA 1: ALPINE, AMADOR, BUTTE, COLUSA, EL DORADO, GLENN,  
LASSEN, MODOC, NEVADA, PLACER, PLUMAS, SACRAMENTO, SHASTA,  
SIERRA, SUTTER, TEHAMA, YOLO AND YUBA COUNTIES

AREA 2: MARIN, NAPA, SISKIYOU, SOLANO, SONOMA AND TRINITY  
COUNTIES

	Rates	Fringes
BRICKLAYER		
AREA 1.....	\$ 43.24	21.63
AREA 2.....	\$ 45.92	26.70

SPECIALTY PAY:

- (A) Underground work such as tunnel work, sewer work, manholes, catch basins, sewer pipes and telephone conduit shall be paid \$1.25 per hour above the regular rate. Work in direct contact with raw sewage shall receive \$1.25 per hour in addition to the above.
- (B) Operating a saw or grinder shall receive \$1.25 per hour above the regular rate.
- (C) Gunite nozzle person shall receive \$1.25 per hour above the regular rate.

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BRCA0003-008 07/01/2019

	Rates	Fringes
TERRAZZO FINISHER.....	\$ 37.58	17.33
TERRAZZO WORKER/SETTER.....	\$ 48.53	26.84

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BRCA0003-010 04/01/2019

	Rates	Fringes
TILE FINISHER		
Area 1.....	\$ 27.31	14.75
Area 2.....	\$ 27.10	16.50
Area 3.....	\$ 29.94	16.38
Area 4.....	\$ 28.06	15.82
Tile Layer		
Area 1.....	\$ 45.51	17.64
Area 2.....	\$ 45.15	19.06
Area 3.....	\$ 49.90	19.16
Area 4.....	\$ 46.77	19.08

- AREA 1: Butte, Colusa, El Dorado, Glenn, Lassen, Modoc, Nevada, Placer, Plumas, Sacramento, Shasta, Sierra, Sutter, Tehama, Yolo, Yuba
- AREA 2: Alpine, Amador
- AREA 3: Marin, Napa, Solano, Siskiyou
- AREA 4: Sonoma

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BRCA0003-014 08/01/2020

	Rates	Fringes
MARBLE MASON.....	\$ 51.30	28.47

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 CARP0034-001 07/01/2020

	Rates	Fringes
Diver		
Assistant Tender, ROV		
Tender/Technician.....	\$ 51.90	34.02
Diver standby.....	\$ 58.09	34.02
Diver Tender.....	\$ 57.09	34.02
Diver wet.....	\$ 101.42	34.02
Manifold Operator (mixed		
gas).....	\$ 62.09	34.02
Manifold Operator (Standby).\$	57.09	34.02

DEPTH PAY (Surface Diving):  
 050 to 100 ft \$2.00 per foot  
 101 to 150 ft \$3.00 per foot  
 151 to 220 ft \$4.00 per foot  
 221 ft.-deeper \$5.00 per foot

SATURATION DIVING:  
 The standby rate shall apply until saturation starts. The saturation diving rate applies when divers are under pressure continuously until work task and decompression are complete. The diver rate shall be paid for all saturation hours.

DIVING IN ENCLOSURES:  
 Where it is necessary for Divers to enter pipes or tunnels, or other enclosures where there is no vertical ascent, the following premium shall be paid: Distance traveled from entrance 26 feet to 300 feet: \$1.00 per foot. When it is necessary for a diver to enter any pipe, tunnel or other enclosure less than 48" in height, the premium will be \$1.00 per foot.

WORK IN COMBINATION OF CLASSIFICATIONS:  
 Employees working in any combination of classifications within the diving crew (except dive supervisor) in a shift are paid in the classification with the highest rate for that shift.

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 CARP0034-003 07/01/2020

	Rates	Fringes
Piledriver.....	\$ 51.90	34.02

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 CARP0035-001 08/01/2020

AREA 1: MARIN, NAPA, SOLANO & SONOMA

AREA 3: SACRAMENTO, WESTERN EL DORADO (Territory west of an including highway 49 and the territory inside the city limits of Placerville), WESTERN PLACER (Territory west of and including highway 49), & YOLO

AREA 4: ALPINE, BUTTE, COLUSA, EASTERN EL DORADO, GLENN, LASSEN, MODOC, NEVADA, EASTERN PLACER, PLUMAS, SHASTA, SIERRA, SISKIYOU, SUTTER, TEHAMA, TRINITY, & YUBA

	Rates	Fringes
Drywall Installers/Lathers:		
Area 1.....	\$ 52.65	31.26
Area 3.....	\$ 47.27	31.26
Area 4.....	\$ 45.92	31.26
Drywall Stocker/Scrapper		
Area 1.....	\$ 26.33	18.22
Area 3.....	\$ 23.64	18.22
Area 4.....	\$ 22.97	18.22

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 CARP0035-009 07/01/2020

Marin County

	Rates	Fringes
CARPENTER		
Bridge Builder/Highway		
Carpenter.....	\$ 52.65	30.82
Hardwood Floorlayer,		



Shingler, Power Saw Operator, Steel Scaffold & Steel Shoring Erector, Saw Filer.....	\$ 52.80	30.82
Journeyman Carpenter.....	\$ 52.65	30.82
Millwright.....	\$ 52.75	32.41

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 CARP0035-010 07/01/2020

AREA 1: Marin, Napa, Solano & Sonoma Counties

AREA 2: Monterey, San Benito and Santa Cruz

AREA 3: Alpine, Butte, Colusa, El Dorado, Glenn, Lassen, Modoc,  
 Nevada, Placer, Plumas, Sacramento, Shasta, Sierra, Siskiyou,  
 Sutter, Tehama, Trinity, Yolo & Yuba counties

	Rates	Fringes
Modular Furniture Installer		
Area 1		
Installer.....	\$ 28.76	22.53
Lead Installer.....	\$ 32.21	23.03
Master Installer.....	\$ 36.43	23.03
Area 2		
Installer.....	\$ 26.11	22.53
Lead Installer.....	\$ 29.08	23.03
Master Installer.....	\$ 32.71	23.03
Area 3		
Installer.....	\$ 25.16	22.53
Lead Installer.....	\$ 27.96	23.03
Master Installer.....	\$ 31.38	23.03

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 CARP0046-001 07/01/2020

El Dorado (West), Placer (West), Sacramento and Yolo Counties

	Rates	Fringes
Carpenters		
Bridge Builder/Highway Carpenter.....	\$ 52.65	30.82
Hardwood Floorlayer, Shingler, Power Saw Operator, Steel Scaffold & Steel Shoring Erector, Saw Filer.....	\$ 46.92	30.82
Journeyman Carpenter.....	\$ 46.77	30.82
Millwright.....	\$ 49.27	32.41

Footnote: Placer County (West) includes territory West of and including Highway 49 and El Dorado County (West) includes territory West of and including Highway 49 and territory inside the city limits of Placerville.

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 CARP0046-002 07/01/2020

Alpine, Colusa, El Dorado (East), Nevada, Placer (East),  
 Sierra, Sutter and Yuba Counties

	Rates	Fringes
Carpenters		
Bridge Builder/Highway Carpenter.....	\$ 52.65	30.82
Hardwood Floorlayer, Shingler, Power Saw Operator, Steel Scaffold & Steel Shoring Erector, Saw Filer.....	\$ 45.57	30.82
Journeyman Carpenter.....	\$ 45.42	30.82
Millwright.....	\$ 47.92	32.41

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 CARP0152-003 07/01/2020

Amador County

	Rates	Fringes
Carpenters		
Bridge Builder/Highway Carpenter.....	\$ 52.65	30.82
Hardwood Floorlayer, Shingler, Power Saw Operator, Steel Scaffold & Steel Shoring Erector, Saw		

Filer.....	\$ 45.57	30.82
Journeyman Carpenter.....	\$ 45.42	30.82
Millwright.....	\$ 47.92	32.41

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 CARP0180-001 07/01/2020

Solano County

	Rates	Fringes
Carpenters		
Bridge Builder/Highway Carpenter.....	\$ 52.65	30.82
Hardwood Floorlayer, Shingler, Power Saw Operator, Steel Scaffold & Steel Shoring Erector, Saw Filer.....	\$ 52.80	30.82
Journeyman Carpenter.....	\$ 52.65	30.82
Millwright.....	\$ 52.75	32.41

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 CARP0751-001 07/01/2020

Napa and Sonoma Counties

	Rates	Fringes
Carpenters		
Bridge Builder/Highway Carpenter.....	\$ 52.65	30.82
Hardwood Floorlayer, Shingler, Power Saw Operator, Steel Scaffold & Steel Shoring Erector, Saw Filer.....	\$ 52.80	30.82
Journeyman Carpenter.....	\$ 52.65	30.82
Millwright.....	\$ 52.75	32.41

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 CARP1599-001 07/01/2020

Butte, Glenn, Lassen, Modoc, Plumas, Shasta, Siskiyou, Tehama  
 and Trinity Counties

	Rates	Fringes
Carpenters		
Bridge Builder/Highway Carpenter.....	\$ 52.65	30.82
Hardwood Floorlayer, Shingler, Power Saw Operator, Steel Scaffold & Steel Shoring Erector, Saw Filer.....	\$ 45.57	30.82
Journeyman Carpenter.....	\$ 45.42	30.82
Millwright.....	\$ 47.92	32.41

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 ELEC0180-001 06/01/2020

NAPA AND SOLANO COUNTIES

	Rates	Fringes
CABLE SPLICER.....	\$ 58.51	24.74
ELECTRICIAN.....	\$ 52.01	24.54

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 ELEC0180-003 12/01/2020

NAPA AND SOLANO COUNTIES

	Rates	Fringes
Sound & Communications		
Installer.....	\$ 42.11	22.41
Technician.....	\$ 48.43	22.60

SCOPE OF WORK INCLUDES-  
 SOUND & VOICE TRANSMISSION (Music, Intercom, Nurse Call,  
 Telephone); FIRE ALARM SYSTEMS [excluding fire alarm work  
 when installed in raceways (including wire and cable  
 pulling) and when performed on new or major remodel  
 building projects or jobs],  
 TELEVISION & VIDEO SYSTEMS, SECURITY SYSTEMS, COMMUNICATIONS  
 SYSTEMS that transmit or receive information and/or control  
 systems that are intrinsic to the above.

EXCLUDES-  
 Excludes all other data systems or multiple systems which  
 include control function or power supply; excludes

installation of raceway systems, line voltage work, industrial work, life-safety systems (all buildings having floors located more than 75' above the lowest floor level having building access); excludes energy management systems.

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 ELEC0340-002 02/01/2018

ALPINE, AMADOR, BUTTE, COLUSA, EL DORADO, GLENN, LASSEN, NEVADA, PLACER, PLUMAS, SACRAMENTO, TRINITY, YOLO, YUBA COUNTIES

	Rates	Fringes
Communications System		
Sound & Communications		
Installer.....	\$ 29.35	3%+15.35
Sound & Communications		
Technician.....	\$ 33.75	3%+15.35

SCOPE OF WORK

Includes the installation testing, service and maintenance, of the following systems which utilize the transmission and/or transference of voice, sound, vision and digital for commercial, education, security and entertainment purposes for the following TV monitoring and surveillance, background-foreground music, intercom and telephone interconnect, inventory control systems, microwave transmission, multi-media, multiplex, nurse call system, radio page, school intercom and sound, burglar alarms, and low voltage master clock systems.

A. SOUND AND VOICE TRANSMISSION/TRANSFERENCE SYSTEMS  
 Background foreground music Intercom and telephone interconnect systems, Telephone systems, Nurse call systems, Radio page systems, School intercom and sound systems, Burglar alarm systems, Low voltage master clock systems, Multi-media/multiplex systems, Sound and musical entertainment systems, RF systems, Antennas and Wave Guide.

B. FIRE ALARM SYSTEMS  
 Installation, wire pulling and testing

C. TELEVISION AND VIDEO SYSTEMS   Television monitoring and surveillance systems, Video security systems, Video entertainment systems, Video educational systems, Microwave transmission systems, CATV and CCTV

D. SECURITY SYSTEMS   Perimeter security systems  
 Vibration sensor systems   Card access systems   Access control systems   Sonar/infrared monitoring equipment

E. COMMUNICATIONS SYSTEMS THAT TRANSMIT OR RECEIVE INFORMATION AND/OR CONTROL SYSTEMS THAT ARE INTRINSIC TO THE ABOVE LISTED SYSTEMS   SCADA (Supervisory Control and Data Acquisition)   PCM (Pulse Code Modulation)  
 Inventory Control Systems   Digital Data Systems  
 Broadband and Baseband and Carriers   Point of Sale Systems   VSAT Data Systems   Data Communication Systems   RF and Remote Control Systems   Fiber Optic Data Systems  
 WORK EXCLUDED Raceway systems are not covered (excluding Ladder-Rack for the purpose of the above listed systems). Chases and/or nipples (not to exceed 10 feet) may be installed on open wiring systems. Energy management systems. SCADA (Supervisory Control and Data Acquisition) when not intrinsic to the above listed systems (in the scope). Fire alarm systems when installed in raceways (including wire and cable pulling) shall be performed at the electrician wage rate, when either of the following two (2) conditions apply:  
 1. The project involves new or major remodel building trades construction.  
 2. The conductors for the fire alarm system are installed in conduit.

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 ELEC0340-003 02/01/2021

ALPINE (West of Sierra Mt. Watershed), AMADOR, BUTTE, COLUSA, EL DORADO (West of Sierra Mt. Watershed), GLENN, LASSEN, NEVADA (West of Sierra Mt. Watershed), PLACER, PLUMAS, SACRAMENTO, SHASTA, SIERRA (West of Sierra Mt. Watershed), SUTTER, TEHAMA, TRINITY, YOLO & YUBA COUNTIES

Rates                      Fringes

ELECTRICIAN

Remaining area.....	\$ 41.56	32.49
Sierra Army Depot, Herlong..	\$ 48.83	18.54
Tunnel work.....	\$ 41.01	18.54

CABLE SPLICER: Receives 110% of the Electrician basic hourly rate.

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ELEC0401-005 07/01/2020

ALPINE (east of the main watershed divide), EL DORADO (east of the main watershed divide), NEVADA (east of the main watershed), PLACER (east of the main watershed divide) and SIERRA (east of the main watershed divide) COUNTIES:

	Rates	Fringes
ELECTRICIAN.....	\$ 41.50	20.17

ZONE RATE:

70-90 miles - \$8.00 per hour  
91+ miles - \$10.00 per hour

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ELEC0551-004 06/01/2020

MARIN AND SONOMA COUNTIES

	Rates	Fringes
ELECTRICIAN.....	\$ 52.40	3%+23.31

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ELEC0551-005 12/21/2020

MARIN & SONOMA COUNTIES

	Rates	Fringes
Sound & Communications		
Installer.....	\$ 42.11	22.41
Technician.....	\$ 48.43	22.60

SCOPE OF WORK INCLUDES-

SOUND & VOICE TRANSMISSION (Music, Intercom, Nurse Call, Telephone); FIRE ALARM SYSTEMS [excluding fire alarm work when installed in raceways (including wire and cable pulling) and when performed on new or major remodel building projects or jobs], TELEVISION & VIDEO SYSTEMS, SECURITY SYSTEMS, COMMUNICATIONS SYSTEMS that transmit or receive information and/or control systems that are intrinsic to the above.

EXCLUDES-

Excludes all other data systems or multiple systems which include control function or power supply; excludes installation of raceway systems, line voltage work, industrial work, life-safety systems (all buildings having floors located more than 75' above the lowest floor level having building access); excludes energy management systems.

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ELEC0659-006 01/01/2021

DEL NORTE, MODOC and SISKIYOU COUNTIES

	Rates	Fringes
ELECTRICIAN.....	\$ 38.49	17.74

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ELEC0659-008 02/01/2019

DEL NORTE, MODOC & SISKIYOU COUNTIES

	Rates	Fringes
Line Construction		
(1) Cable Splicer.....	\$ 59.09	20.22
(2) Lineman, Pole Sprayer,		
Heavy Line Equipment Man....	\$ 52.76	19.96
(3) Tree Trimmer.....	\$ 31.10	11.32
(4) Line Equipment Man.....	\$ 52.76	19.96
(5) Powdermen,		
Jackhammermen.....	\$ 33.80	13.35
(6) Groundman.....	\$ 33.24	14.79

ELEC1245-004 06/01/2020

ALL COUNTIES EXCEPT DEL NORTE, MODOC & SISKIYOU

	Rates	Fringes
LINE CONSTRUCTION		
(1) Lineman; Cable splicer..	\$ 59.14	20.78
(2) Equipment specialist (operates crawler tractors, commercial motor vehicles, backhoes, trenchers, cranes (50 tons and below), overhead & underground distribution line equipment).....	\$ 47.24	19.59
(3) Groundman.....	\$ 36.12	19.19
(4) Powderman.....	\$ 51.87	18.79

HOLIDAYS: New Year's Day, M.L. King Day, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day and day after Thanksgiving, Christmas Day

ELEV0008-001 01/01/2021

	Rates	Fringes
ELEVATOR MECHANIC.....	\$ 72.10	35.825+a+b

FOOTNOTE:

- a. PAID VACATION: Employer contributes 8% of regular hourly rate as vacation pay credit for employees with more than 5 years of service, and 6% for 6 months to 5 years of service.
- b. PAID HOLIDAYS: New Year's Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day, Friday after Thanksgiving, and Christmas Day.

ENGI0003-008 07/20/2020

	Rates	Fringes
Dredging: (DREDGING: CLAMSHELL & DIPPER DREDGING; HYDRAULIC SUCTION DREDGING:)		
AREA 1:		
(1) Leverman.....	\$ 49.88	34.35
(2) Dredge Dozer; Heavy duty repairman.....	\$ 44.92	34.35
(3) Booster Pump Operator; Deck Engineer; Deck mate; Dredge Tender; Winch Operator.....	\$ 43.80	34.35
(4) Bargeman; Deckhand; Fireman; Leveehand; Oiler..	\$ 40.50	34.35
AREA 2:		
(1) Leverman.....	\$ 51.88	34.35
(2) Dredge Dozer; Heavy duty repairman.....	\$ 46.92	34.35
(3) Booster Pump Operator; Deck Engineer; Deck mate; Dredge Tender; Winch Operator.....	\$ 45.80	34.35
(4) Bargeman; Deckhand; Fireman; Leveehand; Oiler..	\$ 42.50	34.35

AREA DESCRIPTIONS

AREA 1: ALAMEDA, BUTTE, CONTRA COSTA, KINGS, MARIN, MERCED, NAPA, SACRAMENTO, SAN BENITO, SAN FRANCISCO, SAN JOAQUIN, SAN MATEO, SANTA CLARA, SANTA CRUZ, SOLANO, STANISLAUS, SUTTER, YOLO, AND YUBA COUNTIES

AREA 2: MODOC COUNTY

THE REMAINING COUNTIES ARE SPLIT BETWEEN AREA 1 AND AREA 2 AS NOTED BELOW:

ALPINE COUNTY:

Area 1: Northernmost part  
Area 2: Remainder

CALAVERAS COUNTY:

Area 1: Remainder  
Area 2: Eastern part

COLUSA COUNTY:  
Area 1: Eastern part  
Area 2: Remainder

ELDORADO COUNTY:  
Area 1: North Central part  
Area 2: Remainder

FRESNO COUNTY:  
Area 1: Remainder  
Area 2: Eastern part

GLENN COUNTY:  
Area 1: Eastern part  
Area 2: Remainder

LASSEN COUNTY:  
Area 1: Western part along the Southern portion of border  
with Shasta County  
Area 2: Remainder

MADERA COUNTY:  
Area 1: Except Eastern part  
Area 2: Eastern part

MARIPOSA COUNTY  
Area 1: Except Eastern part  
Area 2: Eastern part

MONTERREY COUNTY  
Area 1: Except Southwestern part  
Area 2: Southwestern part

NEVADA COUNTY:  
Area 1: All but the Northern portion along the border of  
Sierra County  
Area 2: Remainder

PLACER COUNTY:  
Area 1: All but the Central portion  
Area 2: Remainder

PLUMAS COUNTY:  
Area 1: Western portion  
Area 2: Remainder

SHASTA COUNTY:  
Area 1: All but the Northeastern corner  
Area 2: Remainder

SIERRA COUNTY:  
Area 1: Western part  
Area 2: Remainder

SISKIYOU COUNTY:  
Area 1: Central part  
Area 2: Remainder

SONOMA COUNTY:  
Area 1: All but the Northwestern corner  
Area 2: Remainder

TEHAMA COUNTY:  
Area 1: All but the Western border with Mendocino & Trinity  
Counties  
Area 2: Remainder

TRINITY COUNTY:  
Area 1: East Central part and the Northeastern border with  
Shasta County  
Area 2: Remainder

TUOLUMNE COUNTY:  
Area 1: Except Eastern part  
Area 2: Eastern part

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ENGI0003-019 06/29/2020  
SEE AREA DESCRIPTIONS BELOW

	Rates	Fringes
OPERATOR: Power Equipment (LANDSCAPE WORK ONLY)		
GROUP 1		
AREA 1.....	\$ 39.95	30.28
AREA 2.....	\$ 41.95	30.28
GROUP 2		

AREA 1.....	\$ 36.35	30.28
AREA 2.....	\$ 38.35	30.28
GROUP 3		
AREA 1.....	\$ 31.74	30.28
AREA 2.....	\$ 33.74	30.28

GROUP DESCRIPTIONS:

GROUP 1: Landscape Finish Grade Operator: All finish grade work regardless of equipment used, and all equipment with a rating more than 65 HP.

GROUP 2: Landscape Operator up to 65 HP: All equipment with a manufacturer's rating of 65 HP or less except equipment covered by Group 1 or Group 3. The following equipment shall be included except when used for finish work as long as manufacturer's rating is 65 HP or less: A-Frame and Winch Truck, Backhoe, Forklift, Hydragraphic Seeder Machine, Roller, Rubber-Tired and Track Earthmoving Equipment, Skiploader, Straw Blowers, and Trencher 31 HP up to 65 HP.

GROUP 3: Landscae Utility Operator: Small Rubber-Tired Tractor, Trencher Under 31 HP.

AREA DESCRIPTIONS:

AREA 1: ALAMEDA, BUTTE, CONTRA COSTA, KINGS, MARIN, MERCED, NAPA, SACRAMENTO, SAN BENITO, SAN FRANCISCO, SAN JOAQUIN, SAN MATEO, SANTA CLARA, SANTA CRUZ, SOLANO, STANISLAUS, SUTTER, YOLO, AND YUBA COUNTIES

AREA 2 - MODOC COUNTY

THE REMAINING COUNTIES ARE SPLIT BETWEEN AREA 1 AND AREA 2 AS NOTED BELOW:

ALPINE COUNTY:

Area 1: Northernmost part  
Area 2: Remainder

CALAVERAS COUNTY:

Area 1: Except Eastern part  
Area 2: Eastern part

COLUSA COUNTY:

Area 1: Eastern part  
Area 2: Remainder

DEL NORTE COUNTY:

Area 1: Extreme Southwestern corner  
Area 2: Remainder

ELDORADO COUNTY:

Area 1: North Central part  
Area 2: Remainder

FRESNO COUNTY

Area 1: Except Eastern part  
Area 2: Eastern part

GLENN COUNTY:

Area 1: Eastern part  
Area 2: Remainder

HUMBOLDT COUNTY:

Area 1: Except Eastern and Southwestern parts  
Area 2: Remainder

LAKE COUNTY:

Area 1: Southern part  
Area 2: Remainder

LASSEN COUNTY:

Area 1: Western part along the Southern portion of border with Shasta County  
Area 2: Remainder

MADERA COUNTY

Area 1: Remainder  
Area 2: Eastern part

MARIPOSA COUNTY

Area 1: Remainder  
Area 2: Eastern part

MENDOCINO COUNTY:

Area 1: Central and Southeastern parts  
Area 2: Remainder

MONTEREY COUNTY  
 Area 1: Remainder  
 Area 2: Southwestern part

NEVADA COUNTY:  
 Area 1: All but the Northern portion along the border of  
 Sierra County  
 Area 2: Remainder

PLACER COUNTY:  
 Area 1: All but the Central portion  
 Area 2: Remainder

PLUMAS COUNTY:  
 Area 1: Western portion  
 Area 2: Remainder

SHASTA COUNTY:  
 Area 1: All but the Northeastern corner  
 Area 2: Remainder

SIERRA COUNTY:  
 Area 1: Western part  
 Area 2: Remainder

SISKIYOU COUNTY:  
 Area 1: Central part  
 Area 2: Remainder

SONOMA COUNTY:  
 Area 1: All but the Northwestern corner  
 Area 2: Reaminder

TEHAMA COUNTY:  
 Area 1: All but the Western border with mendocino & Trinity  
 Counties  
 Area 2: Remainder

TRINITY COUNTY:  
 Area 1: East Central part and the Northeaster border with  
 Shasta County  
 Area 2: Remainder

TULARE COUNTY;  
 Area 1: Remainder  
 Area 2: Eastern part

TUOLUMNE COUNTY:  
 Area 1: Remainder  
 Area 2: Eastern Part

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 ENGI0003-038 06/29/2020

""AREA 1"" WAGE RATES ARE LISTED BELOW

""AREA 2"" RECEIVES AN ADDITIONAL \$2.00 PER HOUR ABOVE AREA 1  
 RATES.

SEE AREA DEFINITIONS BELOW

	Rates	Fringes
OPERATOR: Power Equipment		
(AREA 1:)		
GROUP 1.....	\$ 51.42	31.15
GROUP 2.....	\$ 49.89	31.15
GROUP 3.....	\$ 48.41	31.15
GROUP 4.....	\$ 47.03	31.15
GROUP 5.....	\$ 45.76	31.15
GROUP 6.....	\$ 44.44	31.15
GROUP 7.....	\$ 43.30	31.15
GROUP 8.....	\$ 42.16	31.15
GROUP 8-A.....	\$ 39.95	31.15
OPERATOR: Power Equipment		
(Cranes and Attachments -		
AREA 1:)		
GROUP 1		
Cranes.....	\$ 52.30	31.15
Oiler.....	\$ 43.79	31.15
Truck crane oiler.....	\$ 46.08	31.15
GROUP 2		
Cranes.....	\$ 50.54	31.15
Oiler.....	\$ 42.83	31.15
Truck crane oiler.....	\$ 45.07	31.15
GROUP 3		
Cranes.....	\$ 48.80	31.15



Hydraulic.....	\$ 44.44	31.15
Oiler.....	\$ 42.55	31.15
Truck crane oiler.....	\$ 44.83	31.15
GROUP 4		
Cranes.....	\$ 45.76	31.15
OPERATOR: Power Equipment		
(Piledriving - AREA 1:)		
GROUP 1		
Lifting devices.....	\$ 52.64	31.15
Oiler.....	\$ 43.38	31.15
Truck Crane Oiler.....	\$ 45.66	31.15
GROUP 2		
Lifting devices.....	\$ 50.82	31.15
Oiler.....	\$ 43.11	31.15
Truck Crane Oiler.....	\$ 45.41	31.15
GROUP 3		
Lifting devices.....	\$ 49.14	31.15
Oiler.....	\$ 42.89	31.15
Truck Crane Oiler.....	\$ 45.12	31.15
GROUP 4		
Lifting devices.....	\$ 47.37	31.15
GROUP 5		
Lifting devices.....	\$ 44.73	31.15
GROUP 6		
Lifting devices.....	\$ 42.50	31.15
OPERATOR: Power Equipment		
(Steel Erection - AREA 1:)		
GROUP 1		
Cranes.....	\$ 53.27	31.15
Oiler.....	\$ 43.72	31.15
Truck Crane Oiler.....	\$ 45.95	31.15
GROUP 2		
Cranes.....	\$ 51.50	31.15
Oiler.....	\$ 43.45	31.15
Truck Crane Oiler.....	\$ 45.73	31.15
GROUP 3		
Cranes.....	\$ 50.02	31.15
Hydraulic.....	\$ 45.07	31.15
Oiler.....	\$ 43.23	31.15
Truck Crane Oiler.....	\$ 45.46	31.15
GROUP 4		
Cranes.....	\$ 48.00	31.15
GROUP 5		
Cranes.....	\$ 46.70	31.15
OPERATOR: Power Equipment		
(Tunnel and Underground Work		
- AREA 1:)		
SHAFTS, STOPES, RAISES:		
GROUP 1.....	\$ 47.52	31.15
GROUP 1-A.....	\$ 49.99	31.15
GROUP 2.....	\$ 46.26	31.15
GROUP 3.....	\$ 44.93	31.15
GROUP 4.....	\$ 43.79	31.15
GROUP 5.....	\$ 42.65	31.15
UNDERGROUND:		
GROUP 1.....	\$ 47.42	31.15
GROUP 1-A.....	\$ 49.89	31.15
GROUP 2.....	\$ 46.16	31.15
GROUP 3.....	\$ 44.83	31.15
GROUP 4.....	\$ 43.69	31.15
GROUP 5.....	\$ 42.55	31.15

FOOTNOTE: Work suspended by ropes or cables, or work on a Yo-Yo Cat: \$.60 per hour additional.

#### POWER EQUIPMENT OPERATOR CLASSIFICATIONS

GROUP 1: Operator of helicopter (when used in erection work); Hydraulic excavator, 7 cu. yds. and over; Power shovels, over 7 cu. yds.

GROUP 2: Highline cableway; Hydraulic excavator, 3-1/2 cu. yds. up to 7 cu. yds.; licensed construction work boat operator, on site; Power blade operator (finish); Power shovels, over 1 cu. yd. up to and including 7 cu. yds. m.r.c.

GROUP 3: Asphalt milling machine; Cable backhoe; Combination backhoe and loader over 3/4 cu. yds.; Continuous flight tie back machine assistant to engineer or mechanic; Crane mounted continuous flight tie back machine, tonnage to apply; Crane mounted drill attachment, tonnage to apply; Dozer, slope brd; Gradall; Hydraulic excavator, up to 3 1/2 cu. yds.; Loader 4 cu. yds. and over; Long reach excavator; Multiple engine scraper (when used as push pull); Power shovels, up to and including 1 cu. yd.; Pre-stress wire wrapping machine; Side boom cat, 572 or larger; Track loader 4 cu. yds. and over; Wheel excavator (up to and

including 750 cu. yds. per hour)

GROUP 4: Asphalt plant engineer/box person; Chicago boom; Combination backhoe and loader up to and including 3/4 cu. yd.; Concrete batch plant (wet or dry); Dozer and/or push cat; Pull- type elevating loader; Gradesetter, grade checker (GPS, mechanical or otherwise); Grooving and grinding machine; Heading shield operator; Heavy-duty drilling equipment, Hughes, LDH, Watson 3000 or similar; Heavy-duty repairperson and/or welder; Lime spreader; Loader under 4 cu. yds.; Lubrication and service engineer (mobile and grease rack); Mechanical finishers or spreader machine (asphalt, Barber-Greene and similar); Miller Formless M-9000 slope paver or similar; Portable crushing and screening plants; Power blade support; Roller operator, asphalt; Rubber-tired scraper, self-loading (paddle-wheels, etc.); Rubber-tired earthmoving equipment (scrapers); Slip form paver (concrete); Small tractor with drag; Soil stabilizer (P & H or equal); Spider plow and spider puller; Tubex pile rig; Unlicensed construction work boat operator, on site; Timber skidder; Track loader up to 4 yds.; Tractor-drawn scraper; Tractor, compressor drill combination; Welder; Woods-Mixer (and other similar Pugmill equipment)

GROUP 5: Cast-in-place pipe laying machine; Combination slusher and motor operator; Concrete conveyor or concrete pump, truck or equipment mounted; Concrete conveyor, building site; Concrete pump or pumpcrete gun; Drilling equipment, Watson 2000, Texoma 700 or similar; Drilling and boring machinery, horizontal (not to apply to waterliners, wagon drills or jackhammers); Concrete mixer/all; Person and/or material hoist; Mechanical finishers (concrete) (Clary, Johnson, Bidwell Bridge Deck or similar types); Mechanical burm, curb and/or curb and gutter machine, concrete or asphalt; Mine or shaft hoist; Portable crusher; Power jumbo operator (setting slip-forms, etc., in tunnels); Screed (automatic or manual); Self-propelled compactor with dozer; Tractor with boom D6 or smaller; Trenching machine, maximum digging capacity over 5 ft. depth; Vermeer T-600B rock cutter or similar

GROUP 6: Armor-Coater (or similar); Ballast jack tamper; Boom- type backfilling machine; Assistant plant engineer; Bridge and/or gantry crane; Chemical grouting machine, truck-mounted; Chip spreading machine operator; Concrete saw (self-propelled unit on streets, highways, airports and canals); Deck engineer; Drilling equipment Texoma 600, Hughes 200 Series or similar up to and including 30 ft. m.r.c.; Drill doctor; Helicopter radio operator; Hydro-hammer or similar; Line master; Skidsteer loader, Bobcat larger than 743 series or similar (with attachments); Locomotive; Lull hi-lift or similar; Oiler, truck mounted equipment; Pavement breaker, truck-mounted, with compressor combination; Paving fabric installation and/or laying machine; Pipe bending machine (pipelines only); Pipe wrapping machine (tractor propelled and supported); Screed (except asphaltic concrete paving); Self-propelled pipeline wrapping machine; Tractor; Self-loading chipper; Concrete barrier moving machine

GROUP 7: Ballast regulator; Boom truck or dual-purpose A-frame truck, non-rotating - under 15 tons; Cary lift or similar; Combination slurry mixer and/or cleaner; Drilling equipment, 20 ft. and under m.r.c.; Firetender (hot plant); Grouting machine operator; Highline cableway signalperson; Stationary belt loader (Kolman or similar); Lift slab machine (Vagtborg and similar types); Maginnes internal full slab vibrator; Material hoist (1 drum); Mechanical trench shield; Pavement breaker with or without compressor combination; Pipe cleaning machine (tractor propelled and supported); Post driver; Roller (except asphalt); Chip Seal; Self-propelled automatically applied concrete curing machine (on streets, highways, airports and canals); Self-propelled compactor (without dozer); Signalperson; Slip-form pumps (lifting device for concrete forms); Tie spacer; Tower mobile; Trenching machine, maximum digging capacity up to and including 5 ft. depth; Truck- type loader

GROUP 8: Bit sharpener; Boiler tender; Box operator; Brakeperson; Combination mixer and compressor (shotcrete/gunite); Compressor operator; Deckhand; Fire tender; Forklift (under 20 ft.); Generator; Gunite/shotcrete equipment operator; Hydraulic monitor; Ken seal machine (or similar); Mixermobile; Oiler; Pump operator; Refrigeration plant; Reservoir-debris tug (self-propelled floating); Ross Carrier (construction site); Rotomist operator; Self-propelled tape machine; Shuttlecar; Self-propelled power sweeper operator (includes vacuum

sweeper); Slusher operator; Surface heater; Switchperson; Tar pot firetender; Tugger hoist, single drum; Vacuum cooling plant; Welding machine (powered other than by electricity)

GROUP 8-A: Elevator operator; Skidsteer loader-Bobcat 743 series or smaller, and similar (without attachments); Mini excavator under 25 H.P. (backhoe-trencher); Tub grinder wood chipper

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#### ALL CRANES AND ATTACHMENTS

GROUP 1: Clamshell and dragline over 7 cu. yds.; Crane, over 100 tons; Derrick, over 100 tons; Derrick barge pedestal-mounted, over 100 tons; Self-propelled boom-type lifting device, over 100 tons

GROUP 2: Clamshell and dragline over 1 cu. yd. up to and including 7 cu. yds.; Crane, over 45 tons up to and including 100 tons; Derrick barge, 100 tons and under; Self-propelled boom-type lifting device, over 45 tons; Tower crane

GROUP 3: Clamshell and dragline up to and including 1 cu. yd.; Cranes 45 tons and under; Self-propelled boom-type lifting device 45 tons and under;

GROUP 4: Boom Truck or dual purpose A-frame truck, non-rotating over 15 tons; Truck-mounted rotating telescopic boom type lifting device, Manitex or similar (boom truck) over 15 tons; Truck-mounted rotating telescopic boom type lifting device, Manitex or similar (boom truck) - under 15 tons;

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#### PILEDRIVERS

GROUP 1: Derrick barge pedestal mounted over 100 tons; Clamshell over 7 cu. yds.; Self-propelled boom-type lifting device over 100 tons; Truck crane or crawler, land or barge mounted over 100 tons

GROUP 2: Derrick barge pedestal mounted 45 tons to and including 100 tons; Clamshell up to and including 7 cu. yds.; Self-propelled boom-type lifting device over 45 tons; Truck crane or crawler, land or barge mounted, over 45 tons up to and including 100 tons; Fundex F-12 hydraulic pile rig

GROUP 3: Derrick barge pedestal mounted under 45 tons; Self-propelled boom-type lifting device 45 tons and under; Skid/scow piledriver, any tonnage; Truck crane or crawler, land or barge mounted 45 tons and under

GROUP 4: Assistant operator in lieu of assistant to engineer; Forklift, 10 tons and over; Heavy-duty repairperson/welder

GROUP 5: Deck engineer

GROUP 6: Deckhand; Fire tender

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#### STEEL ERECTORS

GROUP 1: Crane over 100 tons; Derrick over 100 tons; Self-propelled boom-type lifting device over 100 tons

GROUP 2: Crane over 45 tons to 100 tons; Derrick under 100 tons; Self-propelled boom-type lifting device over 45 tons to 100 tons; Tower crane

GROUP 3: Crane, 45 tons and under; Self-propelled boom-type lifting device, 45 tons and under

GROUP 4: Chicago boom; Forklift, 10 tons and over; Heavy-duty repair person/welder

GROUP 5: Boom cat

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#### TUNNEL AND UNDERGROUND WORK

GROUP 1-A: Tunnel bore machine operator, 20' diameter or more

GROUP 1: Heading shield operator; Heavy-duty repairperson; Mucking machine (rubber tired, rail or track type); Raised bore operator (tunnels); Tunnel mole bore operator

GROUP 2: Combination slusher and motor operator; Concrete pump or pumpcrete gun; Power jumbo operator

GROUP 3: Drill doctor; Mine or shaft hoist

GROUP 4: Combination slurry mixer cleaner; Grouting Machine operator; Motorman

GROUP 5: Bit Sharpener; Brakeman; Combination mixer and compressor (gunite); Compressor operator; Oiler; Pump operator; Slusher operator

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AREA DESCRIPTIONS:

POWER EQUIPMENT OPERATORS, CRANES AND ATTACHMENTS, TUNNEL AND UNDERGROUND [These areas do not apply to Piledrivers and Steel Erectors]

AREA 1: DEL NORTE, HUMBOLDT, LAKE, MENDOCINO

AREA 2 -NOTED BELOW

THE REMAINING COUNTIES ARE SPLIT BETWEEN AREA 1 AND AREA 2 AS NOTED BELOW:

DEL NORTE COUNTY:

Area 1: Extreme Southwest corner

Area 2: Remainder

HUMBOLDT COUNTY:

Area 1: Except Eastern and Southwestern parts

Area 2: Remainder

LAKE COUNTY:

Area 1: Southern part

Area 2: Remainder

MENDOCINO COUNTY:

Area 1: Central and Southeastern Parts

Area 2: Remainder

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IRON0433-006 07/01/2020

	Rates	Fringes
IRONWORKER		
Fence Erector.....	\$ 34.58	24.81
Ornamental, Reinforcing		
and Structural.....	\$ 41.00	33.45

PREMIUM PAY:

\$6.00 additional per hour at the following locations:

China Lake Naval Test Station, Chocolate Mountains Naval Reserve-Niland, Edwards AFB, Fort Irwin Military Station, Fort Irwin Training Center-Goldstone, San Clemente Island, San Nicholas Island, Susanville Federal Prison, 29 Palms - Marine Corps, U.S. Marine Base - Barstow, U.S. Naval Air Facility - Sealey, Vandenberg AFB

\$4.00 additional per hour at the following locations:

Army Defense Language Institute - Monterey, Fallon Air Base, Naval Post Graduate School - Monterey, Yermo Marine Corps Logistics Center

\$2.00 additional per hour at the following locations:

Port Hueneme, Port Mugu, U.S. Coast Guard Station - Two Rock

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LAB00067-001 06/29/2020

AREA ""A"" - MARIN COUNTY

AREA ""B"" - ALPINE, AMADOR, BUTTE COLUSA EL DORADO, GLENN, LASSEN, MODOC, NAPA, NEVADA, PLACER, PLUMAS, SACRAMENTO, SHASTA, SIERRA, SISKIYOU, SOLANO, SONOMA, SUTTER, TEHAMA, TRINITY, YOLO, AND YUBA COUNTIES

	Rates	Fringes
Asbestos Removal Laborer.....	\$ 25.05	12.00
LABORER (Lead Removal)		
Marin County.....	\$ 33.07	25.30
Remaining Counties.....	\$ 32.07	25.30

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LAB00067-005 06/27/2017

AREA ""A"" - ALAMEDA, CONTRA COSTA, MARIN, SAN FRANCISCO, SAN MATEO AND SANTA CLARA COUNTIES

AREA ""B"" - ALPINE, AMADOR, BUTTE, CALAVERAS, COLUSA, DEL NORTE, EL DORADO, FRESNO, GLENN, HUMBOLDT, KINGS, LAKE, LASSEN, MADERA, MARIPOSA, MENDOCINO, MERCED, MODOC, MONTEREY, NAPA, NEVADA, PLACER, PLUMAS, SACRAMENTO, SAN BENITO, SAN JOAQUIN, SANTA CRUZ, SIERRA, SHASTA, SISKIYOU, SOLANO, SONOMA, STANISLAUS, TEHAMA, TRINITY, TULARE, TUOLUMNE, YOLO AND YUBA COUNTIES

	Rates	Fringes
LABORER (TRAFFIC CONTROL/LANE CLOSURE)		
Escort Driver, Flag Person		
Area A.....	\$ 29.54	22.17
Area B.....	\$ 28.54	22.17
Traffic Control Person I		
Area A.....	\$ 29.84	22.17
Area B.....	\$ 28.84	22.17
Traffic Control Person II		
Area A.....	\$ 27.34	22.17
Area B.....	\$ 26.34	22.17

TRAFFIC CONTROL PERSON I: Layout of traffic control, crash cushions, construction area and roadside signage.

TRAFFIC CONTROL PERSON II: Installation and removal of temporary/permanent signs, markers, delineators and crash cushions.

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LAB00185-002 07/01/2020

ALPINE, AMADOR, BUTTE, COLUSA, EL DORADO, GLENN, LASSEN, MODOC, NEVADA, PLACER, PLUMAS, SACRAMENTO, SHASTA, SIERRA, SISKIYOU, SUTTER, TEHAMA, TRINITY, YOLO AND YUBA COUNTIES

	Rates	Fringes
LABORER		
Mason Tender-Brick.....	\$ 32.84	23.71

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LAB00185-005 06/25/2018

ALPINE, AMADOR, BUTTE, COLUSA, EL DORADO, GLENN, LASSEN, MODOC, NEVADA, PLACER, PLUMAS, SACRAMENTO, SHASTA, SIERRA, SISKIYOU, SUTTER, TEHAMA, TRINITY, YOLO AND YUBA COUNTIES

	Rates	Fringes
Tunnel and Shaft Laborers:		
GROUP 1.....	\$ 37.82	24.11
GROUP 2.....	\$ 37.59	24.11
GROUP 3.....	\$ 37.34	24.11
GROUP 4.....	\$ 36.89	24.11
GROUP 5.....	\$ 36.35	24.11
Shotcrete Specialist.....	\$ 38.34	24.11

TUNNEL AND SHAFT CLASSIFICATIONS

GROUP 1: Diamond driller; Groundmen; Gunite and shotcrete nozzlemen

GROUP 2: Rodmen; Shaft work & raise (below actual or excavated ground level)

GROUP 3: Bit grinder; Blaster, driller, powdermen, heading; Cherry pickermen - where car is lifted; Concrete finisher in tunnel; Concrete screedman; Grout pumpman and potman; Gunite & shotcrete gunman & potman; Headermen; High pressure nozzleman; Miner - tunnel, including top and bottom man on shaft and raise work; Nipper; Nozzleman on slick line; Sandblaster - potman, Robotic Shotcrete Placer, Segment Erector, Tunnel Muck Hauler, Steel Form raiser and setter; Timberman, retimberman (wood or steel or substitute

materials therefore); Tugger (for tunnel laborer work);  
Cable tender; Chuck tender; Powderman - primer house

GROUP 4: Vibrator operator, pavement breaker; Bull gang -  
muckers, trackmen; Concrete crew - includes rodding and  
spreading, Dumpmen (any method)

GROUP 5: Grout crew; Reboundman; Swamper/ Brakeman

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LAB00185-006 06/25/2018

ALPINE, AMADOR, BUTTE, COLUSA, EL DORADO, GLENN, LASSEN, MODOC,  
NEVADA, PLACER, PLUMAS, SACRAMENTO, SHIESTA, SIERRA, SISKIYOU,  
SUTTER, TEHAMA, TRINITY, YOLO, YUBA COUNTIES

	Rates	Fringes
LABORER (CONSTRUCTION CRAFT LABORERS - AREA B:)		
Construction Specialist		
Group.....	\$ 30.49	23.20
GROUP 1.....	\$ 29.79	23.20
GROUP 1-a.....	\$ 30.01	23.20
GROUP 1-c.....	\$ 30.01	23.20
GROUP 1-e.....	\$ 30.34	23.20
GROUP 1-f.....	\$ 30.37	23.20
GROUP 2.....	\$ 29.64	23.20
GROUP 3.....	\$ 29.54	23.20
GROUP 4.....	\$ 23.23	23.20
See groups 1-b and 1-d under laborer classifications.		
LABORER (GARDENERS, HORTICULTURAL & LANDSCAPE LABORERS - AREA B:)		
(1) New Construction.....	\$ 29.54	23.20
(2) Establishment Warranty Period.....	\$ 23.23	23.20
LABORER (GUNITE - AREA B:)		
GROUP 1.....	\$ 29.75	22.31
GROUP 2.....	\$ 29.25	22.31
GROUP 3.....	\$ 28.66	22.31
GROUP 4.....	\$ 28.54	22.31
LABORER (WRECKING - AREA B:)		
GROUP 1.....	\$ 29.79	23.20
GROUP 2.....	\$ 29.64	23.20

FOOTNOTES:

Laborers working off or with or from bos'n chairs, swinging  
scaffolds, belts shall receive \$0.25 per hour above the  
applicable wage rate. This shall not apply to workers  
entitled to receive the wage rate set forth in Group 1-a  
below.

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LABORER CLASSIFICATIONS

CONSTRUCTION SPECIALIST GROUP: Asphalt ironer and raker;  
Chainsaw; Laser beam in connection with laborers' work;  
Cast-in- place manhole form setter; Pressure pipelayer;  
Davis trencher - 300 or similar type (and all small  
trenchers); Blaster; Diamond driller; Multiple unit drill;  
Hydraulic drill

GROUP 1: Asphalt spreader boxes (all types); Barko, Wacker  
and similar type tampers; Buggymobile; Caulker, bander,  
pipewrapper, conduit layer, plastic pipelayer; Certified  
hazardous waste worker including Leade Abatement;  
Compactors of all types; Concrete and magnesite mixer, 1/2  
yd. and under; Concrete pan work; Concrete sander; Concrete  
saw; Cribber and/or shoring; Cut granite curb setter;  
Dri-pak-it machine; Faller, logloader and buckler; Form  
raiser, slip forms; Green cutter; Headerboard, Hubsetter,  
aligner, by any method; High pressure blow pipe (1-1/2" or  
over, 100 lbs. pressure/over); Hydro seeder and similar  
type; Jackhammer operator; Jacking of pipe over 12 inches;  
Jackson and similar type compactor; Kettle tender, pot and  
worker applying asphalt, lay-kold, creosote, lime, caustic  
and similar type materials (applying means applying,  
dipping or handling of such materials); Lagging, sheeting,  
whaling, bracing, trenchjacking, lagging hammer; Magnesite,  
epoxyresin, fiberglass, mastic worker (wet or dry); No  
joint pipe and stripping of same, including repair of  
voids; Pavement breaker and spader, including tool grinder;  
Perma curb; Pipelayer (including grade checking in  
connection with pipelaying); Precast-manhole setter;  
Pressure pipe tester; Post hole digger, air, gas and

electric; Power broom sweeper; Power tampers of all types (except as shown in Group 2); Ram set gun and stud gun; Riprap stonepaver and rock-slinger, including placing of sacked concrete and/or sand (wet or dry) and gabions and similar type; Rotary scarifier or multiple head concrete chipping scarifier; Roto and Ditch Witch; Rototiller; Sandblaster, pot, gun, nozzle operators; Signalling and rigging; Tank cleaner; Tree climber; Turbo blaster; Vibrascreed, bull float in connection with laborers' work; Vibrator; Hazardous waste worker (lead removal); Asbestos and mold removal worker

GROUP 1-a: Joy drill model TWM-2A; Gardner-Denver model DH143 and similar type drills; Track driller; Jack leg driller; Wagon driller; Mechanical drillers, all types regardless of type or method of power; Mechanical pipe layers, all types regardless of type or method of power; Blaster and powder; All work of loading, placing and blasting of all powder and explosives of whatever type regardless of method used for such loading and placing; High scalers (including drilling of same); Tree topper; Bit grinder

GROUP 1-b: Sewer cleaners shall receive \$4.00 per day above Group 1 wage rates. "Sewer cleaner" means any worker who handles or comes in contact with raw sewage in small diameter sewers. Those who work inside recently active, large diameter sewers, and all recently active sewer manholes shall receive \$5.00 per day above Group 1 wage rates.

GROUP 1-c: Burning and welding in connection with laborers' work; Synthetic thermoplastics and similar type welding

GROUP 1-d: Maintenance and repair track and road beds. All employees performing work covered herein shall receive \$ .25 per hour above their regular rate for all work performed on underground structures not specifically covered herein. This paragraph shall not be construed to apply to work below ground level in open cut. It shall apply to cut and cover work of subway construction after the temporary cover has been placed.

GROUP 1-e: Work on and/or in bell hole footings and shafts thereof, and work on and in deep footings. (A deep footing is a hole 15 feet or more in depth.) In the event the depth of the footing is unknown at the commencement of excavation, and the final depth exceeds 15 feet, the deep footing wage rate would apply to all employees for each and every day worked on or in the excavation of the footing from the date of inception.

GROUP 1-f: Wire winding machine in connection with guniting or shotcrete

GROUP 2: Asphalt shoveler; Cement dumper and handling dry cement or gypsum; Choke-setter and rigger (clearing work); Concrete bucket dumper and chute; Concrete chipping and grinding; Concrete laborer (wet or dry); Driller tender, chuck tender, nipper; Guinea chaser (stake), grout crew; High pressure nozzle, adductor; Hydraulic monitor (over 100 lbs. pressure); Loading and unloading, carrying and hauling of all rods and materials for use in reinforcing concrete construction; Pittsburgh chipper and similar type brush shredders; Sloper; Single foot, hand-held, pneumatic tamper; All pneumatic, air, gas and electric tools not listed in Groups 1 through 1-f; Jacking of pipe - under 12 inches

GROUP 3: Construction laborers, including bridge and general laborer; Dump, load spotter; Flag person; Fire watcher; Fence erector; Guardrail erector; Gardener, horticultural and landscape laborer; Jetting; Limber, brush loader and piler; Pavement marker (button setter); Maintenance, repair track and road beds; Streetcar and railroad construction track laborer; Temporary air and water lines, Victaulic or similar; Tool room attendant (jobsite only)

GROUP 4: Final clean-up work of debris, grounds and building including but not limited to: street cleaner; cleaning and washing windows; brick cleaner (jobsite only); material cleaner (jobsite only). The classification "material cleaner" is to be utilized under the following conditions:

- A: at demolition site for the salvage of the material.
- B: at the conclusion of a job where the material is to be salvaged and stocked to be reused on another job.
- C: for the cleaning of salvage material at the jobsite or temporary jobsite yard.

The material cleaner classification should not be used in

the performance of ""form stripping, cleaning and oiling and moving to the next point of erection"".

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GUNITE LABORER CLASSIFICATIONS

GROUP 1: Structural Nozzleman

GROUP 2: Nozzleman, Gunman, Potman, Groundman

GROUP 3: Reboundman

GROUP 4: Guniting laborer  
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WRECKING WORK LABORER CLASSIFICATIONS

GROUP 1: Skilled wrecker (removing and salvaging of sash, windows and materials)

GROUP 2: Semi-skilled wrecker (salvaging of other building materials)  
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LAB00185-008 07/01/2018

	Rates	Fringes
Plasterer tender.....	\$ 32.02	23.00

Work on a swing stage scaffold: \$1.00 per hour additional.  
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LAB00261-002 06/25/2018

MARIN COUNTY

	Rates	Fringes
LABORER (TRAFFIC CONTROL/LANE CLOSURE)		
Escort Driver, Flag Person..	\$ 30.54	23.65
Traffic Control Person I....	\$ 30.84	23.65
Traffic Control Person II...\$	28.34	23.65

TRAFFIC CONTROL PERSON I: Layout of traffic control, crash cushions, construction area and roadside signage.

TRAFFIC CONTROL PERSON II: Installation and removal of temporary/permanent signs, markers, delineators and crash cushions.  
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LAB00261-004 06/25/2018

MARIN COUNTY

	Rates	Fringes
Tunnel and Shaft Laborers:		
GROUP 1.....	\$ 37.82	24.11
GROUP 2.....	\$ 37.59	24.11
GROUP 3.....	\$ 37.34	24.11
GROUP 4.....	\$ 36.89	24.11
GROUP 5.....	\$ 36.35	24.11
Shotcrete Specialist.....	\$ 38.34	24.11

TUNNEL AND SHAFT CLASSIFICATIONS

GROUP 1: Diamond driller; Groundmen; Guniting and shotcrete nozzlemen

GROUP 2: Rodmen; Shaft work & raise (below actual or excavated ground level)

GROUP 3: Bit grinder; Blaster, driller, powdermen, heading; Cherry pickermen - where car is lifted; Concrete finisher in tunnel; Concrete screedman; Grout pumpman and potman; Guniting & shotcrete gunman & potman; Headermen; High pressure nozzleman; Miner - tunnel, including top and bottom man on shaft and raise work; Nipper; Nozzleman on slick line; Sandblaster - potman, Robotic Shotcrete Placer, Segment Erector, Tunnel Muck Hauler, Steel Form raiser and setter; Timberman, retimberman (wood or steel or substitute materials therefore); Tugger (for tunnel laborer work); Cable tender; Chuck tender; Powderman - primer house

GROUP 4: Vibrator operator, pavement breaker; Bull gang -



muckers, trackmen; Concrete crew - includes rodding and spreading, Dumpmen (any method)

GROUP 5: Grout crew; Reboundman; Swamper/ Brakeman

LAB00261-007 07/01/2018

MARIN AND NAPA COUNTIES

	Rates	Fringes
LABORER		
Mason Tender-Brick.....	\$ 32.45	22.20

LAB00261-010 06/25/2018

MARIN COUNTY

	Rates	Fringes
LABORER (CONSTRUCTION CRAFT LABORERS - AREA A:)		
Construction Specialist		
Group.....	\$ 31.49	23.20
GROUP 1.....	\$ 30.79	23.20
GROUP 1-a.....	\$ 31.01	23.20
GROUP 1-c.....	\$ 30.84	23.20
GROUP 1-e.....	\$ 31.34	23.20
GROUP 1-f.....	\$ 31.37	23.20
GROUP 2.....	\$ 30.64	23.20
GROUP 3.....	\$ 30.54	23.20
GROUP 4.....	\$ 24.23	23.20

See groups 1-b and 1-d under laborer classifications.

LABORER (GARDENERS, HORTICULTURAL & LANDSCAPE LABORERS - AREA A:)		
(1) New Construction.....	\$ 30.54	23.20
(2) Establishment Warranty Period.....	\$ 24.23	23.20

LABORER (GUNITE - AREA A:)		
GROUP 1.....	\$ 30.75	22.31
GROUP 2.....	\$ 30.25	22.31
GROUP 3.....	\$ 29.66	22.31
GROUP 4.....	\$ 29.54	22.31

LABORER (WRECKING - AREA A:)		
GROUP 1.....	\$ 30.79	23.20
GROUP 2.....	\$ 30.64	23.20

FOOTNOTES:

Laborers working off or with or from bos'n chairs, swinging scaffolds, belts shall receive \$0.25 per hour above the applicable wage rate. This shall not apply to workers entitled to receive the wage rate set forth in Group 1-a below.

LABORER CLASSIFICATIONS

CONSTRUCTION SPECIALIST GROUP: Asphalt ironer and raker; Chainsaw; Laser beam in connection with laborers' work; Cast-in- place manhole form setter; Pressure pipelayer; Davis trencher - 300 or similar type (and all small trenchers); Blaster; Diamond driller; Multiple unit drill; Hydraulic drill

GROUP 1: Asphalt spreader boxes (all types); Barko, Wacker and similar type tampers; Buggymobile; Caulker, bander, pipewrapper, conduit layer, plastic pipelayer; Certified hazardous waste worker including Leade Abatement; Compactors of all types; Concrete and magnesite mixer, 1/2 yd. and under; Concrete pan work; Concrete sander; Concrete saw; Cribber and/or shoring; Cut granite curb setter; Dri-pak-it machine; Faller, logloader and bucket; Form raiser, slip forms; Green cutter; Headerboard, Hubsetter, aligner, by any method; High pressure blow pipe (1-1/2" or over, 100 lbs. pressure/over); Hydro seeder and similar type; Jackhammer operator; Jacking of pipe over 12 inches; Jackson and similar type compactor; Kettle tender, pot and worker applying asphalt, lay-kold, creosote, lime, caustic and similar type materials (applying means applying, dipping or handling of such materials); Lagging, sheeting, whaling, bracing, trenchjacking, lagging hammer; Magnesite, epoxyresin, fiberglass, mastic worker (wet or dry); No joint pipe and stripping of same, including repair of voids; Pavement breaker and spader, including tool grinder; Perma curb; Pipelayer (including grade checking in

connection with pipelaying); Precast-manhole setter; Pressure pipe tester; Post hole digger, air, gas and electric; Power broom sweeper; Power tampers of all types (except as shown in Group 2); Ram set gun and stud gun; Riprap stonepaver and rock-slinger, including placing of sacked concrete and/or sand (wet or dry) and gabions and similar type; Rotary scarifier or multiple head concrete chipping scarifier; Roto and Ditch Witch; Rototiller; Sandblaster, pot, gun, nozzle operators; Signalling and rigging; Tank cleaner; Tree climber; Turbo blaster; Vibrascreed, bull float in connection with laborers' work; Vibrator; Hazardous waste worker (lead removal); Asbestos and mold removal worker

GROUP 1-a: Joy drill model TWM-2A; Gardner-Denver model DH143 and similar type drills; Track driller; Jack leg driller; Wagon driller; Mechanical drillers, all types regardless of type or method of power; Mechanical pipe layers, all types regardless of type or method of power; Blaster and powder; All work of loading, placing and blasting of all powder and explosives of whatever type regardless of method used for such loading and placing; High scalars (including drilling of same); Tree topper; Bit grinder

GROUP 1-b: Sewer cleaners shall receive \$4.00 per day above Group 1 wage rates. "Sewer cleaner" means any worker who handles or comes in contact with raw sewage in small diameter sewers. Those who work inside recently active, large diameter sewers, and all recently active sewer manholes shall receive \$5.00 per day above Group 1 wage rates.

GROUP 1-c: Burning and welding in connection with laborers' work; Synthetic thermoplastics and similar type welding

GROUP 1-d: Maintenance and repair track and road beds. All employees performing work covered herein shall receive \$ .25 per hour above their regular rate for all work performed on underground structures not specifically covered herein. This paragraph shall not be construed to apply to work below ground level in open cut. It shall apply to cut and cover work of subway construction after the temporary cover has been placed.

GROUP 1-e: Work on and/or in bell hole footings and shafts thereof, and work on and in deep footings. (A deep footing is a hole 15 feet or more in depth.) In the event the depth of the footing is unknown at the commencement of excavation, and the final depth exceeds 15 feet, the deep footing wage rate would apply to all employees for each and every day worked on or in the excavation of the footing from the date of inception.

GROUP 1-f: Wire winding machine in connection with guniting or shot crete

GROUP 2: Asphalt shoveler; Cement dumper and handling dry cement or gypsum; Choke-setter and rigger (clearing work); Concrete bucket dumper and chute; Concrete chipping and grinding; Concrete laborer (wet or dry); Driller tender, chuck tender, nipper; Guinea chaser (stake), grout crew; High pressure nozzle, adductor; Hydraulic monitor (over 100 lbs. pressure); Loading and unloading, carrying and hauling of all rods and materials for use in reinforcing concrete construction; Pittsburgh chipper and similar type brush shredders; Sloper; Single foot, hand-held, pneumatic tamper; All pneumatic, air, gas and electric tools not listed in Groups 1 through 1-f; Jacking of pipe - under 12 inches

GROUP 3: Construction laborers, including bridge and general laborer; Dump, load spotter; Flag person; Fire watcher; Fence erector; Guardrail erector; Gardener, horticultural and landscape laborer; Jetting; Limber, brush loader and piler; Pavement marker (button setter); Maintenance, repair track and road beds; Streetcar and railroad construction track laborer; Temporary air and water lines, Victaulic or similar; Tool room attendant (jobsite only)

GROUP 4: Final clean-up work of debris, grounds and building including but not limited to: street cleaner; cleaning and washing windows; brick cleaner (jobsite only); material cleaner (jobsite only). The classification "material cleaner" is to be utilized under the following conditions:

- A: at demolition site for the salvage of the material.
- B: at the conclusion of a job where the material is to be salvaged and stocked to be reused on another job.
- C: for the cleaning of salvage material at the jobsite or temporary jobsite yard.

The material cleaner classification should not be used in the performance of "form stripping, cleaning and oiling and moving to the next point of erection".

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 GUNITE LABORER CLASSIFICATIONS

GROUP 1: Structural Nozzleman

GROUP 2: Nozzleman, Gunman, Potman, Groundman

GROUP 3: Reboundman

GROUP 4: Guniting laborer

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 WRECKING WORK LABORER CLASSIFICATIONS

GROUP 1: Skilled wrecker (removing and salvaging of sash, windows and materials)

GROUP 2: Semi-skilled wrecker (salvaging of other building materials)

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 LAB00261-015 07/01/2018

	Rates	Fringes
Plasterer tender.....	\$ 32.02	23.00

Work on a swing stage scaffold: \$1.00 per hour additional.

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 LAB00324-004 06/25/2018

NAPA, SOLANO, AND SONOMA, COUNTIES

	Rates	Fringes
LABORER (TRAFFIC CONTROL/LANE CLOSURE)		
Escort Driver, Flag Person..	\$ 29.54	23.65
Traffic Control Person I....	\$ 29.84	23.65
Traffic Control Person II...	\$ 27.34	23.65

TRAFFIC CONTROL PERSON I: Layout of traffic control, crash cushions, construction area and roadside signage.

TRAFFIC CONTROL PERSON II: Installation and removal of temporary/permanent signs, markers, delineators and crash cushions.

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 LAB00324-008 06/25/2018

NAPA, SOLANO, AND SONOMA COUNTIES

	Rates	Fringes
Tunnel and Shaft Laborers:		
GROUP 1.....	\$ 37.82	24.11
GROUP 2.....	\$ 37.59	24.11
GROUP 3.....	\$ 37.34	24.11
GROUP 4.....	\$ 36.89	24.11
GROUP 5.....	\$ 36.35	24.11
Shotcrete Specialist.....	\$ 38.34	24.11

TUNNEL AND SHAFT CLASSIFICATIONS

GROUP 1: Diamond driller; Groundmen; Guniting and shotcrete nozzlemen

GROUP 2: Rodmen; Shaft work & raise (below actual or excavated ground level)

GROUP 3: Bit grinder; Blaster, driller, powdermen, heading; Cherry pickermen - where car is lifted; Concrete finisher in tunnel; Concrete screedman; Grout pumpman and potman; Guniting & shotcrete gunman & potman; Headermen; High pressure nozzleman; Miner - tunnel, including top and bottom man on shaft and raise work; Nipper; Nozzleman on slick line; Sandblaster - potman, Robotic Shotcrete Placer, Segment Erector, Tunnel Muck Hauler, Steel Form raiser and setter; Timberman, retimberman (wood or steel or substitute materials therefore); Tugger (for tunnel laborer work); Cable tender; Chuck tender; Powderman - primer house

GROUP 4: Vibrator operator, pavement breaker; Bull gang - muckers, trackmen; Concrete crew - includes rodding and spreading, Dumpmen (any method)

GROUP 5: Grout crew; Reboundman; Swamper/ Brakeman

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LAB00324-010 07/01/2018

SOLANO AND SONOMA COUNTIES

	Rates	Fringes
LABORER		
Mason Tender-Brick.....	\$ 31.45	22.20

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LAB00324-013 06/25/2018

NAPA, SOLANO, AND SONOMA COUNTIES

	Rates	Fringes
LABORER (CONSTRUCTION CRAFT LABORERS - AREA B:)		
Construction Specialist		
Group.....	\$ 30.49	23.20
GROUP 1.....	\$ 29.79	23.20
GROUP 1-a.....	\$ 30.01	23.20
GROUP 1-c.....	\$ 29.84	23.20
GROUP 1-e.....	\$ 30.34	23.20
GROUP 1-f.....	\$ 29.37	23.20
GROUP 2.....	\$ 29.64	23.20
GROUP 3.....	\$ 29.54	23.20
GROUP 4.....	\$ 23.23	23.20

See groups 1-b and 1-d under laborer classifications.

LABORER (GARDENERS, HORTICULTURAL & LANDSCAPE LABORERS - AREA B:)		
(1) New Construction.....	\$ 29.54	23.20
(2) Establishment Warranty Period.....	\$ 23.23	23.20
LABORER (GUNITE - AREA B:)		
GROUP 1.....	\$ 29.75	22.31
GROUP 2.....	\$ 29.25	22.31
GROUP 3.....	\$ 28.66	22.31
GROUP 4.....	\$ 28.54	22.31
LABORER (WRECKING - AREA B:)		
GROUP 1.....	\$ 29.79	23.20
GROUP 2.....	\$ 29.64	23.20

FOOTNOTES:

Laborers working off or with or from bos'n chairs, swinging scaffolds, belts shall receive \$0.25 per hour above the applicable wage rate. This shall not apply to workers entitled to receive the wage rate set forth in Group 1-a below.

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LABORER CLASSIFICATIONS

CONSTRUCTION SPECIALIST GROUP: Asphalt ironer and raker; Chainsaw; Laser beam in connection with laborers' work; Cast-in- place manhole form setter; Pressure pipelayer; Davis trencher - 300 or similar type (and all small trenchers); Blaster; Diamond driller; Multiple unit drill; Hydraulic drill

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voids; Pavement breaker and spader, including tool grinder; Perma curb; Pipelayer (including grade checking in connection with pipelaying); Precast-manhole setter; Pressure pipe tester; Post hole digger, air, gas and electric; Power broom sweeper; Power tampers of all types (except as shown in Group 2); Ram set gun and stud gun; Riprap stonepaver and rock-slinger, including placing of sacked concrete and/or sand (wet or dry) and gabions and similar type; Rotary scarifier or multiple head concrete chipping scarifier; Roto and Ditch Witch; Rototiller; Sandblaster, pot, gun, nozzle operators; Signalling and rigging; Tank cleaner; Tree climber; Turbo blaster; Vibrascreed, bull float in connection with laborers' work; Vibrator; Hazardous waste worker (lead removal); Asbestos and mold removal worker

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GROUP 4: Final clean-up work of debris, grounds and building including but not limited to: street cleaner; cleaning and washing windows; brick cleaner (jobsite only); material cleaner (jobsite only). The classification "material cleaner" is to be utilized under the following conditions:

A: at demolition site for the salvage of the material.

B: at the conclusion of a job where the material is to be salvaged and stocked to be reused on another job.

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The material cleaner classification should not be used in the performance of ""form stripping, cleaning and oiling and moving to the next point of erection"".

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GUNITE LABORER CLASSIFICATIONS

GROUP 1: Structural Nozzleman

GROUP 2: Nozzleman, Gunman, Potman, Groundman

GROUP 3: Reboundman

GROUP 4: Gunite laborer  
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WRECKING WORK LABORER CLASSIFICATIONS

GROUP 1: Skilled wrecker (removing and salvaging of sash, windows and materials)

GROUP 2: Semi-skilled wrecker (salvaging of other building materials)  
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LAB00324-019 07/01/2018

	Rates	Fringes
Plasterer tender.....	\$ 32.02	23.00
Work on a swing stage scaffold: \$1.00 per hour additional.		

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PAIN0016-004 01/01/2021

MARIN, NAPA, SOLANO & SONOMA COUNTIES

	Rates	Fringes
Painters:.....	\$ 45.22	25.48

PREMIUMS:  
EXOTIC MATERIALS - \$1.25 additional per hour.  
SPRAY WORK: - \$0.50 additional per hour.  
INDUSTRIAL PAINTING - \$0.25 additional per hour  
[Work on industrial buildings used for the manufacture and processing of goods for sale or service; steel construction (bridges), stacks, towers, tanks, and similar structures]

HIGH WORK:  
over 50 feet - \$2.00 per hour additional  
100 to 180 feet - \$4.00 per hour additional  
Over 180 feet - \$6.00 per hour additional  
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PAIN0016-005 06/01/2020

ALPINE, BUTTE, COLUSA, EL DORADO (west of the Sierra Nevada Mountains), GLENN, LASSEN (west of Hwy. 395, excluding Honey Lake); MARIN, MODOC, NAPA, NEVADA (west of the Sierra Nevada Mountains), PLACER (west of the Sierra Nevada Mountains), PLUMAS, SACRAMENTO, SHASTA, SIERRA (west of the Sierra Nevada Mountains), SISKIYOU, SOLANO, SONOMA, SUTTER, TEHAMA, TRINITY, YOLO AND YUBA COUNTIES

	Rates	Fringes
DRYWALL FINISHER/TAPER.....	\$ 47.38	25.99

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PAIN0016-007 01/01/2019

ALPINE, AMADOR, BUTTE, COLUSA, EL DORADO (west of the Sierra Nevada Mountains), GLENN, LASSEN (west of Highway 395, excluding Honey Lake), MODOC, NEVADA (west of the Sierra Nevada Mountains), PLACER (west of the Sierra Nevada Mountains), PLUMAS, SACRAMENTO, SHASTA, SIERRA (west of the Sierra Nevada Mountains), SISKIYOU, SUTTER, TEHAMA, TRINITY, YOLO & YUBA COUNTIES

	Rates	Fringes
Painters:.....	\$ 33.68	20.24

SPRAY/SANDBLAST: \$0.50 additional per hour.  
 EXOTIC MATERIALS: \$1.00 additional per hour.  
 HIGH TIME: Over 50 ft above ground or water level \$2.00 additional per hour. 100 to 180 ft above ground or water level \$4.00 additional per hour. Over 180 ft above ground or water level \$6.00 additional per hour.

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 PAIN0016-008 01/01/2019

MARIN, NAPA, SOLANO AND SONOMA COUNTIES

	Rates	Fringes
SOFT FLOOR LAYER.....	\$ 48.60	27.43

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 PAIN0169-004 07/01/2020

MARIN , NAPA & SONOMA COUNTIES; SOLANO COUNTY (west of a line defined as follows: Hwy. 80 corridor beginning at the City of Fairfield, including Travis Air Force Base and Suisun City; going north of Manakas Corner Rd., continue north on Suisun Valley Rd. to the Napa County line; Hwy. 80 corridor south on Grizzly Island Rd. to the Grizzly Island Management area)

	Rates	Fringes
GLAZIER.....	\$ 52.17	30.55

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 \* PAIN0567-001 07/01/2020

EL DORADO COUNTY (east of the Sierra Nevada Mountains); LASSEN COUNTY (east of Highway 395, beginning at Stacey and including Honey Lake); NEVADA COUNTY (east of the Sierra Nevada Mountains); PLACER COUNTY (east of the Sierra Nevada Mountains); AND SIERRA COUNTY (east of the Sierra Nevada Mountains)

	Rates	Fringes
Painters:		
Brush and Roller.....	\$ 29.80	13.44
Spray Painter & Paperhanger.	\$ 31.29	13.44

PREMIUMS:  
 Special Coatings (Brush), and Sandblasting = \$0.50/hr  
 Special Coatings (Spray), and Steeplejack = \$1.00/hr  
 Special Coating Spray Steel = \$1.25/hr  
 Swing Stage = \$2.00/hr

\*A special coating is a coating that requires the mixing of 2 or more products.

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 PAIN0567-007 07/01/2020

EL DORADO COUNTY (east of the Sierra Nevada Mountains); LASSEN COUNTY (east of Highway 395, beginning at Stacey and including Honey Lake); NEVADA COUNTY (east of the Sierra Nevada Mountains); PLACER COUNTY (east of the Sierra Nevada Mountains) AND SIERRA COUNTY (east of the Sierra Nevada Mountains)

	Rates	Fringes
SOFT FLOOR LAYER.....	\$ 31.01	15.48

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 PAIN0567-010 07/01/2020

EL DORADO COUNTY (east of the Sierra Nevada Mountains); LASSEN COUNTY (east of Highway 395, beginning at Stacey and including Honey Lake); NEVADA COUNTY (east of the Sierra Nevada Mountains); PLACER COUNTY (east of the Sierra Nevada Mountains); AND SIERRA COUNTY (east of the Sierra Nevada Mountains)

	Rates	Fringes
Drywall		
(1) Taper.....	\$ 35.20	14.02
(2) Steeplejack - Taper, over 40 ft with open space below.....	\$ 36.70	14.02

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 PAIN0767-004 07/01/2020

ALPINE, AMADOR, BUTTE, COLUSA, EL DORADO, GLENN, LASSEN, MODOC, NEVADA, PLACER, PLUMAS, SACRAMENTO, SHASTA, SIERRA, SISKIYOU, SOLANO (Remainder), SUTTER, TEHAMA, TRINITY, YOLO, YUBA

	Rates	Fringes
GLAZIER.....	\$ 40.61	30.76

PAID HOLIDAYS: New Year's Day, Martin Luther King, Jr. Day, President's Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, and Christmas Day.

Employee required to wear a body harness shall receive \$1.50 per hour above the basic hourly rate at any elevation.

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PAIN1176-001 07/01/2020

HIGHWAY IMPROVEMENT

	Rates	Fringes
Parking Lot Striping/Highway Marking:		
GROUP 1.....	\$ 38.48	16.88
GROUP 2.....	\$ 32.71	16.88
GROUP 3.....	\$ 33.09	16.88

CLASSIFICATIONS

GROUP 1: Striper: Layout and application of painted traffic stripes and marking; hot thermo plastic; tape, traffic stripes and markings

GROUP 2: Gamecourt & Playground Installer

GROUP 3: Protective Coating, Pavement Sealing

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PAIN1237-001 06/01/2020

ALPINE; COLUSA; EL DORADO (west of the Sierra Nevada Mountains); GLENN; LASSEN (west of Highway 395, beginning at Stacey and including Honey Lake); MODOC; NEVADA (west of the Sierra Nevada Mountains); PLACER (west of the Sierra Nevada Mountains); PLUMAS; SACRAMENTO; SHASTA; SIERRA (west of the Sierra Nevada Mountains); SISKIYOU; SUTTER; TEHAMA; TRINITY; YOLO AND YUBA COUNTIES

	Rates	Fringes
SOFT FLOOR LAYER.....	\$ 39.61	22.59

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PLAS0300-003 07/01/2018

	Rates	Fringes
PLASTERER		
AREA 295: Alpine, Amador, Butte, Colusa, El Dorado, Glenn, Lassen, Modoc, Nevada, Placer, Plumas, Sacramento, Shasta, Sierra, Siskiyou, Solano, Sutter, Tehema, Trinity, Yolo & Yuba Counties.....	\$ 32.70	31.68
AREA 355: Marin.....	\$ 36.73	31.68
AREA 355: Napa & Sonoma Counties.....	\$ 32.70	31.68

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PLAS0300-005 07/01/2017

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER...	\$ 33.49	23.67

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PLUM0038-002 07/01/2020

MARIN AND SONOMA COUNTIES

	Rates	Fringes
PLUMBER (Plumber, Steamfitter, Refrigeration Fitter)		
(1) Work on wooden frame		



structures 5 stories or less excluding high-rise buildings and commercial work such as hospitals, prisons, hotels, schools, casinos, wastewater treatment plants, and research facilities as well as refrigeration pipefitting, service and repair work - MARKET  
 RECOVERY RATE.....\$ 64.86 43.54  
 (2) All other work - NEW  
 CONSTRUCTION RATE.....\$ 76.30 45.27

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 PLUM0038-006 07/01/2019

MARIN & SONOMA COUNTIES

	Rates	Fringes
Landscape/Irrigation Fitter (Underground/Utility Fitter).....	\$ 63.04	31.48

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 PLUM0228-001 01/01/2021

BUTTE, COLUSA, GLENN, LASSEN, MODOC, PLUMAS, SHASTA, SIERRA, SISKIYOU, SUTTER, TEHAMA, TRINITY & YUBA COUNTIES

	Rates	Fringes
PLUMBER.....	\$ 42.00	35.14

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 PLUM0343-001 07/01/2020

NAPA AND SOLANO COUNTIES

	Rates	Fringes
PLUMBER/PIPEFITTER		
Light Commercial.....	\$ 30.85	20.40
All Other Work.....	\$ 54.00	38.74

DEFINITION OF LIGHT COMMERCIAL:  
 Work shall include strip shopping centers, office buildings, schools and other commercial structures which the total plumbing bid does not exceed Two Hundred and Fifty Thousand (\$250,000) and the total heating and cooling does not exceed Two Hundred Fifty Thousand (\$250,000); or Any projects bid in phases shall not qualify unless the total project is less than Two Hundred Fifty Thousand (\$250,000) for the plumbing bid; and Two Hundred Fifty Thousand (\$250,000) for the heating and cooling bid. Excluded are hospitals, jails, institutions and industrial projects, regardless size of the project

FOOTNOTES: While fitting galvanized material: \$.75 per hour additional. Work from trusses, temporary staging, unguarded structures 35' from the ground or water: \$.75 per hour additional. Work from swinging scaffolds, boatswains chairs or similar devices: \$.75 per hour additional.

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 PLUM0350-001 08/01/2019

EL DORADO COUNTY (Lake Tahoe area only); NEVADA COUNTY (Lake Tahoe area only); AND PLACER COUNTY (Lake Tahoe area only)

	Rates	Fringes
PLUMBER/PIPEFITTER.....	\$ 45.84	13.81

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 PLUM0355-001 07/01/2020

ALPINE, AMADOR, BUTTE, COLUSA, EL DORADO, GLENN, LASSEN, MODOC, NAPA, NEVADA, PLACER, PLUMAS, SACRAMENTO, SHASTA, SIERRA, SISKIYOU, SOLANO, SUTTER, TEHAMA, TRINITY, YOLO, AND YUBA COUNTIES

	Rates	Fringes
Underground Utility Worker /Landscape Fitter.....	\$ 29.90	16.30

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 PLUM0442-003 07/01/2020

AMADOR (South of San Joaquin River) and ALPINE COUNTIES

	Rates	Fringes
PLUMBER.....	\$ 45.50	31.89
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PLUM0447-001 07/01/2020		

AMADOR (north of San Joaquin River), EL DORADO (excluding Lake Tahoe area), NEVADA (excluding Lake Tahoe area); PLACER (excluding Lake Tahoe area), SACRAMENTO AND YOLO COUNTIES

	Rates	Fringes
PLUMBER/PIPEFITTER		
Journeyman.....	\$ 54.37	25.75
Light Commercial Work.....	\$ 36.23	17.72
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ROOF0081-006 08/01/2020		

MARIN, NAPA, SOLANO AND SONOMA COUNTIES

	Rates	Fringes
Roofer.....	\$ 44.62	19.36
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ROOF0081-007 08/01/2020		

ALPINE, BUTTE, COLUSA, EL DORADO, GLENN, LASSEN, MODOC, NEVADA, PLACER, PLUMAS, SACRAMENTO, SHASTA, SIERRA, SISKIYOU, SUTTER, TEHAMA, TRINITY, YOLO, AND YUBA COUNTIES

	Rates	Fringes
Roofer.....	\$ 39.73	19.11
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SFCA0483-003 01/01/2021		

MARIN, NAPA, SOLANO AND SONOMA COUNTIES

	Rates	Fringes
SPRINKLER FITTER (Fire Sprinklers).....	\$ 67.99	32.85
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* SFCA0669-003 04/01/2021		

ALPINE, BUTTE, COLUSA, EL DORADO, GLENN, LASSEN, MODOC, NEVADA, PLACER, PLUMAS, SACRAMENTO, SHASTA, SIERRA, SISKIYOU, SUTTER, TEHAMA, TRINITY, YOLO AND YUBA COUNTIES

	Rates	Fringes
SPRINKLER FITTER.....	\$ 42.34	26.29
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SHEE0104-006 06/29/2020		

MARIN, NAPA, SOLANO SONOMA & TRINITY COUNTIES

	Rates	Fringes
Sheet Metal Worker		
Mechanical Contracts		
\$200,000 or less.....	\$ 55.92	45.29
All other work.....	\$ 64.06	46.83
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SHEE0104-009 07/01/2020		

AMADOR, COLUSA, EL DORADO, NEVADA, PLACER, SACRAMENTO, SUTTER, YOLO AND YUBA COUNTIES

	Rates	Fringes
SHEET METAL WORKER.....	\$ 46.60	40.21
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SHEE0104-010 07/01/2020		

ALPINE COUNTY

	Rates	Fringes
SHEET METAL WORKER.....	\$ 43.50	37.42
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SHEE0104-011 07/01/2020		

BUTTE, COLUSA, EL DORADO, GLENN, LASSEN, MODOC, NEVADA, PLACER,  
 PLUMAS, SACRAMENTO, SHASTA, SIERRA, SISKIYOU, SUTTER, TEHAMA,  
 YOLO AND YUBA COUNTIES

	Rates	Fringes
Sheet Metal Worker (Metal decking and siding only).....	\$ 44.45	35.55
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SHEE0104-014 07/01/2020		

MARIN, NAPA, SOLANO, SONOMA AND TRINITY COUNTIES

	Rates	Fringes
SHEET METAL WORKER (Metal Decking and Siding only).....	\$ 44.45	35.55
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SHEE0104-019 07/01/2020		

BUTTE, GLENN, LASSEN, MODOC, PLUMAS, SHASTA, SIERRA, SISKIYOU  
 AND TEHAMA COUNTIES

	Rates	Fringes
SHEET METAL WORKER		
Mechanical Jobs \$200,000 & under.....	\$ 35.16	35.88
Mechanical Jobs over \$200,000.....	\$ 46.60	40.21
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* TEAM0094-001 07/01/2019		

	Rates	Fringes
Truck drivers:		
GROUP 1.....	\$ 32.80	29.19
GROUP 2.....	\$ 33.10	29.19
GROUP 3.....	\$ 33.40	29.19
GROUP 4.....	\$ 33.75	29.19
GROUP 5.....	\$ 34.10	29.19

FOOTNOTES:

Articulated dump truck; Bulk cement spreader (with or without auger); Dumpcrete truck; Skid truck (debris box); Dry pre-batch concrete mix trucks; Dumpster or similar type; Slurry truck: Use dump truck yardage rate.  
 Heater planer; Asphalt burner; Scarifier burner; Industrial lift truck (mechanical tailgate); Utility and clean-up truck: Use appropriate rate for the power unit or the equipment utilized.

TRUCK DRIVER CLASSIFICATIONS

GROUP 1: Dump trucks, under 6 yds.; Single unit flat rack (2-axle unit); Nipper truck (when flat rack truck is used appropriate flat rack shall apply); Concrete pump truck (when flat rack truck is used appropriate flat rack shall apply); Concrete pump machine; Fork lift and lift jitneys; Fuel and/or grease truck driver or fuel person; Snow buggy; Steam cleaning; Bus or personhaul driver; Escort or pilot car driver; Pickup truck; Teamster oiler/greaser and/or serviceperson; Hook tender (including loading and unloading); Team driver; Tool room attendant (refineries)

GROUP 2: Dump trucks, 6 yds. and under 8 yds.; Transit mixers, through 10 yds.; Water trucks, under 7,000 gals.; Jetting trucks, under 7,000 gals.; Single-unit flat rack (3-axle unit); Highbed heavy duty transport; Scissor truck; Rubber-tired muck car (not self-loaded); Rubber-tired truck jumbo; Winch truck and "A" frame drivers; Combination winch truck with hoist; Road oil truck or bootperson; Buggymobile; Ross, Hyster and similar straddle carriers; Small rubber-tired tractor

GROUP 3: Dump trucks, 8 yds. and including 24 yds.; Transit mixers, over 10 yds.; Water trucks, 7,000 gals. and over; Jetting trucks, 7,000 gals. and over; Vacuum trucks under 7500 gals. Trucks towing tilt bed or flat bed pull trailers; Lowbed heavy duty transport; Heavy duty transport tiller person; Self-propelled street sweeper with self-contained refuse bin; Boom truck - hydro-lift or Swedish type extension or retracting crane; P.B. or similar type self-loading truck; Tire repairperson; Combination bootperson and road oiler; Dry distribution truck (A bootperson when employed on such equipment, shall receive

the rate specified for the classification of road oil trucks or bootperson); Ammonia nitrate distributor, driver and mixer; Snow Go and/or plow

GROUP 4: Dump trucks, over 25 yds. and under 65 yds.; Water pulls - DW 10's, 20's, 21's and other similar equipment when pulling Aqua/pak or water tank trailers; Helicopter pilots (when transporting men and materials); Lowbed Heavy Duty Transport up to including 7 axles; DW10's, 20's, 21's and other similar Cat type, Terra Cobra, LeTourneau Pulls, Tournorocker, Euclid and similar type equipment when pulling fuel and/or grease tank trailers or other miscellaneous trailers; Vacuum Trucks 7500 gals and over and truck repairman

GROUP 5: Dump trucks, 65 yds. and over; Holland hauler; Low bed Heavy Duty Transport over 7 axles

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WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at [www.dol.gov/whd/govcontracts](http://www.dol.gov/whd/govcontracts).

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

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The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

#### Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

#### Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and

non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

#### Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

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#### WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- \* an existing published wage determination
- \* a survey underlying a wage determination
- \* a Wage and Hour Division letter setting forth a position on a wage determination matter
- \* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations  
Wage and Hour Division  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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**APPENDIX C – HOUSING AND URBAN DEVELOPMENT  
SUPPLEMENTARY CONDITIONS - FORM HUD-92554N**

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## SUPPLEMENTARY CONDITIONS TO THE CONSTRUCTION CONTRACT

U.S. Department of Housing  
and Urban Development  
Office of Housing

OMB Approval No. 2502-0598  
(Exp. 9/30/2021)

Public Reporting Burden for this collection of information is estimated to average 0.2 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Response to this request for information is required in order to receive the benefits to be derived. This agency may not collect this information, and you are not required to complete this form unless it displays a currently valid OMB control number. While no assurance of confidentiality is pledged to respondents, HUD generally discloses this data only in response to a Freedom of Information Act request.

**Warning:** Federal law provides that anyone who knowingly or willfully submits (or causes to submit) a document containing any false, fictitious, misleading, or fraudulent statement/certification or entry may be criminally prosecuted and may incur civil administrative liability. Penalties upon conviction can include a fine and imprisonment, as provided pursuant to applicable law, which includes, but is not limited to, 18 U.S.C. 1001, 1010, 1012; 31 U.S.C. 3729, 3802, 24 C.F.R. Parts 25, 28 and 30, and 2 C.F.R. Parts 180 and 2424.

### Article 1: Labor Standards

**A. Applicability.** The Project or program to which the construction work covered by this Contract pertains is being assisted or insured by the United States of America, and the following Federal Labor Standards Provisions are included in this Contract or related instrument pursuant to the provisions applicable to such Federal assistance or insurance. Any statute or regulation contained herein shall also include any subsequent amendment or successor statute or regulation. The terms of this Supplementary Conditions to the Construction Contract (HUD-92554M) takes precedence over all provisions of the "General Conditions of the Contract for Construction" (AIA Document A201) inconsistent with said Supplementary Conditions.

**B. Minimum Wages.** Pursuant to Section 212 of the National Housing Act, as amended, 12 U.S.C. 1715c, the minimum wage provisions contained in this paragraph B do not apply to those projects with Security Instruments insured under Section 221(h)(1) designed for less than 9 families and they do not apply to those projects with Security Instruments insured under either Section 220 or 233 designed for less than 12 families.

1. (i) All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the Project) shall be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1 (b)(2) of the Davis-Bacon Act (40 U.S.C. 3141(2)(B)(ii)) on behalf of laborers or mechanics are considered wages paid to such laborers or

mechanics, subject to the provisions of 29 CFR 5.5(a)(1)(iv); also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: *Provided*, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under 29 CFR 5.5(a)(1)(ii)) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the Contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(ii) (a) Any class of laborers or mechanics that is not listed in the wage determination and that is to be employed under this Contract shall be classified in conformance with the wage determination. HUD shall approve an additional classification and wage rate and fringe benefits only when the following criteria have been met:

- (1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and
- (2) The classification is utilized in the area by the construction industry; and
- (3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(b) If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and HUD or its designee agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by HUD or its designee to the Administrator of the Wage and Hour Division, U.S. Department of Labor, Washington, D.C. 20210 (“**Administrator**”). The Administrator, or an authorized representative, shall approve, modify, or disapprove every additional classification action within thirty (30) days of receipt and so advise HUD or its designee or shall notify HUD or its designee within the thirty (30) day period that additional time is necessary.

(c) In the event the Contractor, the laborers or mechanics to be employed in the classification or their representatives and HUD or its designee do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), HUD or its designee shall refer the questions, including the views of all interested parties and the recommendation of HUD or its designee, to the Administrator for determination. The Administrator, or an authorized representative, shall issue a determination within thirty (30) days of receipt and so advise HUD or its



designee or shall notify HUD or its designee within the thirty (30) day period that additional time is necessary.

(d) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs B.1.(ii)(b) or (c) of this Article, shall be paid to all workers performing work in the classification under this Contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the Contract for a class of laborers or mechanics includes a fringe benefit that is not expressed as an hourly rate, the Contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, *Provided*, That the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

**2. Withholding.** HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the Contractor under this Contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees and helpers, employed by the Contractor or any subcontractor the full amount of wages required by the Contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the Project), all or part of the wages required by the Contract, HUD or its designee may, after written notice to the Contractor, sponsor, applicant, or Owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased. HUD or its designee may, after written notice to the Contractor, disburse such amounts withheld for and on account of the Contractor or subcontractor to the respective employees to whom they are due.

### **3. Payrolls, records, and certifications.**

(i) Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the Project). Such records shall contain the name, address, and social security number of each such worker, his or her correct

classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in Section 1 (b)(2)(B) of the Davis-Bacon Act (40 U.S.C. 3141(2)(B)(ii))), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section 1 (b)(2)(B) of the Davis-Bacon Act (40 U.S.C. 3141(2)(B)(ii)), the Contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(a) The Contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to HUD or its designee if the agency is a party to the Contract, but if the agency is not such a party, the Contractor shall submit the payrolls to the applicant, sponsor, or Owner, as the case may be, for transmission to HUD or its designee. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired, whether paper (Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/whd/forms/wh347.pdf> or its successor site), or electronically pursuant to Program Obligations. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to HUD or its designee if the agency is a party to the Contract, but if the agency is not such a party, the Contractor will submit the payrolls to the applicant sponsor, or Owner, as the case may be, for transmission to HUD or its designee, the Contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this subparagraph for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to HUD or its designee.

(b) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the Contractor or subcontractor or his or her agent who pays or

supervises the payment of the persons employed under the Contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under 29 CFR 5.5(a)(3)(ii), the appropriate information is being maintained under 29 CFR 5.5(a)(3)(i), and that such information is correct and complete.

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the Contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR Part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the Contract.

(c) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by subparagraph B.3.(ii)(b) of this Article.

(d) The falsification of any of the above certifications may subject the Contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Sections 3801 et seq of Title 31 of the United States Code.

(iii) The Contractor or subcontractor shall make the records required under subparagraph B.3.(i) of this Article available for inspection, copying, or transcription by authorized representatives of HUD or its designee or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the Contractor or subcontractor fails to submit the required records or to make them available, HUD or its designee may, after written notice to the Contractor, sponsor, applicant, or Owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

#### **4. Apprentices and Trainees.**

(i) **Apprentices.** Apprentices shall be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship, or with a State Apprenticeship Agency recognized by such Office, or if a person is employed in his or her first ninety (90) days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the

program, but who has been certified by the Office of Apprenticeship, or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the Contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where the Contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship, or a State Apprenticeship Agency recognized by such Office, withdraws approval of an apprenticeship program, the Contractor shall no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) **Trainees.** Except as provided in 29 CFR 5.16, trainees shall not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman's hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on

the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the Contractor shall no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) **Equal employment opportunity.** The utilization of apprentices, trainees and journeymen under 29 CFR Part 5 shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

**5. Compliance with Copeland Act Requirements.** The Contractor shall comply with the requirements of 29 CFR Part 3, which are incorporated by reference in this Contract.

**6. Subcontracts.** The Contractor or subcontractor shall insert in any subcontracts the clauses set forth in subparagraphs 1 through 10 of this paragraph B and such other clauses as HUD or its designee may by appropriate instructions require, and a copy of the applicable prevailing wage determination, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all Contract clauses referenced in this subparagraph.

**7. Contract termination and debarment.** A breach of the Contract clauses in 29 CFR 5.5 may be grounds for termination of the Contract, and for debarment as a contractor or a subcontractor as provided in 29 CFR 5.12.

**8. Compliance with Davis-Bacon and Related Act Requirements.** All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this Contract.

**9. Disputes concerning labor standards.** Disputes arising out of the labor standards provisions of this Contract shall not be subject to the general disputes clause of this Contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the Contractor (or any of its subcontractors) and HUD or its designee, the U.S. Department of Labor, or the employees or their representatives.

**10. Certification of Eligibility.**

(i) By entering into this Contract, the Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of Section 3(a) of the Davis-Bacon Act (40 U.S.C. 3144(b)(2)) or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(ii) No part of this Contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of Section 3(a) of the Davis-Bacon Act (40 U.S.C. 3144(b)(2)) or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001. Additionally, U.S. Criminal Code, Section 1010, Title 18, U.S.C., "Federal Housing Administration transactions", provides in part: "Whoever, for the purpose of . . . influencing in any way the action of such Department . . . makes, passes, utters or publishes any statement, knowing the same to be false . . . shall be fined under this title or imprisoned not more than two years, or both."

### **C. Contract Work Hours and Safety Standards Act.**

**1. Applicability and Definitions.** This paragraph C of Article 1 is applicable only if a direct form of federal assistance is involved, such as Section 8, Section 202/811 Capital Advance, grants etc., and is applicable only where the prime contract is in an amount greater than \$100,000. As used in this paragraph C, the terms "laborers" and "mechanics" include watchmen and guards.

**2. Overtime requirements.** No contractor or subcontractor contracting for any part of the Contract work that may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty (40) hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty (40) hours in such workweek.

**3. Violation; liability for unpaid wages; liquidated damages.** In the event of any violation of the immediately preceding subparagraph C.2, the Contractor and any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, the Contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory) for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of such subparagraph, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty (40) hours without payment of the overtime wages required by the clause set forth in such subparagraph.

**4. Withholding for unpaid wages and liquidated damages.** HUD or its designee shall, upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from any moneys payable on account of work performed by the Contractor or subcontractor under any such contract, or under any other Federal contract with the same prime contractor, or under any other Federally-assisted contract subject to the Contract Work

Hours and Safety Standards Act which is held by the same prime contractor such sums as may be determined to be necessary to satisfy any liabilities of such Contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in subparagraph 3 of this paragraph C.

5. **Subcontracts.** The Contractor or subcontractor shall insert in any subcontracts the clauses set forth in subparagraphs 1 through 5 of this paragraph C and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in such subparagraphs 1 through 5.

#### **D. Certification.**

For projects with Security Instruments insured under the National Housing Act, as amended, that are subject to paragraph B of this Article 1, the Contractor is required to execute the Contractor's Prevailing Wage Certificate within HUD-92448 as a condition precedent to insurance by HUD of the Loan, or an advance thereof, made or to be made by the Lender in connection with the construction of the Project.

### **Article 2: Equal Employment Opportunity**

A. **Applicability.** This Article 2 applies to any contract for construction work, or modification thereof, as defined in the regulations of the Secretary of Labor at 41 CFR Chapter 60, which is paid for in whole or in part with funds obtained from the Federal Government or borrowed on the credit of the Federal Government pursuant to a grant, contract, loan insurance, or guarantee, or undertaken pursuant to any Federal program involving such grant, contract, loan, insurance, or guarantee.

B. The Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, disability, or national origin. The Contractor shall take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, disability or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training including apprenticeship. The Contractor agrees to post in conspicuous places available to employees and applicants for employment notices to be provided setting forth the provisions of this nondiscrimination clause.

C. The Contractor shall, in all solicitations or advertisements for employees placed by or on behalf of the Contractor state that all qualified applicants shall receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, disability, or national origin.

D. The Contractor shall send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding a

notice to be provided advising the said labor union or workers representatives of the Contractor's commitments hereunder, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

E. The Contractor shall comply with all provisions of Executive Order 11246 of September 24, 1965 and of the rules, regulations, and relevant orders of the Secretary of Labor.

F. The Contractor shall furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and shall permit access to its books, records, and accounts by the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

G. In the event of the Contractor's noncompliance with the nondiscrimination clauses of this Contract or with any of the said rules, regulations, or orders, this Contract may be canceled, terminated, or suspended in whole or in part and Contractor may be declared ineligible for further government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulations or order of the Secretary of Labor, or as otherwise provided by law.

H. The Contractor shall include the provisions of paragraphs A through H of this Article 2 in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order 11246 of September 24, 1965, so that such provisions shall be binding upon each subcontractor or vendor. The Contractor shall take such action with respect to any subcontract or purchase order as HUD or the Secretary of Labor may direct as a means of enforcing such provisions, including sanctions for noncompliance. *Provided, however,* that in the event the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by HUD or the Secretary of Labor, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

### **Article 3: Equal Opportunity for Businesses and Lower Income Persons Located Within the Project Area**

A. This Article 3 is applicable to projects covered by Section 3, as defined in 24 CFR Part 135.

B. The work to be performed under this Contract is on a project assisted under a program providing Federal financial assistance from HUD and is subject to the requirements of Section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 1701u. Section 3 requires that to the greatest extent feasible opportunities for training and employment be given to low and very-low income residents of the unit of local government or the metropolitan area (or non-metropolitan county) as determined by HUD in which the Project is located and contracts for work in connection with the Project be awarded to business concerns which are located in, or owned in substantial part by persons residing in the same metropolitan area (or non-metropolitan county) as the Project.



#### **Article 4: Health and Safety**

A. This Article 4 is applicable only where the prime contract is in an amount greater than \$100,000.

B. No laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his or her health and safety as determined under construction safety and health standards promulgated by the Secretary of Labor by regulation.

C. The Contractor shall comply with all regulations issued by the Secretary of Labor pursuant to 29 CFR Part 1926, and failure to comply may result in imposition of sanctions pursuant to the Contract Work Hours and Safety Standards Act, 40 USC 3701 et seq.

D. The Contractor shall include the provisions of this Article 4 in every subcontract so that such provisions shall be binding on each subcontractor. The Contractor shall take such action with respect to any subcontract as HUD or the Secretary of Labor shall direct as a means of enforcing such provisions.

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**APPENDIX D – WEEKLY PAYROLL CERTIFICATION FORM**

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**APPENDIX E – NOTICE OF AFFIRMATIVE ACTION**

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STANDARD SOLICITATION FOR BID LANGUAGE: CONSTRUCTION OVER \$10,000  
 (The following notice shall be included in and shall be a part of all solicitations for offers and bids on all federal and federally-assisted construction contracts or subcontracts in excess of \$10,000 to be performed in geographical areas designated by the Secretary of Labor.)

## NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY (EXECUTIVE ORDER 11246)

1. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.
2. The goals and timetables for minority and women participation, **expressed in percentage terms** for the Contractor's aggregate workforce **in each trade** on all construction work in **the covered areas** are as follows:

TIMETABLE:

From award date MM/DD/YY until Project completion MM/DD/YY	GOALS FOR <u>MINORITY</u> PARTICIPATION IN EACH TRADE	GOALS FOR <u>WOMEN</u> PARTICIPATION IN EACH TRADE
Trade	County: Nevada 14.3%	6.9%
Trade	County: Nevada 14.3%	6.9%
Trade	County: Nevada 14.3%	6.9%
Trade	County: Nevada 14.3%	6.9%

These goals are applicable to all the Contractor's construction work (whether or not it is federal or federally assisted) performed in the covered area. If the Contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the Contractor also is subject to the goals for both its federally involved and non-federally-involved construction.

The Contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a), and its efforts to meet the goals. The hours of minority and women employment and training must be substantially

uniform through the length of the contract, and in each trade, and the Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or women employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The Contractor shall provide written notification to the:
  - Director of the Office of Federal Contract Compliance Programs, U.S. Department of Labor,
  - within 10 working days of award of any construction contract or subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation.
  - The notification shall list the name, address, and telephone number of the contractor or subcontractor; estimated starting and completion dates of the contract; and the geographical area in which the contract is to be performed.
  
4. As used in this notice, and in the contract resulting from this solicitation, the "covered area" is **(insert description of the geographical areas where the contract is to be performed giving the state, county, and city, if any).**

**State of California; County: Nevada**

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**APPENDIX F – FEDERAL EQUAL OPPORTUNITY SPECIFICATIONS**

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**STANDARD EQUAL OPPORTUNITY CLAUSE**  
**(CONSTRUCTION OVER \$10,000)**

The Contractor hereby agrees that it will incorporate or cause to be incorporated into any contract for construction work, or modification thereof, as defined in the regulations of the Secretary of Labor at 41 CFR Chapter 60, which is paid for in whole or in part with funds obtained from the Federal Government or borrowed on the credit of the Federal Government pursuant to a grant, contract, loan insurance, or guarantee, or undertaken pursuant to any Federal program involving such grant, contract, loan, insurance, or guarantee, the following equal opportunity clause:

**During the performance of this contract, the Contractor agrees as follows:**

1. The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, national origin or disabilities. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.
2. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, national origin or disabilities.
3. The Contractor will send to each labor union or representative of workers with which the Contractor has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the Contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
4. The Contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

5. The Contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to its books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
6. In the event of the Contractor's noncompliance with the discrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rules, regulations, or orders of the Secretary of Labor, or as otherwise provided by law.
7. The Contractor will include the portion of the sentence immediately preceding paragraph "1" and the provisions of paragraphs "1" through "7" in every contract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 504 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each contractor or vendor. The Contractor will take such action with respect to any contract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance; provided, however, that in the event a Contractor becomes involved in, or is threatened with, litigation with a contractor or vendor as a result of such direction by the administering agency, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

The Contractor further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it participates in federally- assisted construction work; provided that if the Contractor so participating is a State or local government, the above equal opportunity clause is not applicable to any agency, instrumentality, or subdivision of such government which does not participate in work on or under the contract.

The Contractor agrees that it will assist and cooperate actively with the administering agency and the Secretary of Labor in obtaining the compliance of Contractors and subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish the Department and HUD and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the administering agency in the discharge of the agency's primary responsibility for securing compliance.

The Contractor further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated eligibility for, government contracts and federally-assisted construction contracts, pursuant to the Executive Order and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the administering agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive Order. In addition, the Contractor agrees that if it fails or refuses to comply with these undertakings, the administering agency may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this funding commitment (contract, loan, grant, insurance, guarantee); refrain from extending any further assistance to the applicant under the program with respect to which the failure or refund occurred until satisfactory assurance of future compliance has been received from such Contractor; and refer the case to the Department of Justice for appropriate legal proceedings.

**STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY**  
**CONSTRUCTION CONTRACT SPECIFICATIONS**  
**(CONSTRUCTION OVER \$10,000)**

**1. As used in these specifications:**

- a. "Covered area" means the geographical area described in the solicitation from which this contract resulted.
- b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority.
- c. "Employer identification number" means the federal social security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.
- d. "Minority" includes:
  - (1) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin).
  - (2) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish culture or origin, regardless of race).
  - (3) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, southeast Asia, the Indian subcontinent or the Pacific Islands).
  - (4) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

**2. Whenever the Contractor, or any subcontractor at any tier, contracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the notice which contains the applicable goals for minority and women participation and which is set forth in the solicitations from which this contract resulted.**

- 3. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U. S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the plan area (including goals and timetables) shall be in accordance with that plan for those trades which have unions participating in the plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or subcontractor participating in an approved plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the plan in each trade in which it has employees. The overall good faith performance by other contractors or subcontractors toward a goal in an approved plan does not excuse any covered contractor's or subcontractor's failure to take good faith efforts to achieve the plan's goals and timetables.**
- 4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7.a. through 7.p. of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and women utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered construction contractors performing construction work in geographical areas where they do not have a federal or federally-assisted construction contract shall apply the minority and women goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form and such notices may be obtained from any Office of Federal Contract Compliance Programs or from federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.**
- 5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.**
- 6. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the contractor during the training period, and the contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.**
- 7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results**

from its actions. The Contractor shall document these efforts fully and shall implement affirmative action steps at least as extensive as the following:

- a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority individuals or women working at such sites or in such facilities.
- b. Establish and maintain a current list of minority and women recruitment sources, provide written notification to minority and women recruitment sources and to community organizations when the contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.
- c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or women referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the contractor by the union or, if referred, not employed by the contractor, this shall be documented in the file with the reason therefore, along with whatever additional actions the contractor may have taken.
- d. Provide immediate written notification to the Director when the union or unions with which the contractor has a collective bargaining agreement has not referred to the contractor a minority person or woman sent by the Contractor or when the contractor has other information that the union referral process has impeded the contractor's efforts to meet its obligations.
- e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the contractor's employment needs, especially those programs funded or approved by the Department of Labor. The contractor shall provide notice of these programs to the sources compiled under 7b. above.
- f. Disseminate the contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in

any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

- g. Review at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions, including specific review of these items with on-site supervisory personnel such as superintendents, general foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.
- h. Disseminate the contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and women-focused news media, and providing written notification to and discussing the contractor's EEO policy with other contractors and subcontractors with whom the contractor does or anticipates doing business.
- l. Direct its recruitment efforts, both oral and written, to minority, women and community organizations, to schools with minority- and women-students and to minority and women-recruitment and training organizations serving the contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.
- j. Encourage present minority and women employees to recruit other minority persons and women and, where reasonable, provide after-school summer and vacation employment to minority and female youth both on the site and in other areas of a contractor's workforce.
- k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60.3.
- l. Conduct at least annually, an inventory and evaluation at least of all minority and women personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., or other advancement opportunities.

- m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel- and employment-related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.
- n. Ensure that all facilities and company activities are non-segregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.
- o. Document and maintain a record of all solicitations of offers for subcontracts from minority- and women-owned construction companies, contractors and suppliers, including circulation of solicitations to minority- and women-focused Contractor associations and other business associations.
- p. Conduct a review, at least annually, of all supervisors' adherence to and performance under the contractor's EEO policies and affirmative action obligations.

**8. Contractors are encouraged to participate in voluntary associations which** assist in fulfilling one or more of their affirmative action obligations (7.a. through 7.p.). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7.a. through 7.p. of these specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the contractor's minority and women workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

**9. A single goal for minorities and a separate single goal for women have** been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both men and women, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).



10. **The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex or national origin.**
11. **The Contractor shall not enter into any subcontract with any person or firm debarred from government contracts pursuant to Executive Order 11246.**
12. **The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.**
13. **The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.**
14. **The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company's EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the government and to keep records. Records shall at least include for each employee the name, address, telephone number, construction trade, union affiliation, if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, Contractors shall not be required to maintain separate records.**
15. **Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area resident (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).**
16. **By the submission of this bid, the bidder, offeror, applicant, or subcontractor certifies that he/she does not maintain or provide for his/her employees any segregated facility at any of his/her establishments, and that he/she does not permit employees to perform their services at any location under**

his/her control where segregated facilities are maintained. He/she certifies further that he/she will not maintain or provide for employees any segregated facilities at any of his/her establishments, and he/she will not permit employees to perform their services at any location under his/her control where segregated facilities are maintained. The bidder, offeror, applicant, or subcontractor agrees that a breach of this certification is a violation of the Equal Opportunity Clause of this contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms, and other storage or dressing areas,\* transportation and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, or national origin, habits, local custom, or otherwise. He/she further agrees that (except where he/she has obtained identical certifications from proposed subcontractors for specific time periods) he/she will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity Clause; that he/she will retain such certifications in his/her files; and that he/she will forward the following notice to such proposed subcontractors (except where proposed subcontractors have submitted identical certifications for specific time periods).

**\*Parking lots, drinking fountains, recreation or entertainment areas.**

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**APPENDIX G – HOUSING AND URBAN DEVELOPMENT SECTION 3 CLAUSE**

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## **SECTION 3 CLAUSE**

- A. The work to be performed under this contract is subject to the requirements of Section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C 1701u (Section 3). The purpose of Section 3 is to ensure that employment and other economic opportunities generated by HUD assistance or HUD-assisted projects covered by Section 3, shall to the greatest extent feasible, be directed to low- and very low-income persons, particularly persons who are recipients of HUD assistance for housing.
- B. The parties to this contract agree to comply with HUD's regulations in 24 CFR Part 135, which implement Section 3. As evidenced by their execution of this contract, the parties to this contract certify that they are under no contractual or other impediment that would prevent them from complying with part 135 regulations.
- C. The contractor agrees to send to each labor organization or representative of workers with which the contractor has a collective bargaining agreement or other understanding, if any, a notice advising the labor organization or workers' representative of the contractor's commitments under this Section 3 clause, and will post copies of the notice in conspicuous places at the work site where both employees and applicants for training and employment positions can see the notice. The notice shall describe the Section 3 preference, shall set forth minimum number and job titles subject to hire, availability of apprenticeship and training positions, the qualifications for each; and the name and location of the person(s) taking applications for each of the positions, and the anticipated date the work shall begin.
- D. The contractor agrees to include this Section 3 clause in every subcontract subject to compliance with regulations in 24 CFR part 135, and agrees to take appropriate action, as provided in an applicable provision of the subcontract or in this Section 3 clause, upon a finding that the subcontractor is in violation of the regulations in 24 CFR part 135. The contractor will not subcontract with any subcontractor where the contractor has notice or knowledge that the subcontractor has been found in violation of the regulations in 24 CFR Part 135.
- E. The contractor will certify that any vacant employment positions, including training positions, that are filled (1) after the contractor is selected but before the contract is executed, and (2) with persons other than those to whom the regulations of 24 CFR part 135 require employment opportunities to be directed, were not filled to circumvent the contractor's obligations under 24 CFR part 135.
- F. Noncompliance with HUD's regulations in 24 CFR Part 135 may result in sanctions, termination of this contract for default, and debarment or suspension from future HUD-assisted contracts.

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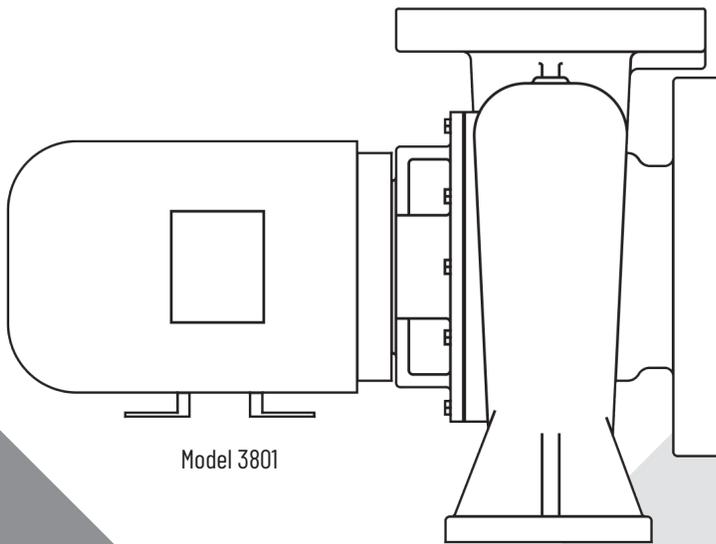
**APPENDIX H – EQUIPMENT MANUALS AND PRODUCT BROCHURES**

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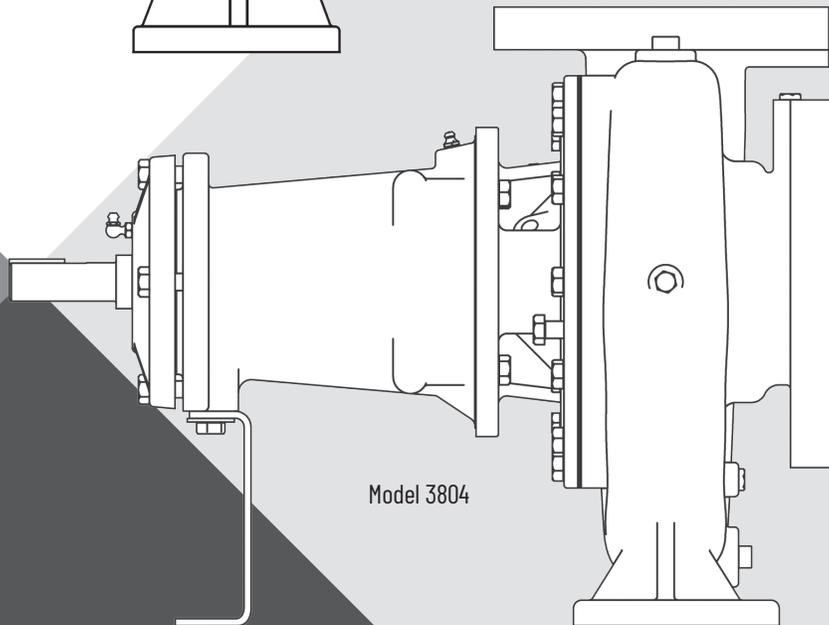


## END SUCTION PUMPS

3801 ♦ 3804



Model 3801



Model 3804

# INSTALLATION AND OPERATION MANUAL

[pentair.com](http://pentair.com)

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# GENERAL INFORMATION

**NOTICE to the installer:** Please make sure you provide this manual to the owner of the equipment or to the responsible party who maintains the system.

This manual contains important information for the safe use of Pentair Aurora\* 3800 End Suction Pumps. Read this manual completely before using this product. DO NOT DISCARD OR LOSE THIS MANUAL.

Pentair Aurora 3804 Series pumps are frame mounted. They feature high efficiency, rugged construction, foot mounted volutes with back pullout power frames, center drop out spacer couplings (optional) and regreasable ball bearings. The pump's stainless steel fitted construction is suitable for unheated domestic, fresh water, condensate, boiler feed water, pressure boosting and hydronic coiling and/or heating.

## SAFETY

### Explanation of Designations

**⚠ DANGER** warns about hazards that will cause serious personal injury, death or major property damage if ignored.

**⚠ WARNING** warns about hazards that can cause serious personal injury, death or major property damage if ignored.

**⚠ CAUTION** warns about hazards that will or can cause minor personal injury or property damage if ignored.

**NOTICE:** indicates special instructions which are important but not related to hazards.

### General Guidelines

- These instructions must always be kept close to the product's operating location or directly with the product.
- These instructions should be read prior to installing, operating, using and maintaining the equipment in any region worldwide. The equipment must not be put into service until all the conditions relating to safety, noted in the instructions, have been met.
- The product must not be operated beyond the parameters specified for the application. If there is any doubt as to the suitability of the product for the application intended, contact Pentair Aurora Customer Service for advice, quoting the serial number.

### Personnel Qualification and Training

All personnel involved in the operation, installation, inspection and maintenance of the unit must be qualified to carry out the work involved. If the personnel in question do not already possess the necessary knowledge and skill, appropriate training and instruction must be provided. It is responsibility of owner or operator to provide training for all personnel involved in the operation, installation, inspection and maintenance of the equipment.

It is recommended that proper documentation of personnel should be maintained by the responsible part(ies).

### Personnel Safety Actions

#### CALIFORNIA PROPOSITION 65 WARNING:

**⚠ WARNING** This product and related accessories contain chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

**⚠ DANGER** Never do maintenance work when the unit is connected to power. Always follow lock out – tag out procedures when working on equipment that may turn on.

**⚠ WARNING** Guards must not be removed while the pump is operational. Always follow lock out – tag out procedures when working on equipment that may turn on.

**⚠ WARNING** Isolate the pump from any fluid in the system and then drain any remaining fluid from the pump casing before proceeding with dismantling the pump. The appropriate safety precautions should be taken where the pumped liquids are hazardous.

**⚠ WARNING Fluoroelastomers (when fitted) :**When a pump has experienced temperatures over 135°C (275°F), partial decomposition of fluoroelastomers (example: Viton™) will occur. In this condition these are extremely dangerous and skin contact must be avoided.

**⚠ WARNING Handling components:** Many precision parts have sharp corners, thus wearing of appropriate safety gloves and equipment is required when handling these components. To lift heavy pieces above 25 kg (55 lb.) use a crane appropriate for the mass and in accordance with current local regulations.

**⚠ WARNING Thermal shock:** Rapid changes in the temperature of the liquid within the pump can cause thermal shock, which can result in damage or breakage of components and should be avoided.

**⚠ WARNING** Never apply heat to remove impeller.

**⚠ WARNING Noise & vibration levels:** Pentair Aurora 3800 End Suction pumps have been designed to meet the noise and vibration levels as per the Hydraulic Institute (HI) standard 9.6.4.

### Electrical Safety

**⚠ WARNING Sudden start-up hazard:** Disconnect and lock out power source before servicing. Failure to follow these instructions could result in serious personal injury, death or property damage.

**⚠ WARNING Electrical shock hazard:** All electrical connections are to be made by a qualified electrician in accordance with all codes and ordinances. Failure to follow these instructions could result in serious personal injury, death or property damage.

**⚠ WARNING Electrical overload hazard:** Ensure all motors have properly sized overload protection. Failure to follow these instructions could result in serious personal injury, death or property damage.

### High Temperature Safety

**⚠ WARNING Hot surface hazard:** If pumping hot water, ensure guards or proper insulation is installed to protect against skin contact with hot piping or pump components. Failure to follow these instructions could result in serious personal injury, death or property damage.

**⚠ WARNING Spraying water hazard:** When servicing pump, replace all gaskets and seals. Do not reuse old gaskets or seals. Failure to follow these instructions could result in serious personal injury, death or property damage.

### High Pressure Safety

**⚠ WARNING High pressure hazard:** All the pumps are designed for specific maximum working pressure. Do not exceed this pressure. Install properly sized pressure relief valves in system. Failure to follow these instructions could result in serious personal injury, death or property damage.

**⚠ WARNING Expansion hazard:** Water expands when heated. Install properly sized thermal expansion tanks and relief valves. Failure to follow these instructions could result in serious personal injury, death or property damage.



## TRANSPORT AND STORAGE

### ▲ CAUTION

- Ensure correct lubrication. See "Lubrication" on Page 13 for lubrication instruction.
- Start the pump at reduced speed or with the discharge valve partly opened. This is recommended to minimize the risk of overloading and damaging the pump motor at full or zero flow. Pumps may be started with the valve further open only on installations where this situation cannot occur. The pump discharge control valve may need to be adjusted to comply with the duty following the run-up process. See "Pump Operation" on page 13.
- Suction valves should be fully open when pump is running.
- Do not run the pump continuously outside the allowable operating region.
- Operating at a flow rate higher than normal or at a flow rate with no backpressure on the pump may overload the motor and cause cavitation. Low flow rates may cause a reduction in pump/bearing life, overheating of the pump, instability, and cavitation/vibration. Running the pump at a flow rate below the manufacturer's recommended minimum flow rate can cause damage.
- Handling, transportation and installation of this equipment should only be undertaken by trained personnel with proper use of lifting equipment. See "Uncrating and Lifting" Figures 1A and 1B for reference.
- Only water or other suitable HVAC media may be circulated through the use of these pumps. Circulation of hazardous, corrosive or flammable liquids by using these pumps is strictly prohibited.
- DO NOT turn on the electrical supply to the pump until all the plumbing connections and commissioning procedure have been completed.
- The pump must not be operated dry without fluid.
- Pipe systems must be installed in such a manner so there is no pipe strain and no piping loads are being transferred on pump flanges.
- Ensure that the motor installation instruction manual has been followed for determining the proper terminal connections so that correct pump rotation is obtained.

## TRANSPORT AND STORAGE

### Transport and Handling Requirements

The pump has been prepared for shipment at the factory in such a way as to minimize potential damage due to handling and transport. The equipment should not be subjected to excessive G-forces during the handling or transport. For large, heavy, rotating components, the manufacturer shall consider and adapt a means to restrict the movement of the rotating assembly to prevent damage to the bearings during transport. All such means shall be removed before installation.

### Uncrating and Lifting

Pump is fastened securely to the crate before shipment. The pump should be removed from the crate carefully by using proper tools and equipment. After removing from crate make sure that all the components are in good condition and have been received as mentioned in the packing list. Report immediately to the concerned person/department if any component is missing or received in a damaged condition. Extreme care must be taken while handling the pump set. Slings and hooks should be used in such a manner, so that while lifting the pump is not exposed to stresses.

While lifting the pump or pump set (with or without driver) suitable lifting equipment of adequate capacity should be used. The unit should be unloaded and handled by lifting equally. Entire pump with base frame should be lifted at four or more points provided in base frame. At each nylon slings, chains, or wire rope to the hooks or clevises for lifting. Ensure that the lift angle of the slings, chains or wire rope is less than 45° from vertical.

▲ CAUTION Do not use lifting lugs on drivers or pumps to lift base plated units; these are only for the individual driver or pump.

Extra care must be taken when lifting base plated pump units without driver because of the unbalanced load that may exist due to the driver not being mounted on the base.

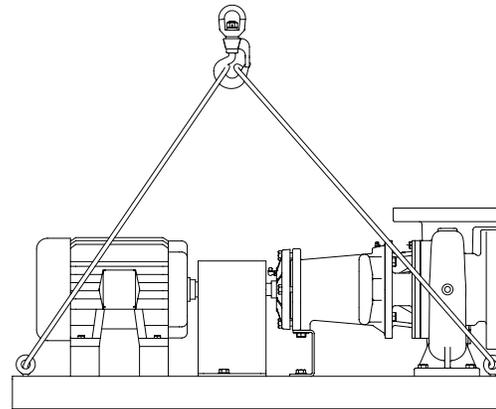


Figure 1A  
Lifting of Pentair Aurora\* 3804 pump assembly

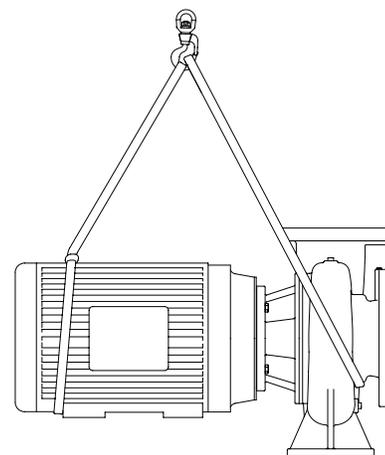


Figure 1B  
Lifting of Pentair Aurora\* 3801 pump assembly

### Receipt, Inspection, and Damage Reporting

Upon receipt of the pump, immediately check for shortages of parts and damages. Prompt reporting to the carrier's agent, with notations made on the freight bill, may expedite resolution by the carrier.

Immediately upon receipt of the pump equipment, check carefully to see that all items have been received and are undamaged. Report any shortage or damage to the transport company handling the shipment and to the equipment manufacturer, noting the extent of damage or shortage on the freight bill and bill of lading. This should be done at once. Do not unpack any more than required to verify that the equipment is complete

## PRODUCT DESCRIPTION

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and undamaged unless installation is to be done immediately. Do not leave the pump unit or any accessories exposed to weather or construction hazards, which may cause damage to the equipment.

### Unpacking

As stated above, do not unpack any more than required to verify that the equipment is complete and undamaged unless installation is to be done immediately. Check all packing material that is to be discarded to verify that no parts or instructions are being accidentally discarded as well. It is best to leave small parts in their shipping container until installation so they do not get misplaced. Make certain that accessories with a pump unit are clearly marked showing which pump unit they are to be used. Clean all parts of dirt, packing materials, and other foreign matter. Clean all non-coated machined surfaces. If the pump is to be installed immediately, then clean all coated machined surfaces too. Remove any rust spots found on the machined surfaces with a fine emery cloth. Clean all threaded connections and any accessory equipment.

### Storage

The standard packaging is suitable for protection during shipment and during covered storage at the jobsite for a short period between installation and start-up. The preservatives applied at the factory have an effective life of two to three months from date of shipment, depending on the severity of the environment in which the equipment is stored.

### Short Term Storage

The pump and equipment, as shipped, have adequate protection for short-term (up to three months) storage in a covered, dry, and ventilated location at the jobsite prior to installation.

- Dry pump internals and spray the liquid end with a water-displacement rust inhibitor.
- Apply a film of compatible lube oil over the water-displacement rust preventative.
- After the pump has been thoroughly drained, cover the pump suction and discharge flanges with full gasket material and blank off these openings with metal blank flanges and a minimum of four bolts. If mechanical seals have been used, then the annular opening between gland plate and shaft should be closed by a removable sealing ring supplied by the original equipment manufacturer to exclude airborne dust. Additionally, all connections in the seal cartridge must be plugged or sealed.
- All exposed painted surfaces should be dry, clean, and free of grease and other contaminants.
- The pump should be covered with a weather-resistant cover of waterproof paper or plastic to prohibit the build-up of dirt and dust accumulations.

### Long Term Storage

All pumps are shop serviced and delivered in a ready to operate condition. If the pump after being delivered is not put into immediate operation, then proper care should be taken so that it operates without failure when put into service. The pump should be kept in a clean and dry area in a horizontal position. Ensure that the following precautions are taken for pumps being stored for more than three months.

- Pump surfaces which are machined and unpainted (e.g. flange ends, feet mounting etc.) and are easily subjected to corrosion must be protected by corrosion resistant coating.
- The pump shaft should be rotated once in a month to avoid locking of rotating assembly. This would also be helpful in uniform distribution of lubrication on bearings.

- Bearings must be lubricated with fresh lubricants when pump is being put into service after a long time.

### Disposal of Packaging Materials

Most of the materials supplied in the pump unit are suitable for recycling. Please conserve our natural resources and recycle these materials.

## PRODUCT DESCRIPTION

### Configuration

Pumps are offered in two models.

- Pentair Aurora\* 3801 close coupled
- Pentair Aurora 3804 frame mounted

Along with above mentioned models, pumps are also offered with following options required and mentioned by customer at the time of placing order.

- With or without flush line
- Oil lube bearings (frame mounted pumps only)
- Type 21 mechanical seal options (required for temperatures over 225°F or 107.2°C)

### Parts

Refer to "Assembly Exploded View" Figures 45 and 46 on Pages 23-24 for listing various parts.

# PUMP INSTALLATION

## INSTALLATION

### Pump Location

- Pentair Aurora\* 3800 End Suction pump must be installed horizontally.
- The pump should be located as close to the liquid source as possible so that the suction line can be short and direct. See Figures 2 and 3 shown below.
- It should be located in a clean, open area, where it is easily accessible for inspection, disassembly and repair. Pumps installed in dark, dirty areas or in cramped locations are often neglected, which can result in premature failure of both the pump and the driver.
- Your pump should be located so that a hoist or crane can be used to move it without interference from piping. This factor is often overlooked in the advance planning stage.
- Install isolating valves on each side of pump so pump maintenance can be performed without draining the system.
- Special mounting requirements may be required if the pump is to be mounted near a noise or vibration sensitive area.
- The pump should be located in an area where moisture from condensation, can be adequately drained off. Moisture dripping on exposed metal or wood can cause rapid deterioration of the area. Also wet floor produces safety hazards.
- Adequate provisions should be made for electrical wiring to the pump motor. A switch and overload protection should be installed near the pump if conditions permit. The electrical conduit should be positioned in such a way as to preclude the possibility of moisture entering the conduit or the motor, and causing short circuits.
- The installation must be evaluated to ensure that the net positive suction head available (NPSHA) meets or exceeds the limits as stated below:
  - 2 ft for building services
  - 5 ft for municipal application
- Outdoor installation will normally provide all of the above mentioned conditions. However, it is recommended to provide a weather shelter for your pump.

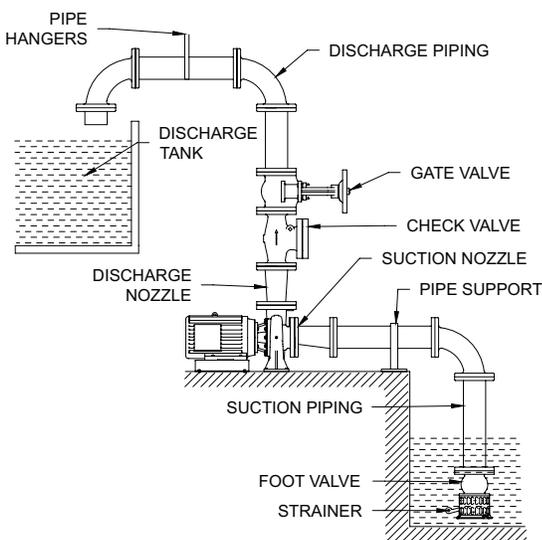


Figure 2  
Recommended location (Short direct suction)

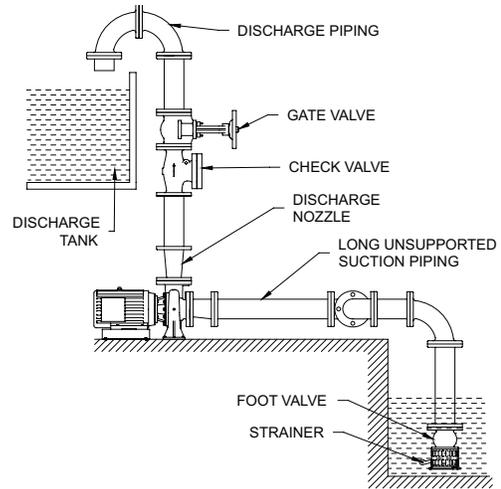


Figure 3  
Unsatisfactory location (Long indirect suction with no support)

### Foundation

The foundation for your pump must be sufficiently rigid to absorb any vibration and stress encountered during pump operation. The mass of the foundation should be sufficient; preferably five times that of the pumping equipment, to form a permanent and rigid support for the baseplate.

A raised foundation of concrete is preferable for most floor mounted pumps. The raised foundation assures a satisfactory base, protects against flooding, simplifies moisture drainage, and facilitates keeping the area clean.

- Your pump should be firmly bolted to the foundation, whether it is a raised concrete base, steelwork wall, or structural member. The mounting bolts or lag screws should be accurately located per the applicable Pentair Aurora dimension sheet.
- Bolt sizing is critical particularly on high-pressure pumps, to adequately restrain reaction forces generated from directional flow change, system transients, and sudden valve closure.

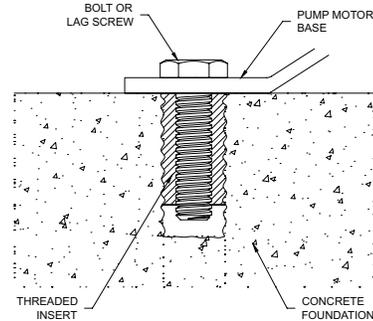


Figure 4  
Typical close coupled pump mounting

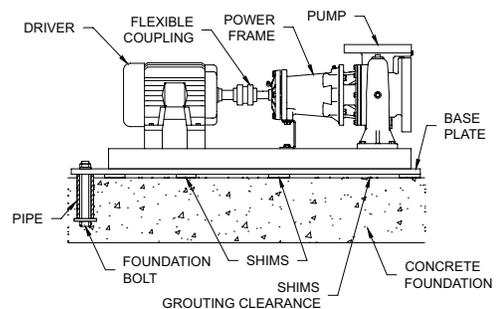


Figure 5  
Typical flexible coupled pump mounting

# PUMP INSTALLATION

- Lag screws or bolts screwed into threaded inserts in the concrete are recommended for mounting close coupled pumps, rather than studs set into concrete (Figure 4 on Page 6). This permits removal of the drive motor without disturbing the pump liquid end or the piping.
- If a large pump is to be mounted on steelwork or other structure, adequate support should be provided to prevent deflection of the structure which could produce excessive strain on the pump casing and piping.

## Setting the Pump

- Check the mounting surfaces of the pump unit and the foundation to make sure they are clean and free of obstructions. Set the pump on the foundation, being careful not to damage the foundation bolts or studs if used.

- Tighten the nuts or bolts finger tight.

**NOTICE:** In close coupled pump assembly make sure the motor (driver) and pump casing are grounded.

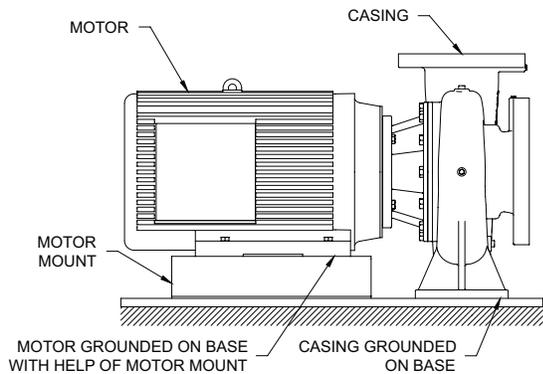


Figure 6  
Setting a close coupled pump

## Seismic Analysis

Please consult factory if the pump is to be installed in seismic zones.

## BASE PLATE

### Leveling The Pump

Pump unit leveling can be done using the suction and discharge nozzles or flanges as reference points. Insertion of a short piece of pipe in the threaded nozzles will facilitate use of a spirit level to determine whether or not the pump unit is leveled in all directions. See Figure 7 shown below.

A spirit level can also be used on the machined faces of the suction and discharge flanges (Figure 8).

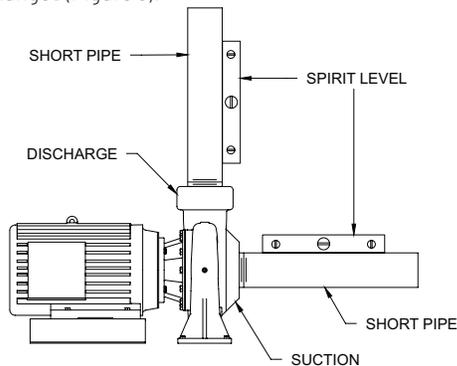


Figure 7  
Leveling pump with spirit level and short lengths of pipe

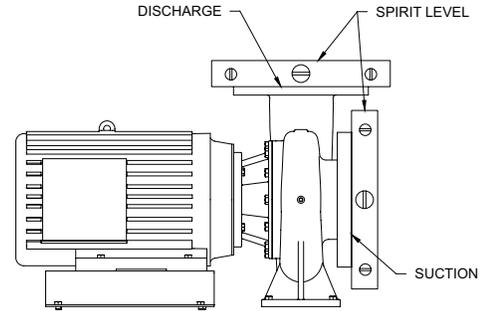


Figure 8

Leveling with spirit level on pump flanges

Leveling the pump can require enough shims to support the base plate near the foundation bolts and at any points of the base plate carrying a substantial weight load. The shims should be large enough to allow a gap of 3/4" to 1-1/2" between the base plate and foundation for grouting.

**NOTICE:** The pump base must be set level to avoid any mechanical difficulties with the pump or motor.

Pentair Aurora\* 3804 pump was properly aligned, if supplied with a motor, at the factory. However, since the pump base is flexible, it may spring and twist during shipment. Do not pipe the pump until it is realigned. Realign the base after piping is completed and after the pump is grouted in and bolted down.

**NOTICE:** It may be necessary to readjust the alignment from time to time while the unit and foundation are new. Realignment may prevent premature bearing failure, excessive vibration or shaft failure.

Ensure that proper hydronic accessories such as pressure relief valves, thermal expansion tanks and flow/pressure control devices are installed in the system. Consult the responsible party for your system to ensure these devices are installed and of the proper size.

## Grouting the Installation

Grouting the base plate prevents lateral movement of the base plate, and improves the vibration absorbing characteristics of the foundation by increasing its mass. A wooden dam should be constructed around the base plate to contain the grout while it is being poured. The dam can be built tight against the base plate, or slightly removed from it as desired. Refer to Figure 9 shown below.

The entire base plate should be completely filled with non-shrinkable type grout. The grout should be puddled frequently to remove any air bubbles from the grout.

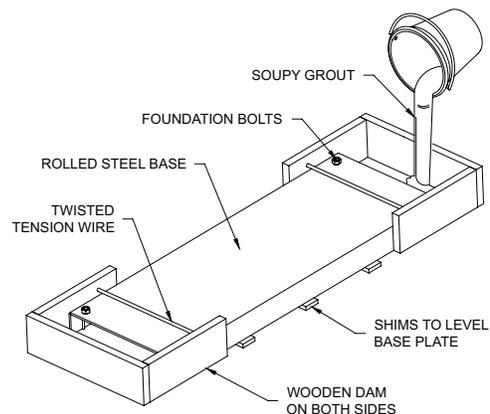


Figure 9

Grouting the base for frame mounted pumps

# PUMP INSTALLATION

## Piping and Connections

Inlet and outlet piping should be anchored, supported, and restrained near the pump to avoid application of forces and moments to the pump in excess. In calculating forces and moments, the weights of the pipe, internal thrust, contained fluid and insulation, as well as thermal expansion and contraction, should be considered. It is recommended that the first section of pipe be installed on the pump flange and then properly supported. Both the suction and discharge piping should be independently supported. The system piping should then be brought into alignment to the first section of pipe attached to the pump before completing the connections to the piping system.

To verify that there is no pipe strain and no piping loads being transmitted to the pump flanges, the flange connections are loosened and the alignment of the piping inspected. The piping to the pump inlet and outlet should be aligned to the pump flanges. The bolts should freely pass through flange with no binding. The alignment of the axis of the flanges should be within a tolerance of 1/2 the radial bolt clearance. Faces of the flanges should be in alignment so that the dimensions between the faces indicate that they are parallel and allow for the insertion of the gasket.

## Suction Piping

The suction piping should be short, but no less than ten pipe diameters in length, and direct with as few elbows and fittings as possible to keep head loss, from friction, at a minimum. However, the suction pipe should provide a minimum uninterrupted length, equal to ten pipe diameters, to the pump suction flange. A horizontal suction line should have a gradual rise to the pump, and pass under any interfering piping. See Figure 10 shown below.

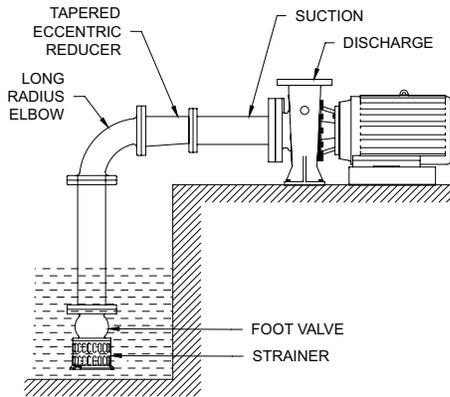


Figure 10

Recommended suction lift piping (Short and direct)

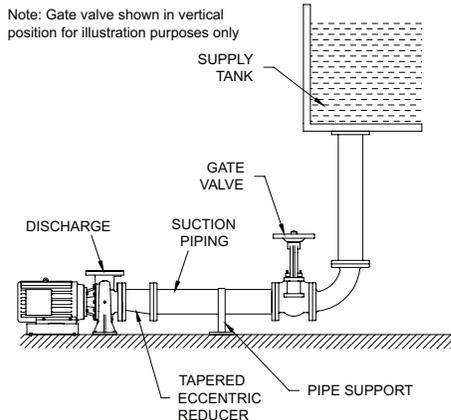


Figure 11

Recommended flooded suction piping (Short and direct)

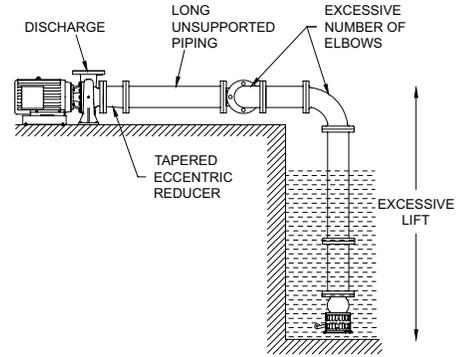


Figure 12

Unsatisfactory suction lift piping (Long and indirect with no support)

## Pipe

The suction pipe diameter should be at least the same diameter as the suction nozzle on the pump, and preferably larger. Use of a smaller diameter pipe will result in loss of head due to friction. All joints must be tight to maintain prime on the pump.

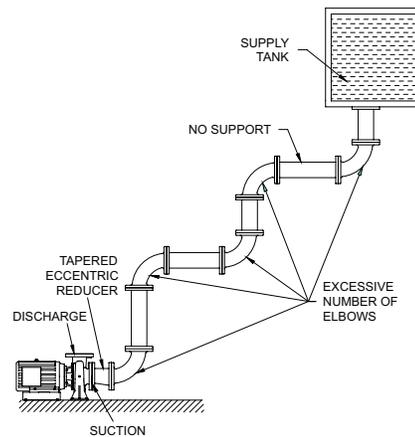


Figure 13

Unsatisfactory flooded suction piping (Long and indirect with no support)

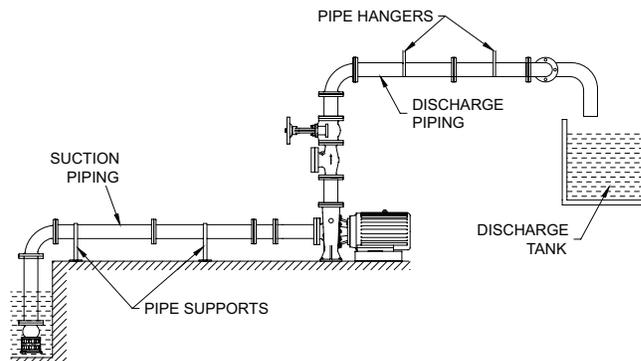


Figure 14

Supporting piping

## Elbows

Long radius elbows should be used in place of standard elbows wherever possible, because of their superior flow characteristics. For instance, head loss in a standard four inch elbow is equivalent to the head loss in a piece of pipe 11 feet long, while the head loss in a long radius elbow is approximately half as much. Elbows should not be used at the suction

# PUMP INSTALLATION

nozzle, but if it is unavoidable, they should be installed in a vertical position. Elbows installed in any position at the suction nozzle have a tendency to distribute the liquid unevenly in the impeller chamber, causing a reduction in capacity, and creating an undesirable thrust condition. See Figures 15, 16A, and 16B shown below.

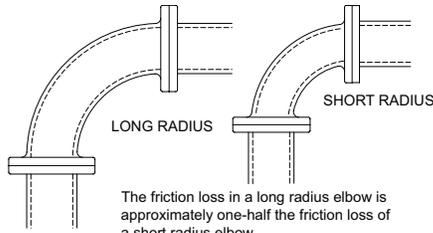


Figure 15  
Long versus short radius elbows

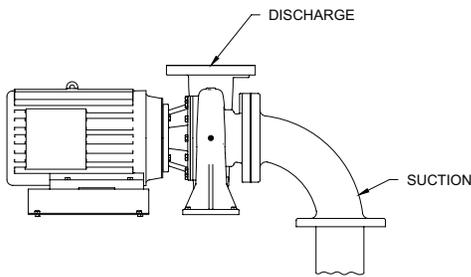


Figure 16A  
Correct elbow installation on suction nozzle

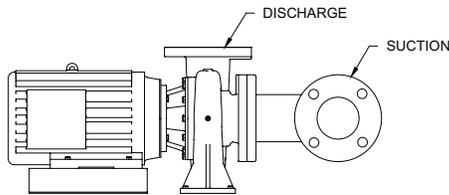


Figure 16B  
Incorrect elbow installation on suction nozzle

## Reducers

Eccentric reducers should be installed directly at the suction nozzle, with the taper at the bottom to prevent air pockets from forming. Straight taper reducers should never be used in a horizontal suction line because of the air pocket that is formed at the leg of the reducer and the pipe. See Figures 17A, 17B, and 18 shown below.

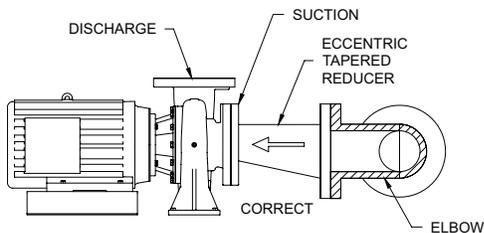


Figure 17A  
Correct Installation of eccentric tapered reducers

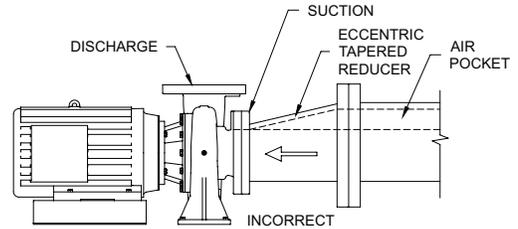
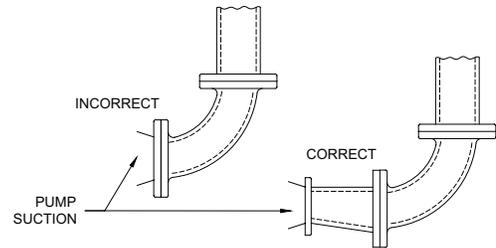


Figure 17B  
Incorrect Installation of eccentric tapered reducers



Spacer between suction and elbow permits equal flow of water to each side of double suction impeller, prevents excessive thrust and resulting wear on bearings, etc.

Figure 18  
Reducer between elbow and pump suction nozzle

## Discharge Piping

Discharge piping should also be short and direct as possible, with few elbows and fittings, to reduce head loss from friction. See Figures 19 and 20 shown below.

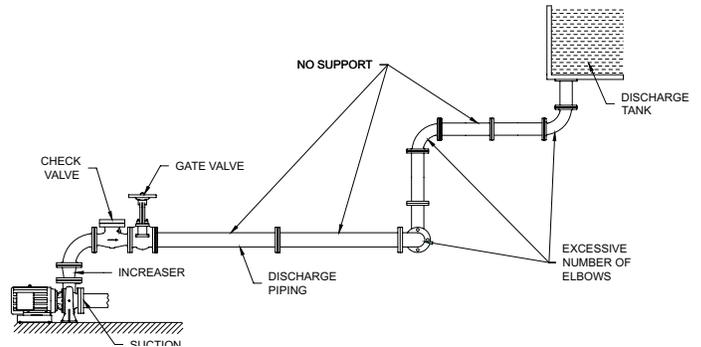


Figure 19  
Unsatisfactory discharge piping  
(Long with excessive elbows and joints)

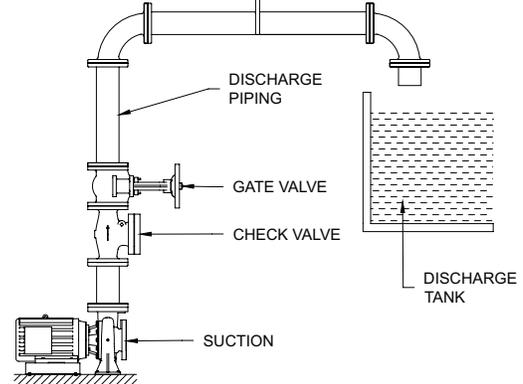


Figure 20  
Recommended discharge piping  
(Short and direct)

# PUMP INSTALLATION

## Pipe

The discharge pipe diameter should be the same as, or larger than, the discharge nozzle diameter. The size of discharge pipe to be used is dependent upon the application. The recommended pipe diameter can be obtained from your nearest Pentair Aurora\* authorized distributor or Customer Service.

## Reducers and Increases

An increaser should be installed at the discharge nozzle if larger diameter discharge piping is used. Straight taper increasers and/or reducers are satisfactory in discharge piping, because air pockets on the discharge side do not affect pump efficiency. See Figure 21 below.

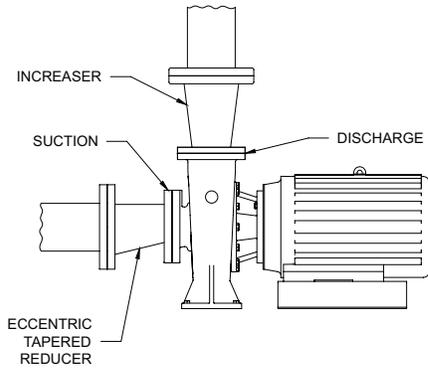


Figure 21  
Reducer and increaser installation

## Valves

Valves are an important part of your installation. They facilitate priming of the pump, and control the volume of the pumped liquid.

## Foot Valves

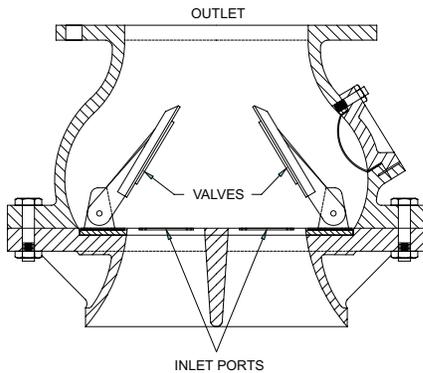


Figure 22  
Foot valve

**Suction Lift:** In suction lift applications where the suction lift is low, a foot valve can be installed to maintain the prime of the pump. A foot valve is essentially a check valve, allowing flow in one direction only, towards the pump. When the pump is shut down, the pressure of the liquid returning to the well causes the valve to close, retaining the liquid in the suction line.

A slow closing check valve should be installed when the static discharge head is high. A foot valve should not be used under these conditions, as failure of the driver would allow the water to rush back rapidly thus causing a heavy water hammer.

Foot valves, when used, should be the flat type rather than multiple spring type. The valve should have a large inlet area, because the

friction loss in the foot valve is high. Install check and foot valve as indicated by arrow to ensure proper installation.

**Flooded Suction:** When the liquid source is above the pump centerline, a flooded suction condition exists and a gate valve is required to shut off the liquid supply for pump inspection and maintenance. The gate valve should be installed with the stem in a horizontal or downward position to prevent formation of an air pocket in the valve.

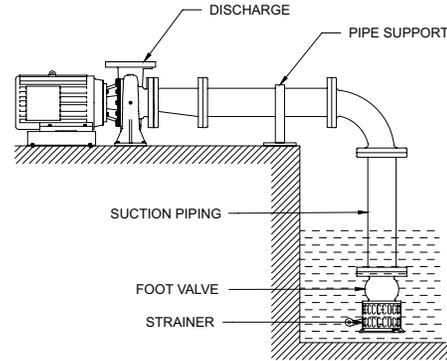


Figure 23  
Foot valve installed with screen

## Discharge Valves

The discharge piping should include a check valve and a gate valve. The check valve should be located between the gate valve and the pump. If an increaser is used in the discharge piping, the increaser should be installed between the pump nozzle and the check valve. The check valve protects against a reverse flow of the liquid if the driver fails. See Figure 24 shown below.

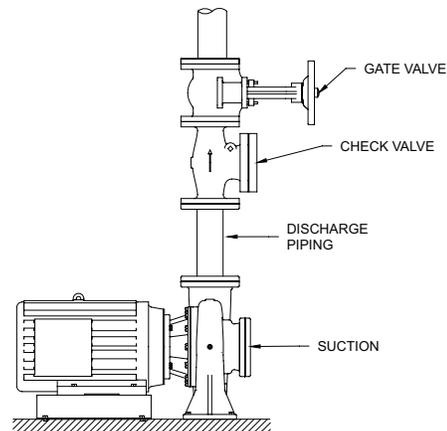


Figure 24  
Gate Valve and Check Valve

# PUMP INSTALLATION

## Air Vent Valves

Vent valves are installed at the high points in the pump casing to allow air or vapor to escape. These valves are used to release trapped air from the pump casing during priming and when pump becomes air bound. See Figure 25 shown below.

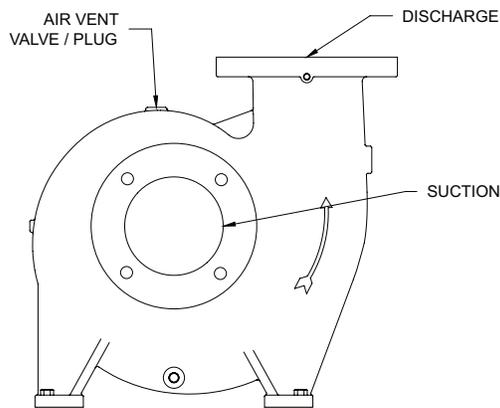


Figure 25  
Air vent valve or plug

## Expansion Joints

Expansion joints are used primarily to prevent transmission of piping strain, caused by thermal expansion and contraction, piping misalignment, pressure changes, or other causes, to the pump casing. They are also used to suppress any noise that may be transmitted through the piping. It is recommended that the flexible metal type of expansion joint be used because rubber expansion joints, have a tendency to deteriorate, making frequent replacement necessary.

If an expansion joint is used, an anchor or a restraining device should be installed between the joint and the pump to prevent objectionable forces from being transmitted to the pump. If an anchor is not installed at this point, a force equal to the area of the expansion joint times the pressure in the pipe is developed and transmitted to the pump. This force may exceed the allowable flange loading and could result in damage to the pump or piping. See Figures 26 and 27 shown below.

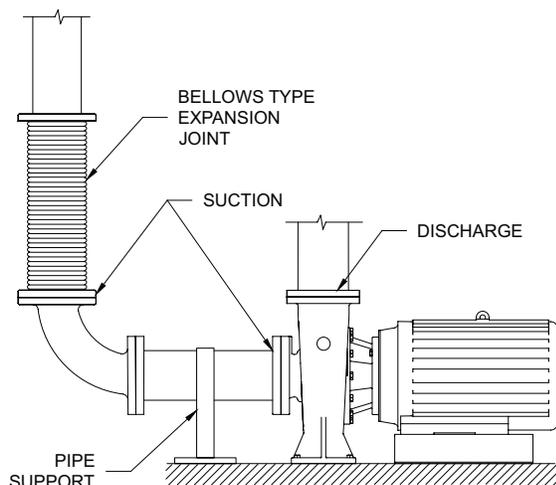


Figure 26  
Expansion joint in suction line

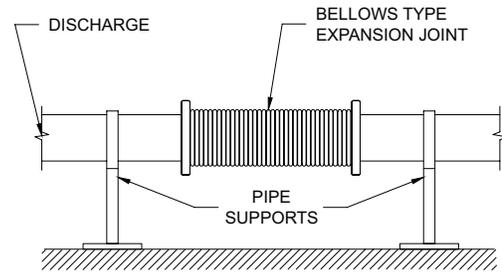


Figure 27  
Expansion joint in discharge piping

## Strainers and Screens

It is important to remove foreign matter that can clog the pump and impair its capacity, or stop it completely. Small particles such as sand, dirt, scale from inside pipe and other extraneous materials can get into the close clearance parts of the pump and cause considerable damage to the parts.

Strainers should be selected to have a total area of holes equal to at least four times the suction pipe area.

In applications where stick, twigs, leaves and other large debris are present, a larger outside screen should be placed around the suction inlet to prevent choking of the strainer. This screen should have sufficient openings so that flow velocity does not exceed two feet per second.

## ALIGNMENT

### General Alignment

Pumps and drivers received from the factory with both machines mounted on a common baseplate are aligned or checked for alignment before shipment. All baseplates are flexible to some extent and, therefore, must not be relied on to maintain the factory alignment. Realignment is necessary after the complete unit has been leveled, the grout has set, foundation bolts have been tightened and the piping has filled with fluid. The alignment must be rechecked after the unit is piped and rechecked periodically.

### SHAFT/COUPLING ALIGNMENT

#### Initial Alignment of Flexible Coupling

A flexible coupling is used to compensate for minor misalignment of the pump and driver shaft and is limited to misalignment due to minor temperature changes.

The pump and driver were accurately aligned at the factory. However, alignment cannot be maintained during shipping and handling. Therefore it will be necessary for you to realign the pump and driver. Flexible couplings are not universal joints. They should not be used to compensate for misalignment of the pump and motor shafts. Their function is to transmit power from the driver to the pump while compensating for thermal expansion and shaft end movement. The coupling faces should be far enough apart so that they do not make contact when the motor shaft is forced to the limit of the bearing clearance toward the pump shaft.

In order to properly align the coupling, you will need a taper gauge or set of feeler gauges, and a straight edge.

There are two types of misalignment encountered with flexible couplings: angular misalignment, in which the shafts are not parallel, and parallel misalignment where the shafts are parallel but not on the same axis.



# PUMP INSTALLATION

To check angular alignment, insert a feeler gauge or taper gauge at any four places 90° apart around the coupling halves. Insert shims under the driver feet until the same reading is obtained at all four check points. The pump and driver will then be in angular alignment.

To check parallel alignment, a straight edge should be held against the edges of the coupling halves at any four places 90° apart around the coupling. The straight edge should be parallel to the pump and driver shafts at all times. Insert shims until the straight edge lies flat against both coupling halves at all four checkpoints. The pump and driver will then be in proper parallel alignment. For more detailed alignment information consult the coupling manufacturer's installation instructions. Refer to Figure 28 shown below.

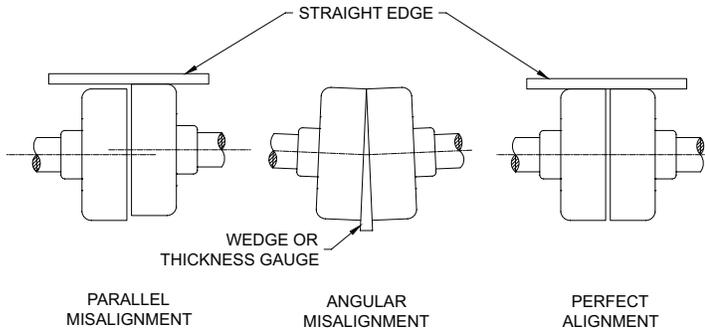


Figure 28  
Flexible coupling alignment piping

## For Fine Alignment, 3500 RPM Operation, For All Other Coupler Types

A dial indicator should be used when greater alignment accuracy is required. Use the following alignment tolerances unless specified otherwise by the coupling manufacturer. On sleeve type couplings make sure there is at least 1/8" end clearance between the sleeve and the two coupling halves.

To check angular misalignments, mount the dial indicator base to the coupling half, and position the dial indicator button on the front or rear face of the opposite coupling half. Set the dial to zero, rotate both coupling halves together, making sure the indicator button always indicates off the same spot. Misalignment values within 0.004 inches TIR per inch of coupler radius is permissible.

To check parallel misalignment, mount the dial indicator base to one coupling half, or shaft and position the dial indicator button on the outside diameter of the opposite coupling half. Set the dial to zero. Rotate both coupling halves together, making sure the indicator button always indicates off the same spot. Misalignment within 0.004 inches TIR is permissible.

## Pipe Alignment

Proper piping alignment is essential before connection is made. Piping alignment should never be achieved by force, as this could produce strain on the piping and the pump casing. Proper supports should be installed for the piping to keep its weight off the pump casing.

When flange bolts are used, line up the piping first, then loosely install flange bolts. Check the piping alignment, and tighten the flange bolts until all bolts are tightened securely. See Figure 29 shown below.

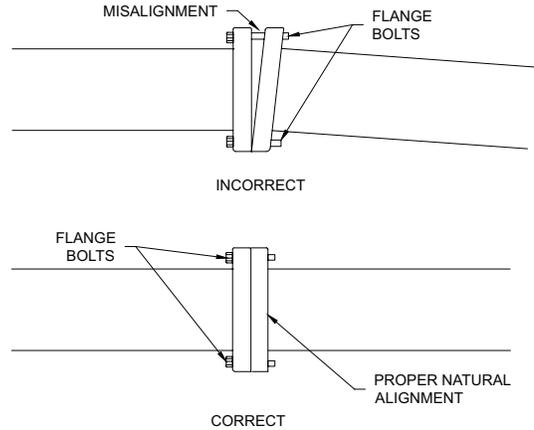


Figure 29  
Pipe alignment

## Air in Piping

One of the most common conditions affecting pump efficiency is the formation of air pockets in the suction line. The air pockets are a result of high points and improper installation of elbows, reducers, and valves in the suction piping. See Figures 30 and 31 shown below and on next page.

The pump seal depend on the liquid being pumped for lubrication with resultant damage to them.

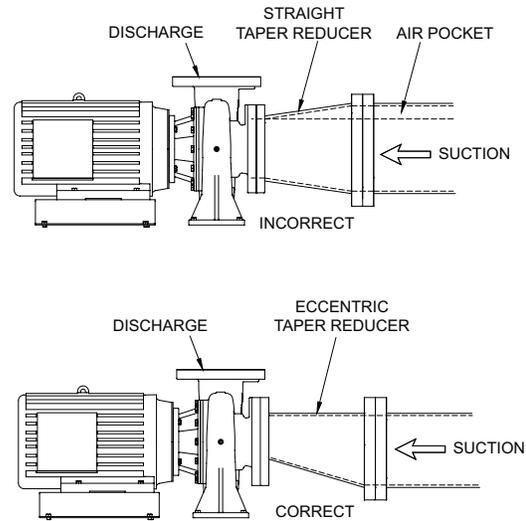


Figure 30  
Air pocket in reducer

# PUMP OPERATION

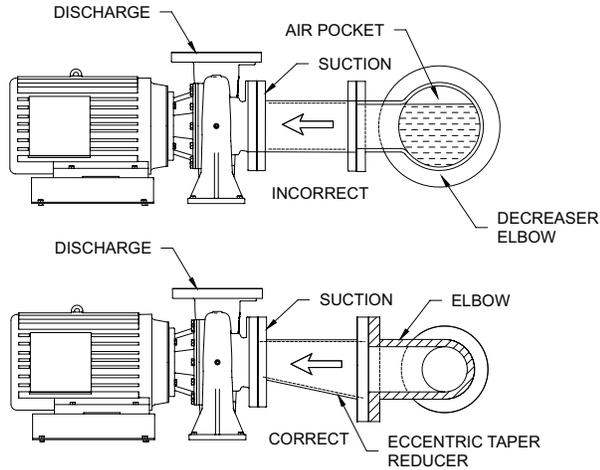


Figure 31  
Air pocket in elbow

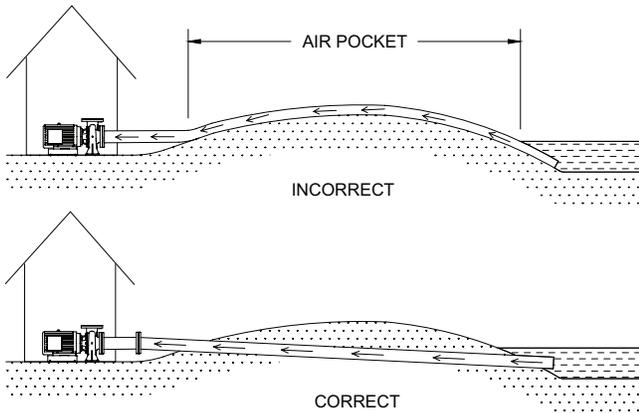


Figure 32  
Air pocket in horizontal suction piping

In suction lift applications, the suction pipe in the liquid well must be sufficiently submerged to prevent exposure of the end of the pipe when the well is at its minimum level and to prevent vortex action (whirlpool effect) of the liquid at the suction pipe, which will draw air into the pipe. Also, care should be taken to keep the suction pipe located away from the well inlet since the incoming liquid may be carrying air bubbles. Another cause of air in the liquid is dropping of the liquid from too high a point into the well. See Figure 32 shown above.

## Electrical Wiring

Normally, your pump will be supplied with an attached drive motor. The motor should be wired in accordance with the wiring diagram found on the motor nameplate. Be sure the voltage, frequency, and phase of your power supply corresponds with the nameplate data. It is recommended to provide a separate switch and overload protection for your pump motor to protect against power failure in some other area. Conversely, if the pump motor develops electrical problems, it will be isolated from other equipment.

**Notice:** PRESTARTING INSTRUCTION: The coupling halves should be connected. Prior to connection, however, the drive motor should be started to make sure the direction of rotation is the same as the direction indicated by the arrow on the pump casing.

## COMMISSIONING, START-UP, OPERATION, AND SHUTDOWN

### Lubrication

In dry locations, each bearing will need lubrication at least after every 4,000 hours of running time or 6 to 12 months, whichever is more frequent. In wet locations (exposed to dripping water, to the weather or to heavy condensation found in unheated or poorly ventilated underground locations) every 2,000 hours or every 3 to 6 months, whichever is more frequent. Applicable to 3804 series pumps.

- Use Chevron® SRI Grease NLGI grade 2.

**CAUTION** Before running the driver, either separately or connected to the pump, check lubrication and cooling requirements.

**CAUTION** Proper lubrication is critical for trouble-free, long-term operation of the equipment. Lubrication methods and frequency vary with bearing type, application, environment, and the unique operating characteristics of the individual piece of equipment. Ensure lubrication is present and lubrication systems are connected and operational per instructions.

### Rotation

Pump rotation is clockwise when viewed from the back of the motor. An arrow is also located on the pump casing to show the direction of rotation.

It is absolutely essential that the rotation of the motor be checked before connecting the shaft coupling. Incorrect rotation of the pump, for even a short time, can dislodge and damage the impeller, casing, shaft, and shaft seal.

### Guarding

All guards must be in place and secure per the instructions prior to start-up.

**WARNING** Guards must not be removed while the pump is operational. Always follow lock out – tag out procedures when working on equipment that may turn on.

## START-UP CONSIDERATIONS

### System Flushing

When the pump is installed in the completed piping system, it is recommended that the system be flushed to remove debris such as stubs of welding rod, welding slag, and loose scale. The pump manufacturer should be consulted as to the suitability of any chemical flush additives added to the system.

### Priming and Filling

The pump should not run unless it is completely filled with liquid as there is danger of damaging some of the pump components. This includes short runs for rotation verification. The pump will not operate satisfactorily until it is primed. All air must be expelled from the suction piping and pump casing, and replaced by the liquid to be pumped. There are several methods of priming pumps. The one you select will depend on your specific requirements.

### Flooded Suction Priming

This method of priming a pump is relatively simple. The liquid source is located above the pump, and all that is necessary to prime the pump is to open the air vent valve or plug in the pump casing, and to crack the gate valve in the suction line. The suction line and pump should be filled

# PUMP OPERATION

slowly until a steady stream of liquid is observed flowing from the air vent. After your pump is operating, it is recommended that the air vent valve or plug be opened again to ensure that all air has been expelled from the pump casing. See Figure 33 on shown below.

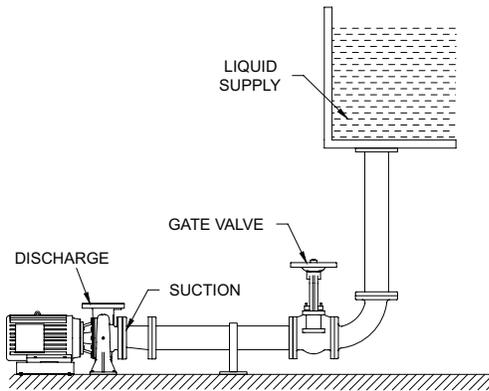


Figure 33  
Flooded suction priming

## Foot Valve Priming

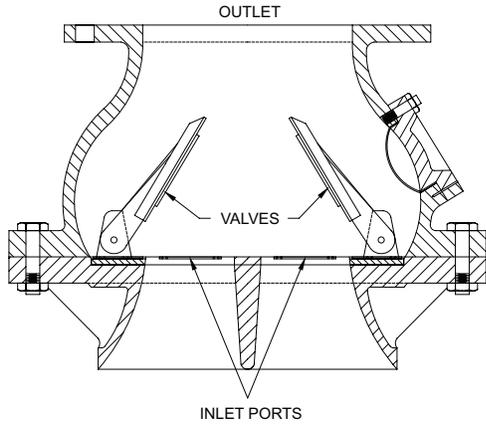


Figure 34  
Foot valve cutaway

A foot valve can be used for priming on suction lift applications. The foot valve located at the bottom end or foot of the suction piping, functions as a check valve which allows flow in one direction only toward the pump.

Initial priming is accomplished by completely filling the suction piping and pump casing with the liquid to be pumped. This can be done by removing the air vent valve or plug at the top of the pump casing, and inserting a pipe nipple in the orifice with an appropriate increaser to accommodate a hose connection.

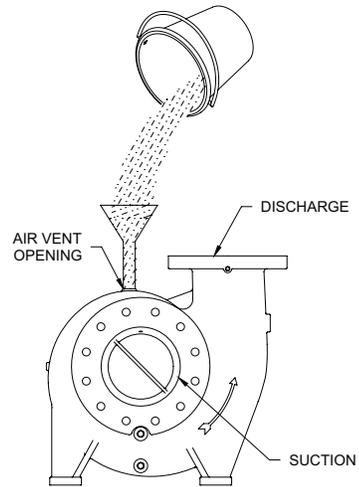


Figure 35  
Priming by hand

A priming line can also be inserted in the discharge piping between the check valve and the pump, or the priming can be done with a bucket and funnel. Refer to Figure 35 shown above. It is important to completely fill the suction pipe and pump casing with liquid. When the pump is started, the vacuum created by pumping the priming fluid, combined with atmospheric pressure in the liquid well, forces liquid into the suction piping, thus opening the valve and keeping it open until the pump is shut down. When the pump is shut down, the liquid being pumped reverses its flow causing the valve to close. The liquid is now trapped in the suction piping and pump casing, thus maintaining a prime on the pump.

## Vacuum Priming

Vacuum priming consists of removing air from the pump casing and suction piping, and drawing liquid into them by means of a vacuum creating device. The types of vacuum equipment range from a simple hand pump to complex central priming systems. Your specific priming requirements will govern what type of vacuum primer you use.

## Air Ejector

One type of vacuum primer is the air ejector. If liquid under pressure or steam is available, an ejector can be used. The ejector is connected to the air vent orifice. A stream of the ejecting medium is passed through the ejector creating a vacuum in the ejector, and drawing air from the pump casing and suction piping. When liquid flows steadily from the ejector discharge pipe, the pump is primed. See Figure 36 shown below.

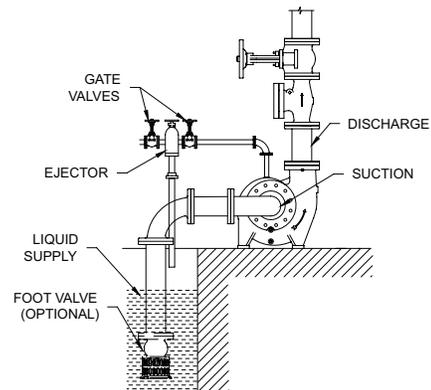


Figure 36  
Priming by ejector

# PUMP OPERATION

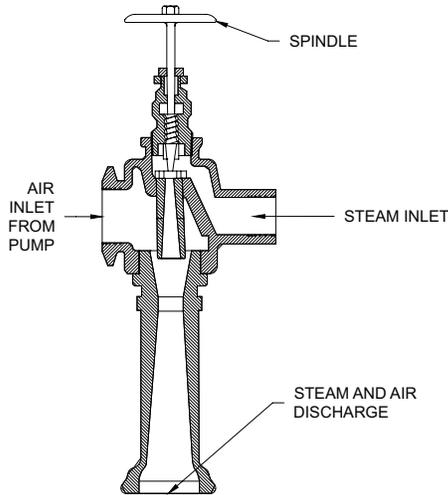


Figure 37  
Ejector cutaway

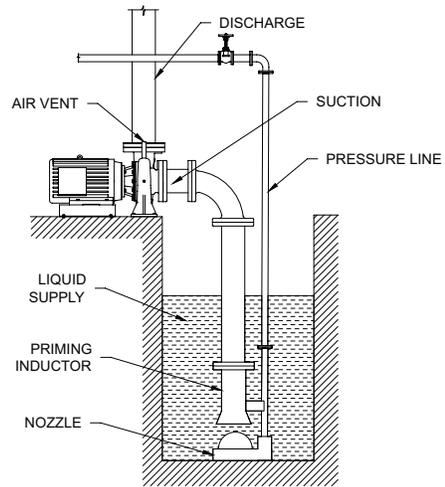


Figure 39  
Inductor priming

## Vacuum Pumps

Rotary or reciprocating pumps are frequently used as vacuum pumps. They fall into two categories, wet-vacuum and dry-vacuum. The principle of operation is essentially the same, however, the dry-vacuum pump cannot accommodate a liquid and air mixture, while the wet-vacuum pump can accommodate liquid, air, or a combination of both.

Vacuum pumps can be installed as part of a central priming system servicing many pumps, as an automatic priming system, or as a manually controlled independently driven pump.

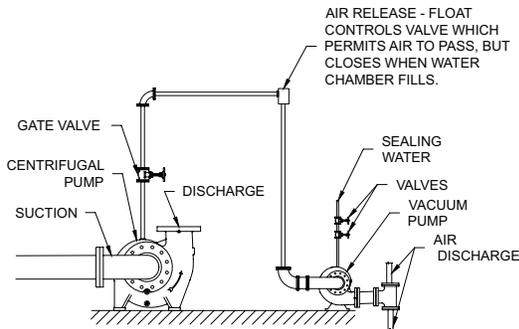


Figure 38  
Vacuum pump priming

The suction piping of the vacuum pump is connected to the air vent orifice on the pump to be primed. The vacuum produced by the vacuum pump removes air from the turbine pump suction piping and casing, and draws liquid from the liquid well into the turbine pump. Dry-vacuum pumps must be installed so that no liquid is taken into the air pump. Installation of a water trap or use of a vacuum tank is recommended for dry-vacuum pumps. Refer to Figure 38 shown above.

## Inductor Priming

On suction lift applications it may be desirable to prime your pump with a priming inductor. This type of primer is comprised of a liquid nozzle and an inductor at the foot end of the suction piping. The nozzle and inductor are connected to a high pressure liquid supply such as a city water service. The pump is primed by opening the valve in the pressure line. This will allow the liquid to flow through the nozzle and into the inductor. The velocity of the high pressure liquid drives the liquid into the suction piping and up to the pump, thus completing the priming operation. Refer to Figure 39.

## SHAFT SEALING SETTINGS AND ADJUSTMENTS

### Mechanical Seals

A mechanical seal consists of a rotating element and a stationary element. The sealing faces are highly lapped surfaces on materials selected for their low coefficient of friction and their resistance to corrosion by the liquid being pumped. The faces run with a very thin film of liquid between them. In addition, there must be a means of loading the seal. This is accomplished either with a spring (or springs) or with an elastomeric or metallic flexible member.

Mechanical seals are made in a wide variety of designs; therefore the instructions for the specific seal must be carefully studied and followed. A mechanical seal is a precision device and must be treated accordingly. Mechanical seals normally require no adjustment during operation. Except for slight initial leakage, the seal should operate with negligible leakage.

**CAUTION** Mechanical seals should not run dry unless allowed by the manufacturer. Seals require a continuous supply of flush and/or cooling fluid.

## START-UP, OPERATION, AND SHUTDOWN

### Valve Setting at Start-up

#### Position of Discharge Gate Valve When Starting

The discharge gate valve should be partially closed when a high or medium head centrifugal pump is started, because this type of pump requires much less power with the gate valve closed, than when it is operated at rated capacity and head with the discharge gate valve open. As soon as the pump is up to operating speed, the discharge gate valve should be opened to the desired position.

#### Position of Suction Piping Gate Valve When Starting

In flooded suction applications, the gate valve is opened at the time the pump is being primed, and will remain open for starting and operation.

**CAUTION** The pump should not be operated with the inlet or outlet valves closed. The operation of a pump with the inlet valve closed may cause serious damage and should not be attempted. Operation with both inlet and outlet valves closed for even brief periods of time is an unacceptable and dangerous practice.

# PUMP MAINTENANCE AND SERVICE

## Operation

The following points must be ensured before starting the pump:

1. The current supply agrees with the voltage and frequency on the motor nameplate.
2. The motor is wired for correct voltage.
3. The thermal overload relays are correct size and set for operation.
4. The pump is fully primed. Flood the casing and seal area with liquid to release the air out of pump through flush line and air vent valve near discharge flange. Priming must be continued until air is completely removed. This is indicated by continuous flow of liquid through flush line and air vent. Disconnect power to the motor and lock-out / tag-out the power source prior to rotating the shaft by hand.
  - a. Failure to flood the seal area with water may cause seal failure due to lack of lubrication.
5. Jog the motor to check that the motor rotates clockwise, as indicated by the arrow on the pump casing.
6. Coupling guard must be in its appropriate position on account of human safety.

## Starting Up

1. Start the pump with the discharge valve slightly open and verify that the pump is operating smoothly and is not rubbing.
2. Start opening the discharge valve gradually.
 

**Notice:** Do not run the pump for extended period with discharge valve closed, so as to avoid overheating and potential damaging loads.
3. If the pump is equipped with a circulation relief valve, such valve prevents overheating when the pump is operating at reduced capacity.
4. Stop the pump immediately if any of the following situations arise:
  - a. No/insufficient liquid.
  - b. Inadequate discharge pressure.
  - c. Loss of suction pressure.
  - d. High power consumption.
  - e. Noisy operation and/or high vibration after discharge valve is in an open position.  
Check the manual for troubleshooting the cause. See Pages 21 - 22.

## Shut Down

It is recommended to close the discharge valve before stopping the pump to avoid any water hammer effect. However, this practice is not mandatory and pump may be stopped with discharge valve open in case an emergency.

Preferred shutdown sequence is as follows:

1. Preferably close the discharge valve first.
2. Then turn off the motor.
3. Now, close the suction line valve.
4. Drain the pump liquid completely, if pump to be kept nonoperational for longer period or if there is danger of freezing.
5. If it is necessary for the pump to maintain its prime while it is shutdown, it is recommended to install either a foot valve or a check valve in the suction piping.

# MAINTENANCE AND SERVICE

## Schedule

Preventive maintenance and routine check-ups may prevent the pump from major failures. An inspection & maintenance log should be kept and the inspector is to immediately report any problems. Pump should be checked on regular basis for any unusual noise, vibrations and abnormal rise of temperature. If equipped with a sight flow indicator, check it from time to time for fluid flow and if no flow is observed, replace the filter or check the separator. A suggested guide for preventive maintenance for normal application is given below in Table 1:

**Table 1**

Guide for preventive maintenance

ITEMS	ACTION REQUIRED	FREQUENCY
Vibration	Check for change in vibration levels	Refer to ANSI/HI 9.6.5 Condition Monitoring
Bolting	Check for proper bolt torque	Annually
Mechanical Seals	Monitor seal leakage	Refer to ANSI/HI 9.6.5 Condition Monitoring
Pump/Motor Alignment	Check for change in alignment	Annually
Surface Inspection	Check for coating integrity or signs of corrosion	Exterior components: Quarterly Interior components: Annually
Wear and running clearance	Inspect and measure	Annually or as determined by service condition when performance decreases are noted or as recommended
No flow in sight flow indicator (if installed)	Replace filter, Inspect separator	Daily
Controls and accessories	Inspect for damage, proper function and condition	Annually
General site conditions	Inspect for damage, proper function and condition	150 hours of operation as necessary

# PUMP MAINTENANCE AND SERVICE

## Cold Weather Maintenance

When handling water or other liquids that may freeze at low temperatures, care should be taken to prevent the pump from freezing during cold weather when the pump is not in operation. It may be necessary to drain the pump casing during shutdown periods by removing the bottom drain plug.

## Mechanical Seal Maintenance

The mechanical seal require flushing which is flushed from discharge of the pump through a flush line. A throttle bush isolates the mechanical seal from the liquid in the pump. Since mechanical seals need a film of liquid between the sealing faces, pump must not be run unless properly filled with liquid for intended operation.

A 'weep' sound may be heard from mechanical seals at start-up. The pump should run for approximately 8-10 hours, which is the break-in period for seal. During this operation the mechanical seal would 'seat' properly.

Pentair Aurora\* 3800 pumps are supplied with type 21 mechanical seal.

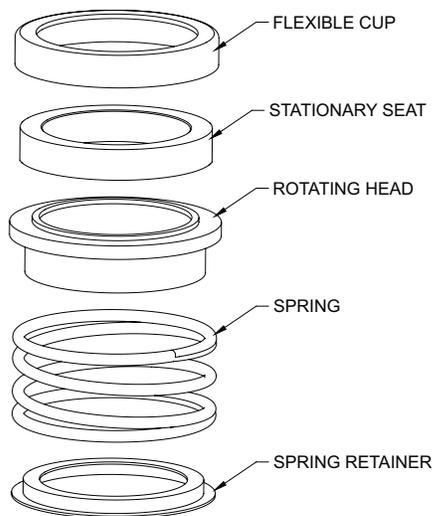


Figure 40  
Mechanical Seal (type 21)

## Recommended Spare Part List

Although all the components could be procured by the customer at short interval, to reduce downtime the below mentioned components should be kept handy in case the pump is to be shut down for maintenance. The components are:

- Mechanical seal
- Wear rings
- Gaskets, O-rings, seals

**Notice:** Refer to Table 2 before ordering seal kit corresponding to power frame numbers in case of Pentair Aurora 3804 pumps.

Table 2

Pentair Aurora 3804 pumps seal kit selection matrix

IMPELLER SIZE <sup>1</sup>	POWER FRAME NO.	POWER FRAME PART NO.	SEAL KIT NO.
7" PUMPS	1	3550006644	4761251644
	2	3550008644	4761252644
	3	3550009644	4761252644
	21A	NA	NA
ALL 9.5" PUMPS EXCEPT 6x8x9.5	1	3550006644	4761254644
	2	3550008644	4761255644
	3	3550009644	4761255644
	21A	NA	NA
6x8x9.5	1	NA	NA
	2	3550008644	4761256644
	3	3550009644	4761256644
	21A	NA	NA
11" PUMPS	1	3550006644	4761257644
	2	3550008644	4761258644
	3	3550009644	4761258644
	21A	3550300644	4761260644
1.5x2x12	1	3550006644	4761261644
13.5" PUMPS	1	NA	NA
	2	3550008644	4761263644
	3	3550009644	4761263644
	21A	3550300644	4761264644

<sup>1</sup>Last digit of pump model denotes impeller size. E.g., 2x2.5x7, here 7" is the impeller size

## Consumables

Following items are of regular use during preventive and accidental maintenance and must be kept in stock by the customer.

- Lubricants
- Cleaning materials
- Touch up coating

## Tools and Fixtures

Pump assembly and disassembly can be performed by using standard hand tools available in market. For quick reference, tools required for disassembly of various pump components are mentioned below in Table 3 on the next page.

# PUMP MAINTENANCE AND SERVICE

**Table 3**

Quick reference for tools and fixtures

ITEM NO.	MOTOR FRAME	PUMPS	WRENCH SIZE AND TYPE
#4 & #4A	ALL	ALL	9/16" wrench
#5	ALL	7"	9/16" wrench
		9.5", 11"	3/4" wrench
		13.5"	1-1/2" wrench
#5B	143-184	9.5", 11", 12", 13.5"	9/16" wrench
	213-215	9.5", 11", 12", 13.5"	
	254-256	9.5", 11", 13.5"	
	284-326	9.5", 11", 13.5"	
	364-405	9.5"	3/4" wrench
	444-449	9.5"	
#9	143-215	7", 9.5", 11", 13.5"	9/16" socket wrench
	254-326	7", 9.5", 11", 13.5"	3/4" socket wrench
	364-449		
#32	143-184	7", 9.5"	9/16" wrench
	213-215	7", 9.5", 11", 13.5"	3/4" wrench
	254-256		
	284-326		
	364-405	7", 9.5", 11", 13.5"	1-1/2" wrench
	444-449 TCZ		

In addition to the above mentioned tools some additional equipment & fixtures may be required which are mentioned below:

- Lifting devices (crane, hoist, lifting chains or straps)
- Impeller puller (to remove pressed-on impeller from shaft)
- Torch (to heat parts to aid in removal)
- Die grinder (to cut out wear rings or shaft sleeves, if needed)
- Work table or fixture for holding pump
- Measuring equipment (feeler gauges, dial indicator, etc.)
- Bearing puller (to remove pressed on bearings from shaft)
- Hot oil bath (or method to heat bearings and coupling hubs for installation)

### Fastener Torque and Sequence

Proper tightening of bolting is very important. Torque values will vary depending on the size and grade of bolting used. Torque values for coupling bolts and grub screws and sequence of their tightening are mentioned in the following section for replacement procedure of mechanical seals. Tightening torques for common bolt diameter can be found in Table 4 below.

**Table 4**

Cap screw torque for common bolt diameters

CAPSCREW TYPE	HEAD MARKING	IN-POUNDS				FOOT-POUNDS		
		1/4"	5/16"	3/8"	7/16"	1/2"	5/8"	3/4"
SAE GRADE 5		85	180	27	43	65	130	230

### REPAIRS

**Notice:** READ AND UNDERSTAND ALL SAFETY WARNINGS AT THE BEGINNING OF THE MANUAL BEFORE BEGINNING INSTALLATION OR ANY REPAIR WORK

This repairs section is broken into two major parts. The first part covers the dismantling of the mechanical seal, power frame disassembly and complete pump disassembly. The second part covers installation of mechanical seal, power frame reassembly and complete pump assembly. Refer to the exploded pump diagram (Figures 45 and 46 on Pages 23-24) for item numbers.

#### Complete Pump Disassembly - Pentair Aurora\* Model 3804/3801

**⚠ WARNING Sudden Start-Up Hazard.** Disconnect and lock out power source before servicing. Failure to follow these instructions could result in serious personal injury, death or property damage.

1. Ensure the electrical power is locked out, the system pressure has been lowered and temperature of the unit is at a safe level.
2. Isolate the pump from the system by closing the valves that should be located on the suction and discharge side of the pump.
3. Loosen pipe plug and drain the pump.
4. Remove all relief, cooling, flushing, or drain lines from the pump. Break suction and discharge connections only if it is desired to remove casing (#6).

**⚠ WARNING Hot surface hazard:** If pumping hot water, ensure guards or proper insulation is installed to protect against skin contact to hot piping or pump components. Failure to follow these instructions could result in serious personal injury, death or property damage.

**⚠ WARNING High pressure hazard:** All pumps are designed for specific maximum working pressure. Do not exceed this pressure. Install properly sized pressure relief valves in system. Failure to follow these instructions could result in serious personal injury, death or property damage.

**⚠ WARNING Spraying water hazard:** When servicing pump replace all gaskets and seals. Do not reuse old gaskets or seals. Failure to follow these instructions could result in serious personal injury, death or property damage.

**Notice:** For Pentair Aurora 3804 complete pump disassembly continue with step 5, For Pentair Aurora 3801 complete pump disassembly proceed to step 7 on the next page.

5. For Pentair Aurora 3804 pumps, remove the coupling guard.
6. For Pentair Aurora 3804 pumps, loosen the set screws in both coupling halves and slide each half back as far as possible on its shaft. Then, remove the coupling insert. See Figure 41 shown on next page.

# PUMP MAINTENANCE AND SERVICE

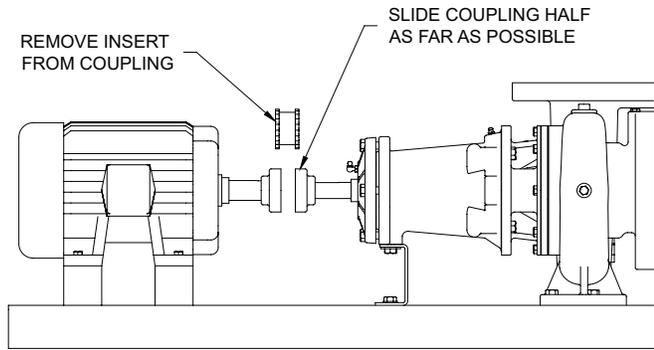


Figure 41

Pentair Aurora® 3804-frame mounted pump assembly

7. Remove the foot support cap screws of power frame (for 3804)/ motor (for 3801).
8. Loosen the casing cap screws (#5) connecting the seal plate (#35A). Do not remove them. Utilize two casing bolts to jack the power frame assembly (for 3804)/ motor assembly (for 3801) out from the casing (#6).
9. Utilize suitable lifting equipment to lift the motor assembly out from the casing.
10. Utilize suitable lifting equipment to lift the power frame assembly (for 3804)/ motor assembly (for 3801) out from the casing.
11. Remove impeller (#11).
12. Remove impeller key (#12).
13. Slide sleeve (#25) and O-ring (#10) with the rotating parts of the mechanical seal (Refer Figure 42) from the shaft. See Figure 43.

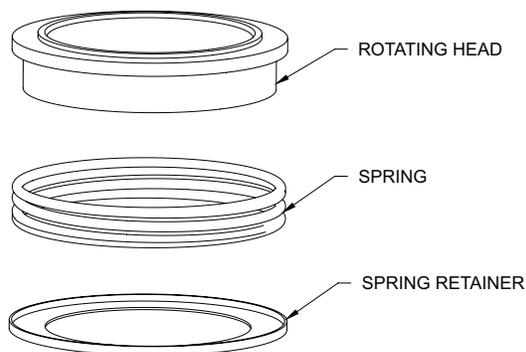
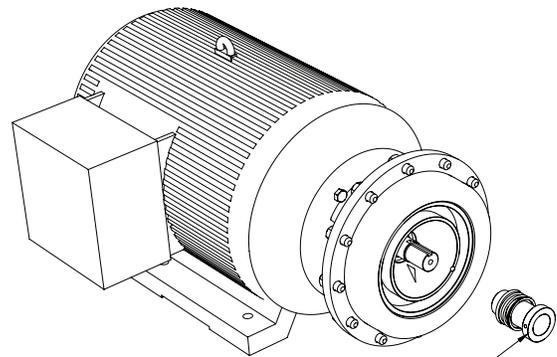


Figure 42

Rotating parts of mechanical seal



SLEEVE REMOVED WITH ROTATING PART OF MECHANICAL SEAL

Figure 43

14. Unscrew cap screws (#5B) holding motor bracket (#35B) and seal plate (#35A) if any repair is required or for ease of replacing mechanical seal.
15. The seal flexible cup and stationary seat should be pressed out of the seal plate and the cavity cleaned of all residues. Make sure that the seal cavity is not damaged during disassembly since sharp edge can easily damage the elastomer on the mechanical seal during reassembly.

**CAUTION** The mechanical seal is a precision product and must be treated as such. During removal, great care must be taken to avoid dropping any part of the seal. Take particular care not to scratch the lapped faces on the washer or the sealing seat. Do not put a seal back into service until the sealing faces of the washer and the seat have been lapped or replaced.

**Notice:** The sleeve should be carefully cleaned to remove any residue that may be remaining in the seal area. The rubber in the seal may have been partially adhered to the sleeve. The sleeve must also be checked for abrasion or corrosion that can occur when fluid residue penetrates between the seal and the sleeve. The sleeve under the seal may be polished lightly to a 32 RMS finish before reassembly. Do not reuse a pitted sleeve. Pin may be removed if necessary.

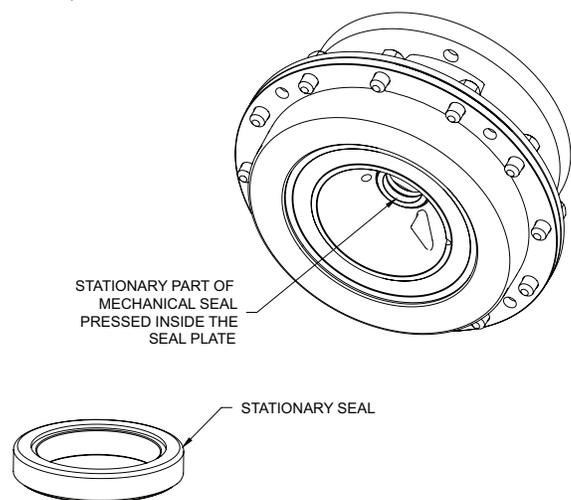


Figure 44

If only mechanical seal is to be replaced, stop at this point and proceed to step 1 under section titled "Installation of the Mechanical Seal - 3801/3804 pumps". Otherwise continue for Pentair Aurora® 3804 complete pump disassembly.



# PUMP MAINTENANCE AND SERVICE

## Pentair Aurora\* 3804 Complete Pump Disassembly or Power Frame Disassembly

**Notice:** Read and understand all safety warnings at the beginning of the manual before beginning installation or any repair work.

16. Remove the seal plate (#35A) cap screws (#5B) from the bracket (#35B).
17. Remove the power frame cap screws (#5) and washers (#5A) from the bracket (#35B).  
If the power frame assembly is being replaced, skip to section titled "Power Frame Reassembly". If replacing the shaft (#55), continue with step 18 for shaft disassembly.
18. Remove the grease fittings (#43) from the power frame.
19. Unscrew cap screws (#48) and remove bearing cap (#49). Remove O-ring (oil lubed only) and retainer ring (#52).
20. Slide out shaft (#55), bearings (#53 and #54). Since bearings (#53 and #54) are press fitted on the shaft, they will have to be pulled or pressed off the shaft. Remove grease seals (#51 & #51A) from frame (#57) and bearing cap (#49) respectively
21. Thoroughly clean the shaft (#55), removing any oil or dirt.

### Inspection

Once the pumping unit is disassembled, component parts should be inspected to determine their condition. Ball bearings that turn roughly or show wear should be replaced. Cracked castings should never be used. Scored or worn pump shaft should be replaced. Gaskets should be replaced at reassembly for efficiency. It is recommended to replace routinely than to replace singly as the need arises.

### Complete Pump Reassembly - Model 3804/3801

To install mechanical seal skip to step 8 under section "Installation of the Mechanical Seal-3801-3804 Pumps". Otherwise continue with step 1 for "Complete Pump Reassembly - Model 3804/3801".

### Power Frame Reassembly

Reassembly will generally be in reverse order of disassembly. If disassembly was not complete, use only those steps related to your particular repair program.

1. Press grease seals (#51 & 51A) into frame (#57) and bearing cap (#49) respectively.
2. Press bearings (#53 & #54) onto shaft (#55).
3. Snap retainer ring (#52) into place.
4. Slide shaft (#55) and bearings (#53 & #54) into frame (#57).
5. Fasten bearing cap (#49) in position with cap screws (#48). Position slingers (#47) on the shaft.
6. Position the bracket (#35B) on the power frame (#57) and secure with cap screws (#5) and washers (#5A). Tighten screws evenly to assure proper alignment.
7. Position the Seal Plate (#35A) on the bracket (#35B) and secure with cap screws (#5B). Tighten screws evenly to assure proper alignment.

### Installation of the Mechanical Seal-3801-3804 Pumps

8. Thoroughly clean the shaft sleeve and seal plate seal cavity. Replace the shaft sleeve (#25) or seal plate (#35A) if there is evidence of surface damage like pitting, corrosion, nicks or scratches.
9. Lubricate the shaft sleeve (#25) and seal plate (#35A) with soap and water or P-80™ rubber emulsion. Do not use petroleum lubricant. Install a new insert gasket and a new seal (#27) insert down into the seal plate.

10. Slide a new rotating seal assembly (#27) on to the shaft sleeve. With a screwdriver, push the top of the compression ring until the seal is tight against the seal insert. Install seal spring.

**Notice:** Refer to Table 2 "Seal Kit Selection Matrix" on Page 17 to determine the seal kit to be used for repair in relation to the power frame assembly for Pentair Aurora 3804- frame mounted pumps.

**CAUTION** The mechanical seal (#27) is a precision product and must be treated as such. During installation, great care must be taken to avoid dropping any part of the seal. Take particular care not to scratch the lapped faces on the washer or the sealing seat.

11. Install O-ring (#10).
12. Install a new impeller key (#12).
13. Install impeller (#11), new impeller washer gasket (#9B), impeller washer (#9A), impeller seal (#9C) and cap screw (#9). Tighten cap screw per torque chart (see Table 4 on Page 18).
14. Install new casing gasket (#8). Then install the pump assembly into the volute.
15. Tighten volute cap screws (#5) per torque chart (see Table 4 on Page 18).
16. For Pentair Aurora 3804 pumps, install foot support cap screws (#62)
17. For Pentair Aurora 3804 pumps, install coupling and align. (Follow coupling alignment procedure "Shaft/Coupling Alignment" on Page 12).
18. Install drain plugs, close drain valve.
19. For Pentair Aurora 3804 pumps, reinstall the coupling guard.
20. Open isolation valves and inspect pump for leaks.
21. Return pump to service.

**CAUTION** Do not start pump until all air and vapor has been bled and until making sure that there is liquid in the pump to provide the necessary lubrication for the packing.

**Notice:** WHEN ORDERING SPARE PARTS ALWAYS INCLUDE THE PUMP TYPE, SIZE, SERIAL NUMBER, AND THE PIECE NUMBER FROM THE EXPLODED VIEW IN THIS MANUAL. ORDER ALL PARTS FROM YOUR LOCAL AUTHORIZED DISTRIBUTOR OR PENTAIR AURORA CUSTOMER SERVICE.

PENTAIR AURORA RESERVES THE RIGHT TO SUBSTITUTE MATERIALS WITHOUT NOTICE.

# TROUBLESHOOTING GUIDE

## THE FOLLOWING IS A LIST OF COMMON PROBLEMS AND THEIR PROBABLE CAUSES.

Symptoms	Possible causes	Possible remedies	
Insufficient pressure or Insufficient/no flow	Speed too low	Check and ensure correct voltage at motor terminals	
		Check if rotating elements freely rotate	
	Wrong direction of rotation	Check motor rotation with direction arrow on casing	
		Ensure correct motor wiring	
	Entrained air in pump	Ensure all air is vented, and pump is adequately primed	
		Ensure eccentric reducer, if correctly installed	
	Air leaks into suction line	Tighten the suction piping flange bolts as required	
	Leaking joints	Check for any external leakage and arrest	
	Excessive leakage from seal	Inspect and replace mechanical seal, as required	
	Insufficient submergence of suction pipe	Check and ensure sufficient pipe length, submerged well below the water surface	
	Insufficient pressure at pump inlet	Ensure correct suction pipe sizing	
		Raise fluid level or move pump closer to the water level	
		Clogged impeller	Clean impeller as required
		Damaged impeller	Check and replace impeller as required
		Worn wear rings	Check and replace wear rings, if equipped
	System head not as anticipated	Contact manufacturer for correct pump sizing	
	Smaller impeller diameter	Contact manufacturer for correct impeller sizing	
Excessive power consumption	Speed too high	Check and ensure correct voltage at motor terminals	
	Rubbing or binding of rotating elements	Check if rotating elements are not rubbing against stationary components	
	Shaft bent	Inspect shaft for any deformation and replace	
	Worn wear rings	Check and replace wear rings, if equipped	
	Head lower than rating, pumps too much liquid	Contact manufacturer for correct pump/impeller sizing	
Abnormal noise and vibration	Coupling misalignment	Check and ensure alignment between pump and driver shaft	
	Foundation/grouting not rigid	Ensure foundation is adequately sized and rigid to absorb the vibrations	
		Ensure foundation bolts are tightened to adequate torque	
	Defective bearings	Check motor and/or pump for worn bearings, and replace as required	
	Rubbing or binding of rotating elements	Check if rotating elements are not rubbing against stationary components	
	Pump operating outside Allowable Operating Region (AOR)	Ensure the pump is being operated within its Allowable Operating region. Contact manufacturer for correct pump sizing.	
	Entrained air in pump	Ensure all air is vented, and pump is adequately primed	
	Ensure eccentric reducer, if correctly installed		
Insufficient pressure at pump inlet	Ensure correct suction pipe sizing		
	Raise fluid level or move pump closer to the water level		

## TROUBLESHOOTING GUIDE

Motor fails to start	Incorrect wiring	Check motor wiring against motor wiring diagram (on motor)
	Wrong voltage	Check and ensure correct voltage at motor terminals
	Switches not set	Set switches ON
	Tripped thermal overload relay	Set relays ON
	Blown fuses	Replace fuses
	Loose or broken wiring	Check and tighten connections. Replace broken wiring
	Binding of rotating elements	Check if rotating elements freely rotate
	Defective motor	Check and replace motor
Motor runs hot	Speed too high	Check and ensure correct voltage at motor terminals
	Voltage lower than rated	Check and ensure correct voltage at motor terminals
	Rubbing or binding of rotating elements	Check if rotating elements are not rubbing against stationary components

**Note: The pump delivered may not be fitted with all the components mentioned in the troubleshooting guide.**

# ASSEMBLY EXPLODED VIEW

## PENTAIR AURORA\* MODEL 3801 CLOSE COUPLED CONFIGURATION

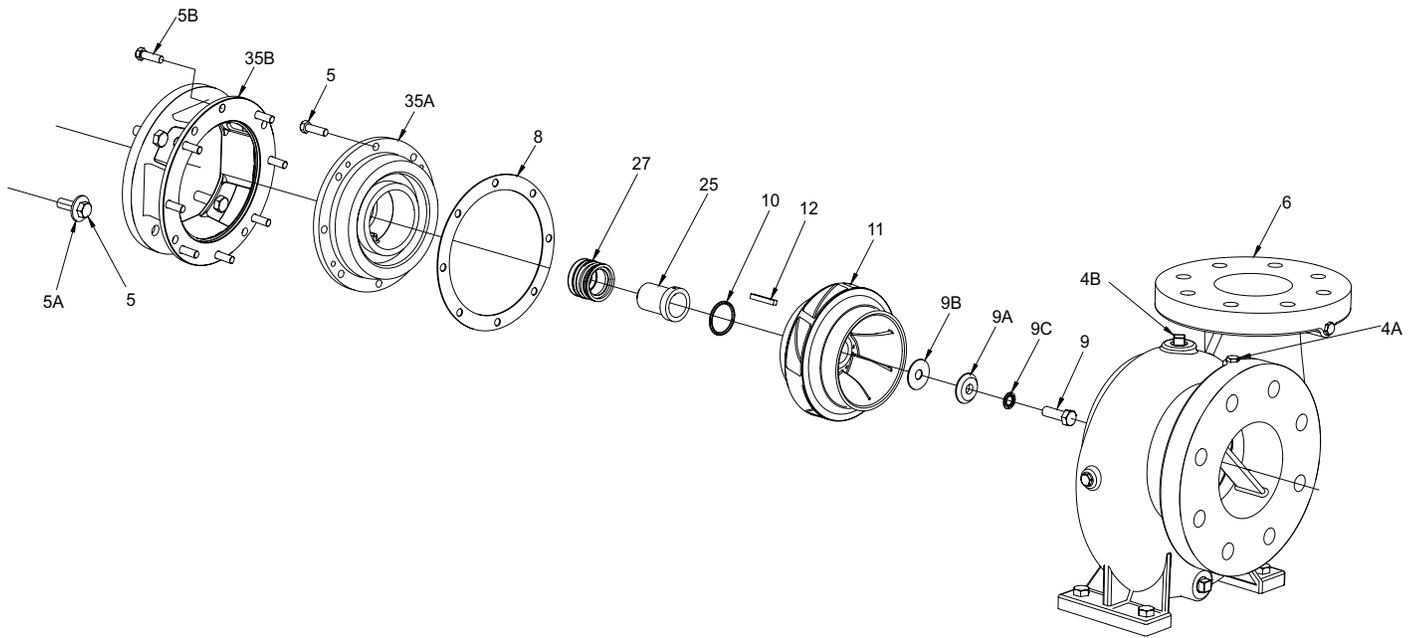


Figure 45  
Pentair Aurora Model 3801, close coupled configuration



# PART LIST

## PENTAIR AURORA\* 3801 AND 3804

Reference: Figure 45, 46(Exploded Views)

ITEM NO.	DESCRIPTION
4	Pipe plug
4A/B.	Cap screw
5A.	Cap screw washer
5B.	Cap screw
6	Casing
8	Gasket
9	Impeller screw
9A.	Impeller washer
9B.	Impeller gasket
9C.	Impeller seal
10	O-ring
11	Impeller
12	Impeller key
25	Sleeve
27	Mechanical seal
32	Cap screw
33	Screw
34	Nameplate
35A.	Seal plate
35B.	Motor bracket
42	Key
43	Grease fitting
47	Slinger
48	Cap screw
49	Bearing cap
52	Retaining ring
53	Bearing
54	Bearing
55	Shaft
57	Power frame
62A.	Cap screw
62B.	Nut
63	Washer
64A/B.	Foot support

# AQUATRAM® ADA COMPLIANT POOL ACCESS LIFTS

RECREATION FOR ALL. SUPPORT BY PENTAIR.



AquaTRAM 90

Choose the only ADA Compliant lift brand that's backed by the world's #1 manufacturer of swimming pool equipment. When you install an AquaTRAM lift, you provide safer, easier swimming pool access for swimmers with physical disabilities. Thanks to our versatile five-model

lineup, there's an AquaTRAM lift to fit every pool and every budget... comfortably. And with the backing of the industry leader, Pentair Commercial Aquatics™, there's every reason to feel confident about the quality of your purchase.

## STANDARD FEATURES

- All AquaTRAM lifts comply with ADA Guidelines.
- Dual flip-up armrests provide easier and safer access.
- Rechargeable battery-powered operation for easier use.
- Comfortable seat with adjustable lap belt.
- Simple-to-operate controls provide easier access in and out of pool.
- Stainless steel with corrosion-resistant powder-coated finish.
- Lifting capacities up to 500 pounds.



AquaTRAM LT



AquaTRAM 360



AquaTRAM PT

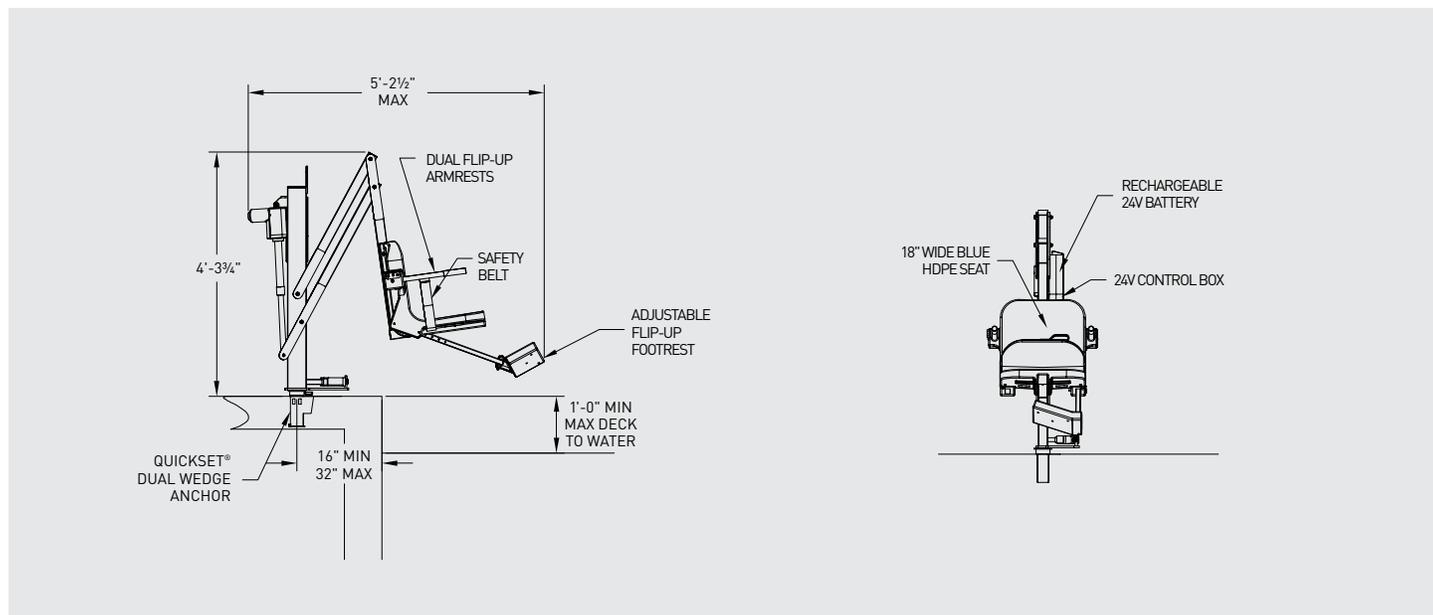


AquaTRAM

# AQUATRAM®

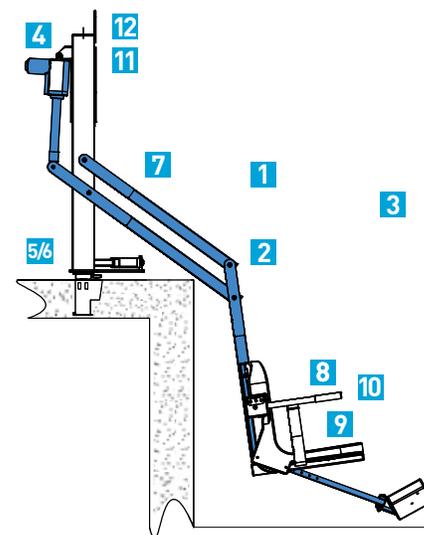
## ADA COMPLIANT POOL ACCESS LIFTS

### AQUATRAM 90 LIFT



#### Features and Benefits

1. Unique, versatile and cost-effective design accommodates most pools with a deck-to-water (d-w) dimension up to 12".
2. ADA Compliant; Lifting Capacity: 300 lbs.
3. Reversible design rotates 90°. Same model number can be installed "Right-Facing" or "Left-Facing" by rotating the lift 90° in its anchor.
4. Superior Reach and Versatile Anchor Placement:
  - A. Can clear a 16" Built-In (Spa) Bench when installed with a 16" anchor set-back\* (at 6" d-w).
  - B. Can accommodate anchor set-back\* of 16"-20" for "Square" Pool Profiles (with max.d-w).
  - C. Can accommodate up to 29" anchor set-back\* for typical "Roll-Out" Gutter Profile (based on 6" d-w dimension).
  - D. Consult with factory for assistance with your application.
5. Quickset model (11220) has a 2-1/2" square port penetration for use with Paragon Dual-Wedge, tool-less, clamping anchor which also retrofits into existing 2-1/2" sq. x 6" deep anchors.
6. Round post model (11221) has a 1.90" OD Round post X 6" deep penetration. Lift may be purchased with anchor, or can retrofit into many existing anchor systems\*\*.
7. Lightweight; easy to move and store when not in use. Optional cart available.
8. Dual flip-up armrests provide easier access and safer transfers on the pool deck and in the water.
9. Comfortable seat has an adjustable lap belt with hook-and-loop fasteners, plus an adjustable and removable footrest.
10. Simple 4-button submersible handset lets the user raise, lower, and rotate while seated or from the pool edge.
11. Stainless steel construction with corrosion-resistant epoxy powder-coat finish.
12. Rechargeable battery-powered operation is easier to install than water-powered lifts; provides a smoother ride, greater reliability and easier servicing with plug-and-play components.

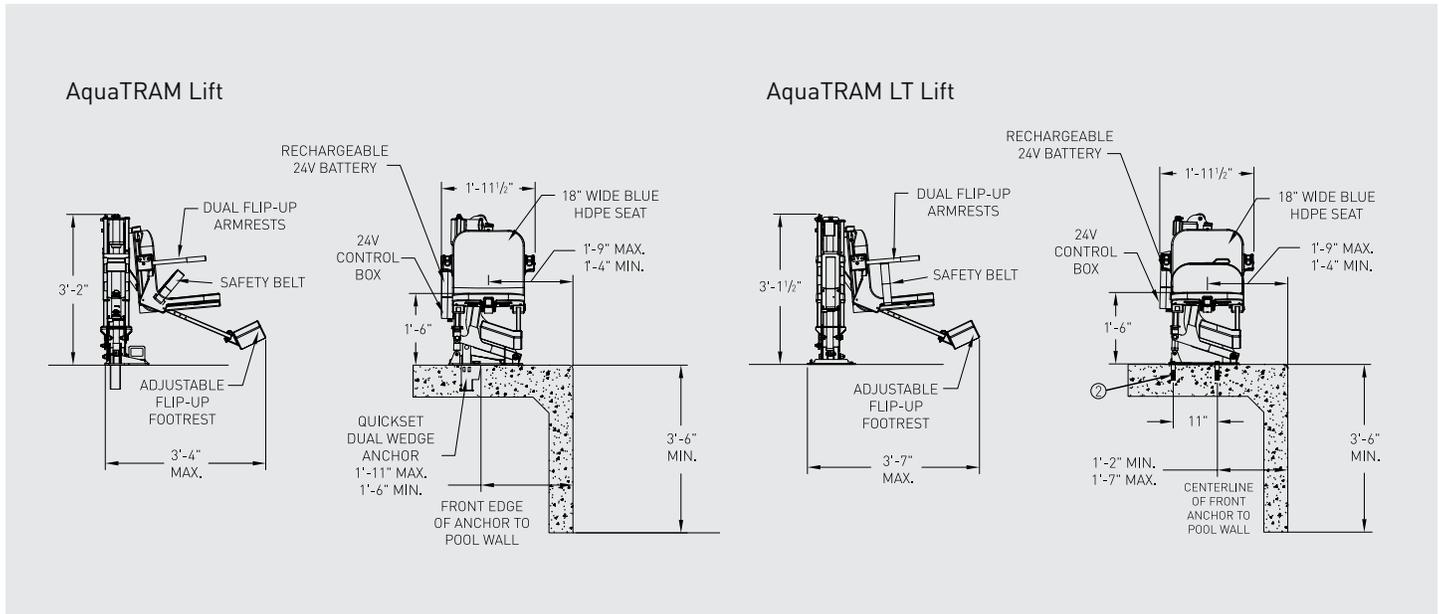


\*Set-back dimension as referenced herein is from pool wall to centerline of anchor. All clearance dimensions presented are estimated and are affected by d-w, deck obstructions and other physical characteristics of the specific application.

\*\*For retrofit, the existing anchor must be designed to accept a 1.90" diameter x 6" long round post penetration and the entire anchor system must be designed to withstand the resulting loads applied by lift under full capacity. Adapter kits are available for existing 2-3/8", 2-1/2", and 2-5/8" round anchors. In new installations, the anchor should be installed in a deck or footing as specified in the Installation and User's Guide [3'-3" x 3'-3" x 10" thick at time of this printing.]

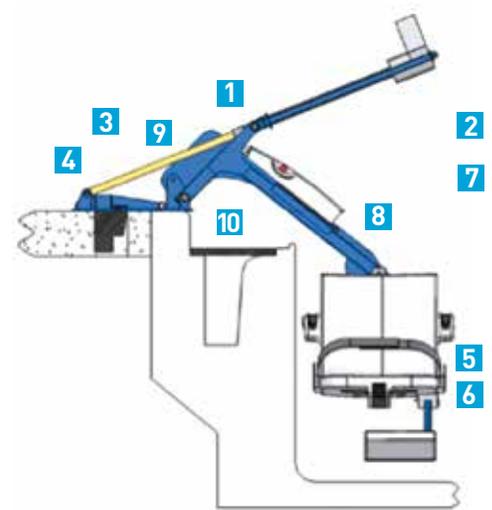


## AQUATRAM AND AQUATRAM LT LIFTS

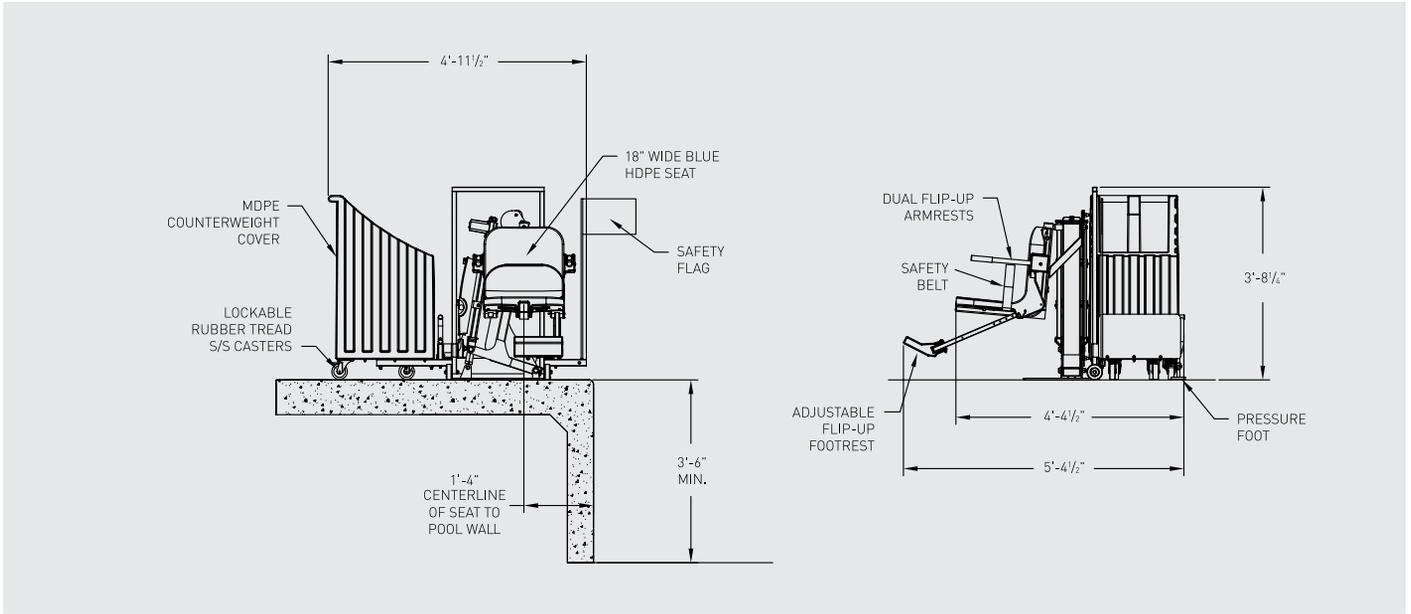


### Features and Benefits

1. Ultra-compact design has low height, uses minimal deck space, and does not extend into the water when not in use. Accommodates most pools with a deck-to-water (d-w) dimension up to 9".
2. ADA Compliant; Lifting Capacity: 400 lbs. (AquaTRAM); 350 lbs. (AquaTRAM LT)
3. Lightweight; easily transports with optional cart. Anchors can be installed in multiple locations around the pool to best support scheduled activities.
4. AquaTRAM lift: Removes without tools; AquaTRAM LT lift: Lag bolt anchoring allows quick removal with tools.
5. Dual flip-up armrests provide easier access and safer transfers on the pool deck and in the water.
6. Comfortable seat has an adjustable lap belt with hook-and-loop fasteners, plus an adjustable and removable footrest.
7. Simple 2-button submersible handset lets the user raise and lower while seated or from the pool edge.
8. Stainless steel construction with corrosion-resistant powder-coat finish.
9. Rechargeable battery-powered operation is easier to install than water-powered lifts; provides a smoother ride, greater reliability and easier servicing with plug-and-play components.
10. Standard models are "Right-Facing" as shown. "Left-Facing" (Reversed) models are also available upon request.

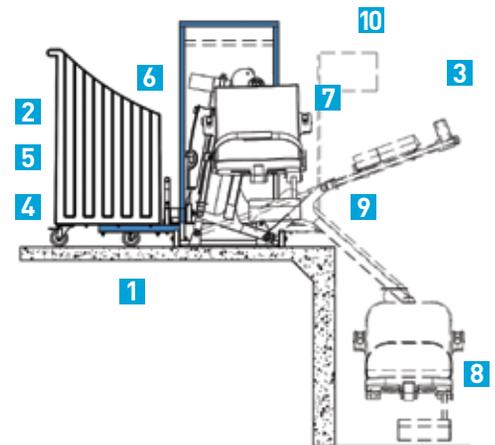


## AQUATRAM PT LIFT



### Features and Benefits

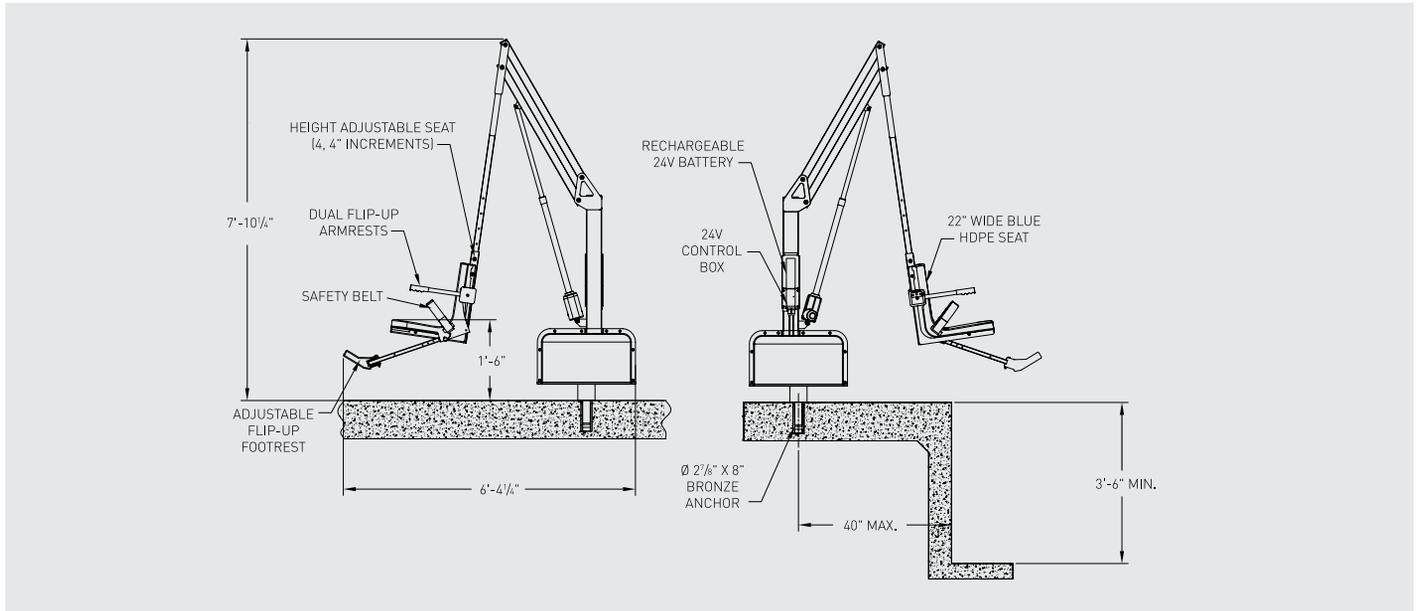
1. Mobile swimming pool access stores off-deck when not in use.
2. Highly maneuverable. Fits through most doorways.
3. ADA compliant with the use of the Affixment Kit (included). Docking Bar and anchor "affix" the lift in place during operating hours. Kits can be installed at various locations.
4. Standard model (11280S) is counter-weighted using sand ballast. Sand can be sourced locally, saving substantial freight cost. 350 lb. Lifting Capacity.
5. Also available with optional Concrete Block Ballast included with factory shipment (11280) for ease of ordering. 350 lb. Lifting Capacity.
6. Accommodates most pools with a "deck-to-water" dimension of up to 6".
7. Dual flip-up armrests provide easier access and safer transfers on the pool deck and in the water.
8. Comfortable seat has an adjustable lap belt with hook-and-loop fasteners, plus an adjustable and removable footrest.
9. Simple 2-button submersible handset lets the user raise and lower while seated or from the pool edge.
10. Rechargeable battery-powered operation is easier to install than water-powered lifts; provides a smoother ride, greater reliability and easier servicing with plug-and-play components.



# AQUATRAM®

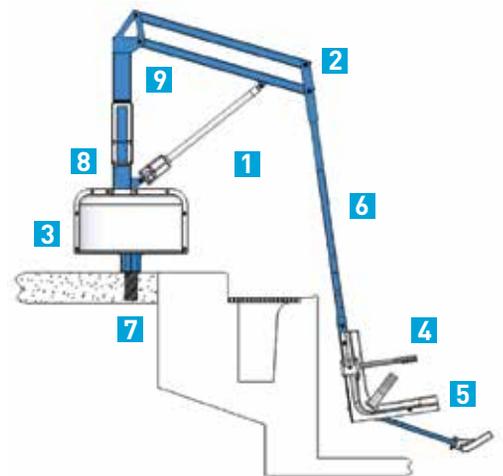
## ADA COMPLIANT POOL ACCESS LIFTS

### AQUATRAM 360 LIFT



#### Features and Benefits

1. ADA Compliant; Lifting Capacity: 500 lbs.
2. Versatile boom arm design accommodates anchor set-back distances up to 40"; clears walls up to 30" high and 10" wide; and can serve two adjoining pools from the same install location.
3. 360° unimpeded rotation in either direction allows access to and from the lift, even in small areas.
4. Dual flip-up armrests provide easier access and safer transfers on the pool deck and in the water.
5. Comfortable seat has an adjustable lap belt with hook-and-loop fasteners, plus an adjustable and removable footrest.
6. Simple 4-button submersible handset lets the user raise, lower and rotate while seated or from the pool edge.
7. Removes without tools, and moves easily with the optional transport cart. Multiple anchors can be installed in various locations around the pool to accommodate the pool's scheduled activities.
8. Stainless steel construction with corrosion-resistant powder-coat finish.
9. Rechargeable battery-powered operation is easier to install than water-powered lifts; provides a smoother ride, greater reliability and easier servicing with plug-and-play components.



## Choose the AquaTRAM Lift that Rises to Your Needs

Features and Benefits	AquaTRAM 90	AquaTRAM 360 Lift with in-deck tool-free anchoring	AquaTRAM Lift with in-deck tool-free anchoring	AquaTRAM LT Lift with Lag-bolt anchoring	AquaTRAM PT
Lifting capacity	300 lbs.	500 lbs.	400 lbs.	350 lbs.	350 lbs.
ADA Compliant	✓	✓	✓	✓	✓
Rotation for tight-area access	90° right or left	360°			
Boom arm design adapts to the most demanding and specialized applications; superb reach and wall clearance	✓	✓			
Can serve 2 adjoining pools with 1 lift		✓			
Low profile design uses minimal deck space	✓		✓	✓	✓
22" wide seat standard		✓			
Compact and lightweight, fits through most doorways	✓		✓	✓	✓
Secure in-deck anchoring with patented design; tool-free removal; portable with optional Transport Cart	✓	✓	✓		
Secure Docking Bar included to secure in place per ADA requirement					✓
Lag bolt anchoring, quick removal with tools; portable with optional Transport Cart				✓	
Dual flip-up armrests for easier access and safer transfers	✓	✓	✓	✓	✓
Adjustable & removable footrest fits users across a wide range of sizes	✓	✓	✓	✓	✓
Adjustable lap belt with hook & eye fastening	✓	✓	✓	✓	✓
Easy-to-use Slim Line controls can be operated from seat or pool ledge	✓	✓	✓	✓	✓
Stainless steel construction, durable powder-coat finish	✓	✓	✓	✓	✓
Battery-operated; easier to install & smoother transport than water power	✓	✓	✓	✓	✓
Slim, one-piece 24v rechargeable battery	✓	✓	✓	✓	✓
Submersible remote	✓	✓	✓	✓	✓
5-year Limited Warranty (pro-rated after Year 2 on electronics)		✓	✓		
Lifetime Limited Warranty on frame		✓	✓		
2-year Limited Warranty	✓			✓	✓

AquaTRAM LT Lift and Anchor	
Pentair P/N	Description
11230	AquaTRAM LT Lift w/ Anchor Kit
11230-A	AquaTRAM LT Lift Less Anchor Kit
11231	AquaTRAM LT Anchor Kit only
11232	AquaTRAM LT Transport Cart
11204	AquaTRAM Protective Cover
11205	Adjustable Headrest, AquaTRAM only
11270	AquaTRAM Replacement Hand Control
11271	AquaTRAM Replacement Control Box
11273	AquaTRAM Replacement Actuator Cover

AquaTRAM Series SHARED Options & Accessories	
Pentair P/N	Description
11206	AquaTRAM Series Adjustable Chest Strap
11208	AquaTRAM Series Pull-out Leg rest
11211	AquaTRAM Series Replacement Battery
11277	AquaTRAM Series Replacement Charger
11213	AquaTRAM Series Replacement Footrest
11207	AquaTRAM Series Cycle Attachment
11214	AquaTRAM Series Replacement Seat w/ Arms
11215	AquaTRAM Series Replacement Seat Belt

AquaTRAM PT Lift	
Pentair P/N	Description
11280S	AquaTRAM PT Lift w/ Sand Ballast (sand not incl.)
11280	AquaTRAM PT Lift w/ Concrete Ballast (concrete incl.)
11285	AquaTRAM PT Cover, Blue
11287	AquaTRAM PT Accessory Upgrade Kit**
11289	Affixment Kit (contains docking bar and anchor)

AquaTRAM Lift and Anchor	
Pentair P/N	Description
11200	AquaTRAM Lift w/ Anchor
11200-A	AquaTRAM Lift without Anchor
11201	AquaTRAM Lift w/ Anchor - Left facing
11201-A	AquaTRAM Lift without Anchor - Left facing
11202	QuickSet Dual Wedge Anchor for AquaTRAM Lift
11203	AquaTRAM Transport Cart
11272	AquaTRAM Replacement Actuator w/ Frame
11204	AquaTRAM Protective Cover
11205	Adjustable Headrest, AquaTRAM Only
11270	AquaTRAM Replacement Hand Control
11271	AquaTRAM Replacement Control Box
11273	AquaTRAM Replacement Actuator Cover

AquaTRAM 90 Lift	
Pentair P/N	Description
11220	AquaTRAM 90 Lift w/ Quickset Dual Wedge Anchor
11220-A	AquaTRAM 90 Lift w/o Quickset Dual Wedge Anchor
11221	AquaTRAM 90 Lift for Round Anchor Post w/Anchor
11221-A	AquaTRAM 90 Lift for Round Anchor w/o Anchor
11222	AquaTRAM 90 Lift Cover
11224	AquaTRAM 90 Lift Transport Cart
11226	AquaTRAM 90 Anchor for Round Post Model
11202	AquaTRAM 90 Anchor for Square Post Anchor
11240	2-1/2"OD x 1.95"ID Anchor Adapter Sleeve
11241	2-3/8"OD x 1.95"ID Anchor Adapter Sleeve
11242	2-5/8"OD x 1.95"ID Anchor Adapter Sleeve
11243	Round Anchor for Wood Framed Deck

AquaTRAM 360 Lift and Accessories	
Pentair P/N	Description
11250	AquaTRAM 360 Lift w/ Anchor
11250-A	AquaTRAM 360 Lift without Anchor
11252	AquaTRAM 360 Anchor Kit w/ Cap
11257	AquaTRAM 360 Protective Cover
11254	AquaTRAM 360 Adjustable Headrest
11253	AquaTRAM 360 Transport Cart
11255	AquaTRAM 360 Sling Arm Option (500# Capacity)
11256-C	AquaTRAM 360 Replacement Sling Chain Set
11256	AquaTRAM 360 Replacement Sling (500# Capacity)
11256-B	AquaTRAM 360 Replacement Sling Bars
11258	AquaTRAM 360 Gurney Option
11260	AquaTRAM 360 Spine Board Option
11261	AquaTRAM 360 Head Immobilizer for Spine Board
11274	AquaTRAM 360 Replacement Hand Control, 4-Button
11275	AquaTRAM 360 Replacement Control Box
11276	AquaTRAM 360 Replacement Actuator
11259	AquaTRAM 360 Wheelchair Option 22" Chair included

\*\*Includes cover, headrest, chest strap and extra battery

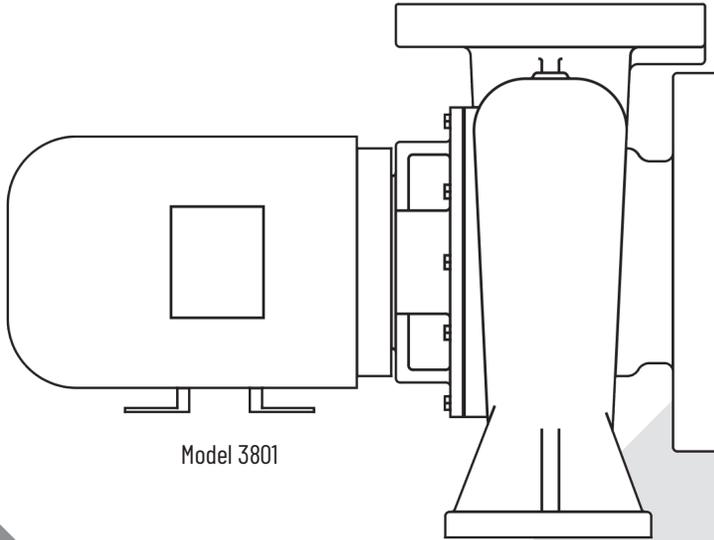


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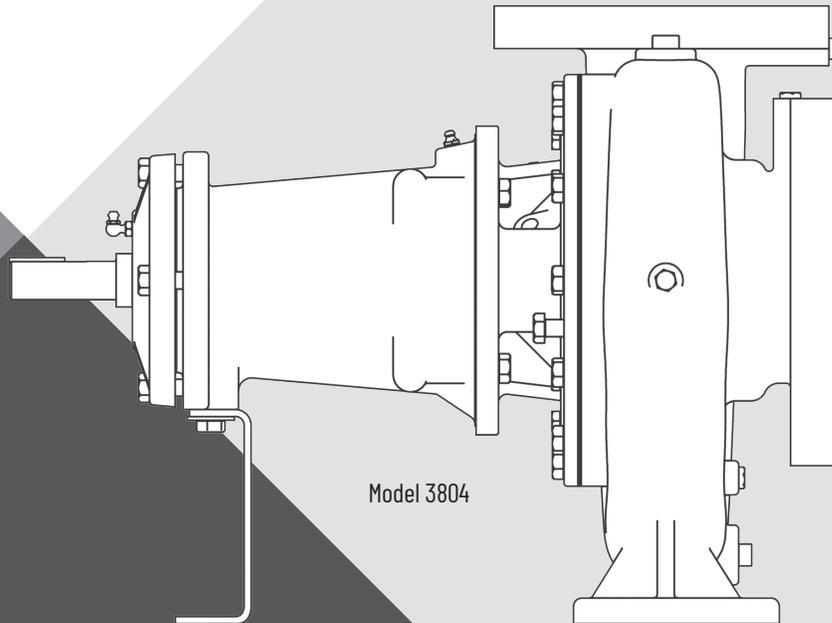
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**END SUCTION PUMPS**

3801 ♦ 3804



Model 3801



Model 3804

**DIMENSION TABLES  
ADDENDUM**

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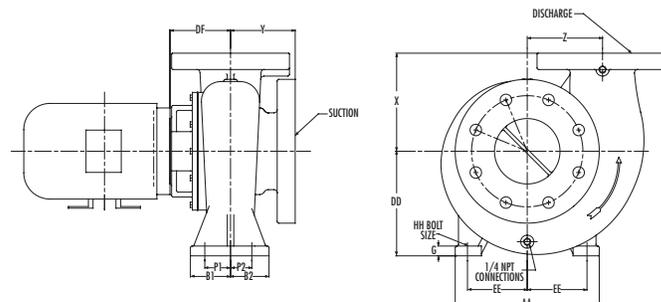
# PENTAIR AURORA® MODEL 3801 PUMPS

Pump Size	Disch.	Suct.	DD	X	Y	Z	P1	P2	B1	B2	G	HH	EE	AA	DF 143-184JM	DF 213-215JM	DF 254-256JM	DF 284-326JM	DF 384-405TCZ	DF 444-449TCZ
1.25x1.5x7 (NPT)	1.25	1.5	7.00 (178)	5.00 (127)	3.25 (83)	4.50 (114)	1.63 (041)	1.38 (035)	2.63 (067)	2.38 (060)	0.63 (016)	0.44 (011)	3.25 (083)	8.00 (203)	4.25 (108)	4.25 (108)	N/A	N/A	N/A	N/A
1.25x1.5x9.5 (NPT)	1.25	1.5	7.00 (178)	8.00 (203)	3.25 (83)	5.50 (140)	2.44 (62)	1.94 (49)	3.06 (78)	2.56 (65)	0.63 (16)	0.50 (13)	4.56 (116)	10.38 (264)	4.59 (117)	4.59 (117)	5.25 (133)	5.25 (133)	N/A	N/A
1.5x2x7 (NPT)	1.5	2	7.00 (178)	6.00 (152)	3.13 (079)	4.63 (117)	1.44 (037)	1.56 (040)	2.44 (062)	2.56 (065)	0.63 (016)	0.44 (011)	3.25 (083)	8.00 (203)	4.75 (121)	4.75 (121)	5.31 (135)	N/A	N/A	N/A
1.5x2x9.5 (NPT)	1.5	2	7.00 (178)	6.50 (165)	3.11 (79)	5.75 (146)	2.44 (62)	1.94 (49)	3.25 (83)	2.75 (70)	0.63 (16)	0.63 (16)	4.56 (116)	10.75 (273)	4.59 (117)	4.59 (117)	5.25 (133)	5.25 (133)	N/A	N/A
1.5x2x11 (NPT)	1.5	2	8.00 (203)	9.00 (229)	3.13 (079)	5.75 (146)	1.44 (037)	2.94 (075)	2.25 (057)	3.75 (095)	0.69 (017)	0.44 (011)	4.56 (116)	11.00 (279)	4.63 (118)	4.63 (118)	5.63 (143)	5.63 (143)	N/A	N/A
1.5x2x12 (NPT)	1.5	2	10.00 (254)	7.75 (197)	2.75 (070)	5.75 (146)	1.94 (049)	2.94 (075)	2.87 (073)	3.75 (095)	0.69 (017)	0.44 (011)	4.56 (116)	11.00 (279)	4.81 (122)	4.81 (122)	N/A	N/A	N/A	N/A
2x2.5x7▲	2	2.5	7.00 (178)	6.50 (165)	3.50 (089)	4.75 (121)	1.63 (041)	1.44 (037)	2.56 (065)	2.44 (062)	0.63 (016)	0.44 (011)	3.25 (083)	8.00 (203)	4.88 (124)	4.88 (124)	5.50 (140)	5.50 (140)	N/A	N/A
2x2.5x9.5▲	2	2.5	8.00 (203)	7.00 (178)	4.00 (102)	5.88 (149)	1.56 (040)	2.81 (071)	2.38 (060)	3.63 (092)	0.69 (017)	0.44 (011)	4.56 (116)	11.00 (279)	4.75 (121)	4.75 (121)	5.44 (138)	5.44 (138)	N/A	N/A
2x3x11▲	2	3	10.00 (254)	8.00 (203)	5.50 (140)	6.50 (165)	2.23 (051)	2.77 (070)	3.23 (082)	3.77 (096)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	4.44 (113)	4.44 (113)	5.31 (135)	5.31 (135)	9.13 (232)	9.13 (232)
2x3x13.5▲	2	3	10.00 (254)	9.00 (229)	5.50 (140)	7.25 (184)	2.00 (051)	3.00 (076)	3.00 (076)	4.00 (102)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	N/A	5.38 (137)	5.38 (137)	5.38 (137)	N/A	N/A
2.5x3x7▲	2.5	3	7.00 (178)	6.00 (152)	4.25 (108)	4.69 (121)	1.63 (041)	1.38 (035)	2.63 (067)	2.38 (060)	0.63 (016)	0.44 (011)	3.25 (083)	8.00 (203)	4.81 (122)	4.81 (122)	4.44 (113)	4.44 (113)	N/A	N/A
2.5x3x9.5▲	2.5	3	8.00 (203)	6.75 (171)	4.00 (102)	6.00 (152)	1.63 (041)	2.75 (070)	2.44 (062)	3.56 (090)	0.69 (017)	0.44 (011)	4.56 (116)	11.00 (279)	4.94 (125)	4.94 (125)	5.56 (141)	5.56 (141)	9.56 (243)	9.56 (243)
2.5x3x13.5▲	2.5	3	10.00 (254)	9.00 (229)	6.00 (152)	8.00 (203)	2.00 (051)	3.00 (076)	3.00 (076)	4.00 (102)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	N/A	5.50 (140)	5.50 (140)	5.50 (140)	N/A	N/A
3x4x7▲	3	4	7.00 (178)	6.00 (152)	4.13 (105)	5.00 (127)	1.69 (043)	1.31 (033)	2.69 (068)	2.31 (059)	0.63 (016)	0.44 (011)	3.25 (083)	8.00 (203)	4.69 (119)	4.69 (119)	5.31 (135)	5.31 (135)	N/A	N/A
3x4x9.5▲	3	4	8.00 (203)	9.50 (241)	4.75 (121)	6.13 (156)	1.81 (046)	2.56 (065)	2.69 (068)	3.31 (084)	0.75 (019)	0.44 (011)	4.56 (116)	11.00 (279)	4.69 (119)	4.69 (119)	5.31 (135)	5.31 (135)	9.31 (236)	9.31 (236)
3x4x11▲	3	4	10.00 (254)	9.50 (241)	5.50 (140)	7.38 (187)	2.44 (062)	2.56 (065)	3.44 (087)	3.56 (091)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	4.44 (113)	4.44 (113)	5.31 (135)	5.31 (135)	9.13 (232)	9.13 (232)
3x4x13.5▲	3	4	10.00 (254)	9.50 (241)	5.63 (143)	8.00 (203)	2.13 (054)	2.88 (073)	3.13 (080)	3.88 (098)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	N/A	N/A	5.44 (138)	5.44 (138)	9.31 (236)	9.31 (236)
4x5x7▲	4	5	8.00 (203)	7.50 (191)	4.94 (125)	5.75 (146)	2.25 (057)	2.13 (054)	3.06 (078)	2.94 (075)	0.69 (017)	0.44 (011)	4.56 (116)	11.00 (279)	4.94 (125)	4.94 (125)	5.56 (141)	5.56 (141)	N/A	N/A
4x5x9.5▲	4	5	10.00 (254)	8.00 (203)	5.00 (127)	7.00 (178)	1.88 (048)	2.50 (064)	2.69 (068)	3.31 (084)	0.75 (019)	0.44 (011)	4.56 (116)	11.00 (279)	4.69 (119)	4.69 (119)	5.31 (135)	5.31 (135)	9.31 (236)	9.31 (236)
4x5x11▲	4	5	10.00 (254)	9.75 (248)	5.56 (141)	7.25 (184)	2.41 (061)	2.59 (066)	3.41 (087)	3.59 (091)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	4.50 (114)	4.50 (114)	5.38 (137)	5.38 (137)	9.19 (233)	9.19 (233)
4x5x13.5▲	4	5	11.00 (279)	10.00 (254)	6.00 (152)	8.56 (218)	2.25 (057)	2.75 (070)	3.25 (083)	3.75 (095)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	N/A	N/A	5.06 (129)	5.06 (129)	8.88 (226)	8.88 (226)
5x6x7▲	5	6	10.00 (254)	8.50 (216)	5.81 (148)	6.25 (159)	2.81 (071)	1.56 (040)	3.63 (092)	2.38 (060)	0.69 (018)	0.44 (011)	4.56 (116)	11.00 (279)	5.18 (132)	5.18 (132)	5.81 (148)	5.81 (148)	9.50 (241)	N/A
5x6x9.5▲	5	6	11.00 (279)	10.00 (254)	6.00 (152)	7.50 (191)	2.19 (056)	2.81 (071)	3.19 (081)	3.81 (097)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	5.06 (129)	5.06 (129)	5.69 (145)	5.69 (145)	9.69 (246)	9.69 (246)
5x6x11▲	5	6	11.00 (279)	10.50 (267)	5.44 (138)	7.94 (202)	2.59 (066)	2.41 (061)	3.44 (087)	3.56 (091)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	N/A	N/A	5.44 (138)	5.44 (138)	9.25 (235)	9.25 (235)
5x6x13.5▲	5	6	12.00 (305)	13.00 (330)	6.00 (152)	9.00 (229)	4.19 (106)	4.81 (122)	5.19 (132)	5.81 (148)	1.00 (025)	0.63 (016)	10.50 (267)	23.00 (584)	N/A	N/A	5.56 (141)	5.56 (141)	9.38 (238)	9.38 (238)
6x8x9.5▲	6	8	11.00 (279)	10.50 (267)	7.00 (178)	8.25 (210)	3.13 (079)	1.88 (048)	4.13 (105)	2.88 (073)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	N/A	N/A	6.19 (157)	6.19 (157)	N/A	N/A
6x8x11▲	6	8	12.00 (305)	11.00 (279)	6.13 (156)	8.47 (215)	4.63 (117)	4.38 (111)	5.63 (143)	5.38 (137)	1.00 (025)	0.63 (016)	10.50 (267)	23.00 (584)	N/A	N/A	5.81 (148)	5.81 (148)	N/A	N/A
6x8x13.5▲	6	8	12.63 (321)	13.38 (340)	6.50 (165)	9.31 (237)	4.50 (114)	4.50 (114)	5.50 (140)	5.50 (140)	1.00 (025)	0.63 (016)	10.50 (267)	23.00 (584)	N/A	N/A	6.38 (161)	6.38 (161)	9.44 (240)	9.44 (240)
8x10x13.5▲	8	10	15.00 (381)	14.00 (356)	8.00 (203)	11.00 (279)	4.50 (114)	4.50 (114)	5.50 (140)	5.50 (140)	1.00 (025)	0.63 (016)	10.50 (267)	23.00 (584)	N/A	N/A	8.19 (208)	8.19 (208)	9.25 (235)	9.25 (235)

\*Temporarily unavailable until further notice.

**NOTES:**

- Dimensions are approximate.
- All dimensions are in inches(mm) and may vary ± 1/4(6).
- Not for construction purposes unless certified.
- ▲ Available in 250 lb./125 lb. flanges.
- Dimensions do not match Bell & Gossett®.
- Conduit box is shown in approximate location. Dimensions are not specified as they may vary with each motor manufacturer.



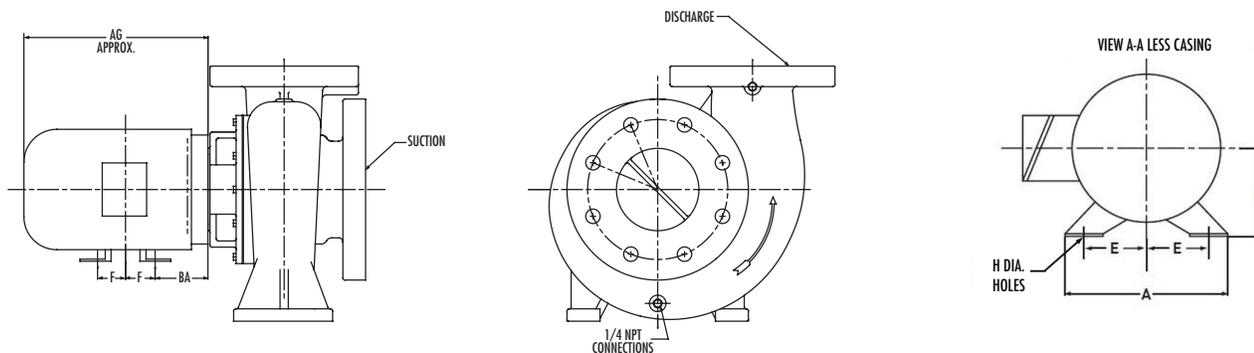
# PENTAIR AURORA® MODEL 3801 PUMPS

## MOTOR FRAME

Frame	AG Approx.	A	D	E	F	H	BA <sup>3</sup>
143JM	10.00 (254)	7.00 (178)	3.50 (089)	2.75 (070)	2.00 (051)	0.34 (009)	2.25 (057)
145JM	11.00 (279)	7.00 (178)	3.50 (089)	2.75 (070)	2.50 (064)	0.34 (009)	2.25 (057)
182JM	11.00 (279)	9.00 (229)	4.50 (114)	3.75 (095)	2.25 (057)	0.41 (010)	2.75 (070)
184JM	12.00 (305)	9.00 (229)	4.50 (114)	3.75 (095)	2.75 (070)	0.41 (010)	2.75 (070)
213JM	14.00 (356)	10.50 (267)	5.25 (133)	4.25 (108)	2.75 (070)	0.41 (010)	3.50 (089)
215JM	15.00 (381)	10.50 (267)	5.25 (133)	4.25 (108)	3.50 (089)	0.41 (010)	3.50 (089)
254JM	17.50 (445)	12.50 (318)	6.25 (159)	5.00 (127)	4.13 (105)	0.53 (013)	4.25 (108)
256JM	19.00 (483)	12.50 (318)	6.25 (159)	5.00 (127)	5.00 (127)	0.53 (013)	4.25 (108)
284JM	19.00 (483)	14.00 (356)	7.00 (178)	5.50 (140)	4.75 (121)	0.53 (013)	4.75 (121)
286JM	21.00 (533)	14.00 (356)	7.00 (178)	5.50 (140)	5.50 (140)	0.53 (013)	4.75 (121)
324JM	22.00 (559)	16.00 (406)	8.00 (203)	6.25 (159)	5.25 (133)	0.66 (017)	5.25 (133)
326JM	23.00 (584)	16.00 (406)	8.00 (203)	6.25 (159)	6.00 (152)	0.66 (017)	5.25 (133)
364JM	26.00 (660)	17.17 (436)	9.00 (229)	7.00 (178)	5.63 (143) / 6.13 (156) <sup>B</sup>	0.66 (017)	5.88 (149)
365JM	26.00 (660)	17.17 (436)	9.00 (229)	7.00 (178)	5.63 (143) / 6.13 (156) <sup>B</sup>	0.66 (017)	5.88 (149)
404JM	32.00 (813)	19.92 (506)	10.00 (254)	7.99 (203)	6.12 (155) / 6.87 (174) <sup>B</sup>	0.81 (21)	6.61 (168)
405JM	32.00 (813)	19.92 (506)	10.00 (254)	7.99 (203)	6.12 (155) / 6.87 (174) <sup>B</sup>	0.81 (21)	6.61 (168)
364TCZ	24.00 (610)	18.00 (457)	9.00 (229)	7.00 (178)	5.63 (143)	0.66 (017)	5.88 (149)
365TCZ	24.00 (610)	18.00 (457)	9.00 (229)	7.00 (178)	6.13 (156)	0.66 (017)	5.88 (149)
404TCZ	27.25 (692)	20.00 (508)	10.00 (254)	8.00 (203)	6.13 (156)	0.81 (021)	6.63 (168)
405TCZ	28.75 (730)	20.00 (508)	10.00 (254)	8.00 (203)	6.88 (175)	0.81 (021)	6.63 (168)
444TCZ	31.13 (791)	22.00 (559)	11.00 (279)	9.00 (229)	7.25 (184)	0.81 (021)	7.50 (191)
445TCZ	31.13 (791)	22.00 (559)	11.00 (279)	9.00 (229)	8.25 (210)	0.81 (021)	7.50 (191)
447TCZ	39.63 (1006)	22.00 (559)	11.00 (279)	9.00 (229)	10.00 (254)	0.81 (021)	7.50 (191)
449TCZ	39.63 (1006)	22.00 (559)	11.00 (279)	9.00 (229)	12.50 (318)	0.81 (021)	7.50 (191)

### NOTES:

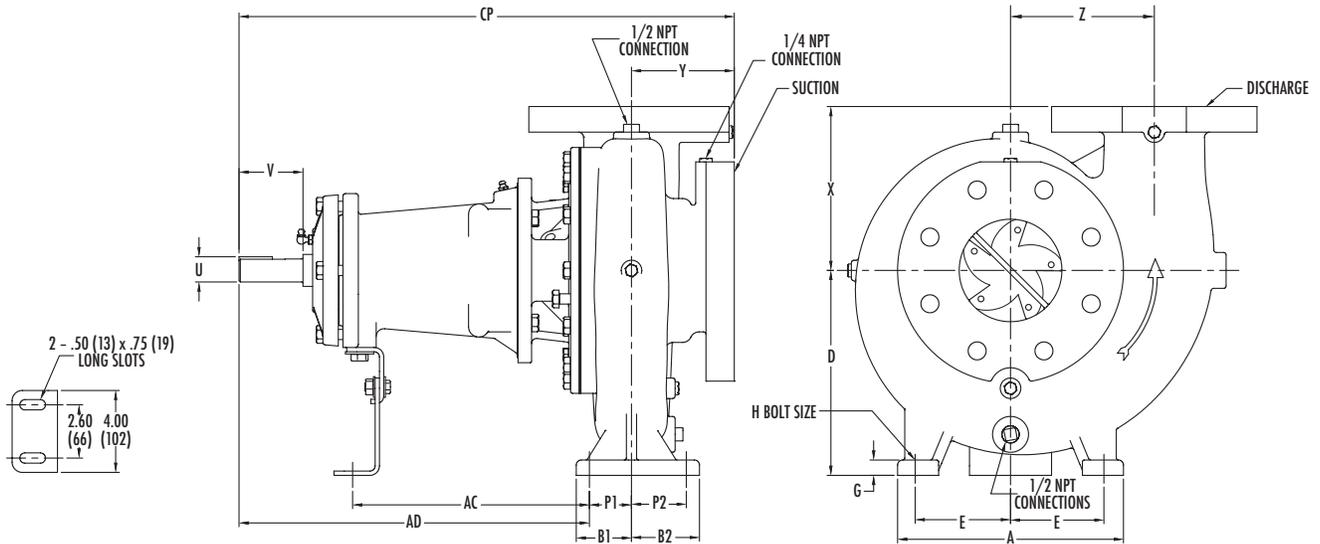
1. All dimensions are in inches (mm) and may vary  $\pm 1/4$  (6).
2. Not for construction purposes unless certified.
3. BA dimensions may vary for different manufacturers. Reference only.
4. Conduit box is shown in approximate location. Dimensions are not specified as they may vary with each motor manufacturer.
5. There are two mounting holes on the rear foot for the noted motors.





# PENTAIR AURORA® MODEL 3804 PUMPS

## PUMP END ONLY



## PUMP END ONLY

Pump Size	Power Frame Size	Discharge	Suction	D	X	Y	Z	P1	P2	B1	B2	G	H	E	A	AC	AD	CP	U	V	Key
1.25x1.5x7(NPT)	S	1.25	1.5	7.00 (178)	5.00 (127)	3.25 (83)	4.50 (114)	1.63 (041)	1.38 (035)	2.63 (067)	2.38 (060)	0.63 (016)	0.44 (011)	3.25 (83)	8.00 (203)	8.35 (212)	12.93 (328)	17.81 (452)	0.88 (022)	2.13 (054)	.19(5) SO. x 1.38(35) LNG
1.25x1.5x9.5(NPT)	S	1.25	1.5	7.00 (178)	8.00 (203)	3.25 (83)	5.5 (140)	2.44 (62)	1.94 (49)	3.06 (78)	2.56 (65)	0.63 (16)	0.50 (13)	4.56 (116)	10.38 (264)	7.71 (196)	12.27 (312)	17.96 (456)	0.88 (22)	2.13 (54)	0.19(5) SO. x 1.38(35) LNG.
1.25x1.5x9.5(NPT)	L	1.25	1.5	7.00 (178)	8.00 (203)	3.25 (83)	5.5 (140)	2.44 (62)	1.94 (49)	3.06 (78)	2.56 (65)	0.63 (16)	0.50 (13)	4.56 (116)	10.38 (264)	10.63 (270)	16.43 (417)	22.12 (562)	1.13 (29)	3.13 (80)	0.25(6) SO. x 1.75(44) LNG.
1.5x2x7(NPT)	S	1.5	2	7.00 (178)	6.00 (152)	3.13 (079)	4.63 (117)	1.44 (037)	1.56 (040)	2.44 (062)	2.56 (065)	0.63 (016)	0.44 (011)	3.25 (83)	8.00 (203)	9.03 (229)	13.59 (345)	18.16 (461)	0.88 (022)	2.13 (054)	.19(5) SO. x 1.38(35) LNG
1.5x2x9.5(NPT)	S	1.5	2	7.00 (178)	6.50 (165)	3.11 (79)	5.75 (146)	2.44 (62)	1.94 (49)	3.25 (83)	2.75 (70)	0.63 (16)	0.63 (16)	4.56 (116)	10.75 (273)	7.90 (201)	12.46 (316)	18.01 (457)	0.88 (22)	2.13 (54)	0.19(5) SO. x 1.38(35) LNG.
1.5x2x9.5(NPT)	L	1.5	2	7.00 (178)	6.50 (165)	3.11 (79)	5.75 (146)	2.44 (62)	1.94 (49)	3.25 (83)	2.75 (70)	0.63 (16)	0.63 (16)	4.56 (116)	10.75 (273)	10.81 (275)	16.62 (422)	22.17 (563)	1.13 (29)	3.13 (80)	0.25(6) SO. x 1.75(44) LNG.
1.5x2x11(NPT)	S	1.5	2	8.00 (203)	9.00+ (229)	3.13 (079)	5.75 (146)	1.44 (037)	2.94 (075)	2.25 (057)	3.75 (095)	0.69 (017)	0.44 (011)	4.56 (116)	11.00 (279)	8.92 (227)	13.48 (342)	18.05 (458)	0.88 (022)	2.13 (054)	.19(5) SO. x 1.38(35) LNG
1.5x2x11(NPT)	L	1.5	2	8.00 (203)	9.00+ (229)	3.13 (079)	5.75 (146)	1.44 (037)	2.94 (075)	2.25 (057)	3.75 (095)	0.69 (017)	0.44 (011)	4.56 (116)	11.00 (279)	12.19 (310)	18.62 (473)	23.19 (589)	1.13 (029)	3.13 (079)	.25(6) SO. x 1.75(44) LNG
1.5x2x12(NPT)	S	1.5	2	10.00 (254)	7.75 (197)	2.75 (070)	5.75 (146)	1.94 (049)	2.94 (075)	2.87 (073)	3.75 (095)	0.69 (017)	0.44 (011)	4.56 (116)	11.00 (279)	8.60 (218)	13.16 (334)	17.85 (453)	0.88 (022)	2.13 (054)	.19(5) SO. x 1.38(35) LNG
2x2.5x7A▲	S	2	2.5	7.00 (178)	6.50 (165)	3.50 (089)	4.75 (005)	1.56 (040)	1.44 (037)	2.56 (065)	2.44 (062)	0.63 (016)	0.44 (011)	3.25 (83)	8.00 (203)	9.08 (231)	13.63 (346)	18.70 (475)	0.88 (022)	2.13 (054)	.19(5) SO. x 1.38(35) LNG
2x2.5x9.5▲	S	2	2.5	8.00 (203)	7.00 (178)	4.00 (102)	5.88 (149)	1.56 (040)	2.81 (071)	2.38 (060)	3.63 (092)	0.69 (017)	0.44 (011)	4.56 (116)	11.00 (279)	8.94 (227)	13.50 (343)	19.07 (484)	0.88 (022)	2.13 (054)	.19(5) SO. x 1.38(35) LNG
2x2.5x9.5▲	L	2	2.5	8.00 (203)	7.00 (178)	4.00 (102)	5.88 (149)	1.56 (040)	2.81 (071)	2.38 (060)	3.63 (092)	0.69 (017)	0.44 (011)	4.56 (116)	11.00 (279)	11.85 (301)	17.69 (449)	23.22 (590)	1.13 (029)	3.13 (079)	.25(6) SO. x 1.75(44) LNG
2x3x11▲	S	2	3	10.00 (254)	8.00 (203)	5.50 (140)	6.50 (165)	2.23 (057)	2.77 (070)	3.23 (082)	3.77 (096)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	7.93 (201)	12.52 (318)	20.22 (514)	0.88 (022)	2.13 (054)	.19(5) SO. x 1.38(35) LNG

S - denotes small power frame  
 L - denotes large power frame  
 XL - denotes extra large power frame

- NOTES:
1. Dimensions are approximate.
  2. All dimensions are in inches (mm) and may vary ± 1/4 (6).
  3. Not for construction purposes unless certified.
  4. Use Extra Large power frame with impeller diameters larger than 12.5 (318).
- ▲ Available in 250 lb./125 lb. flanges.  
 • Dimensions do not match Bell & Gossett®.

# PENTAIR AURORA® MODEL 3804 PUMPS

## PUMP END ONLY

Pump Size	Power Frame Size	Discharge	Suction	D	X	Y	Z	P1	P2	B1	B2	G	H	E	A	AC	AD	CP	U	V	Key
2x3x11▲	L	2	3	10.00 (254)	8.00 (203)	5.50 (140)	6.50 (165)	2.23 (057)	2.77 (070)	3.23 (082)	3.77 (096)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	11.06 (281)	16.87 (426)	24.59 (625)	1.13 (029)	3.13 (079)	.25(6) SO. x 1.75(44) LNG
2x3x13.5▲	L	2	3	10.00 (254)	9.00 (229)	5.50 (140)	7.25 (184)	2.00 (051)	3.00 (076)	3.00 (076)	3.00 (102)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	11.34 (288)	17.25 (438)	24.65 (626)	1.13 (029)	3.13 (079)	.25(6) SO. x 1.75(44) LNG
2.5x3x7▲	S	2.5	3	7.00 (178)	6.00 (152)	4.25 (108)	4.69 (119)	1.63 (041)	1.38 (035)	2.63 (067)	2.38 (060)	0.63 (016)	0.44 (011)	3.25 (083)	8.00 (203)	8.94 (227)	13.50 (343)	19.38 (492)	0.88 (022)	2.13 (054)	.19(5) SO. x 1.38(35) LNG
2.5x3x7▲	L	2.5	3	7.00 (178)	6.00 (152)	4.25 (108)	4.69 (119)	1.63 (041)	1.38 (035)	2.63 (067)	2.38 (060)	0.63 (016)	0.44 (011)	3.25 (083)	8.00 (203)	11.81 (300)	17.69 (449)	23.49 (597)	1.13 (029)	3.13 (080)	.25(6) SO. x 1.75(44) LNG
2.5x3x9.5▲	S	2.5	3	8.00 (203)	6.75 (171)	4.00 (102)	6.00 (152)	1.63 (041)	2.75 (070)	2.44 (062)	3.56 (090)	0.69 (017)	0.44 (011)	4.56 (116)	11.00 (279)	9.03 (229)	13.62 (346)	19.22 (488)	0.88 (022)	2.13 (054)	.19(5) SO. x 1.38(35) LNG
2.5x3x9.5▲	L	2.5	3	8.00 (203)	6.75 (171)	4.00 (102)	6.00 (152)	1.63 (041)	2.75 (070)	2.44 (062)	3.56 (090)	0.69 (017)	0.44 (011)	4.56 (116)	11.00 (279)	11.93 (303)	17.75 (451)	23.37 (594)	1.13 (029)	3.13 (079)	.25(6) SO. x 1.75(44) LNG
2.5x3x13.5▲	L	2.5	3	10.00 (254)	9.00 (229)	6.00 (152)	8.00 (203)	2.00 (051)	3.00 (076)	3.00 (076)	4.00 (102)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	11.47 (291)	17.28 (439)	25.28 (642)	1.13 (029)	3.13 (079)	.25(6) SO. x 1.75(44) LNG
3x4x7▲	S	3	4	7.00 (178)	6.00 (152)	4.13 (105)	5.00 (127)	1.69 (043)	1.31 (033)	2.69 (068)	2.31 (059)	0.63 (016)	0.44 (011)	3.25 (083)	8.00 (203)	8.73 (222)	13.24 (336)	19.11 (485)	0.88 (022)	2.13 (054)	.19(5) SO. x 1.38(35) LNG
3x4x7▲	L	3	4	7.00 (178)	6.00 (152)	4.13 (105)	5.00 (127)	1.69 (043)	1.31 (033)	2.69 (068)	2.31 (059)	0.63 (016)	0.44 (011)	3.25 (083)	8.00 (203)	11.60 (295)	17.43 (443)	23.22 (590)	1.13 (029)	3.13 (079)	.25(6) SO. x 1.75(44) LNG
3x4x9.5▲	S	3	4	8.00 (203)	7.50 (191)	4.75 (121)	6.13 (156)	1.81 (046)	2.56 (065)	2.69 (068)	3.31 (084)	0.75 (019)	0.44 (011)	4.56 (116)	11.00 (279)	8.54 (217)	13.19 (335)	19.72 (501)	0.88 (022)	2.13 (054)	.19(5) SO. x 1.38(35) LNG
3x4x9.5▲	L	3	4	8.00 (203)	7.50 (191)	4.75 (121)	6.13 (156)	1.81 (046)	2.56 (065)	2.69 (068)	3.31 (084)	0.75 (019)	0.44 (011)	4.56 (116)	11.00 (279)	11.50 (292)	17.32 (440)	23.87 (606)	1.13 (029)	3.13 (079)	.25(6) SO. x 1.75(44) LNG
3x4x11▲	S	3	4	10.00 (254)	9.50 (241)	5.50 (140)	7.38 (187)	2.44 (062)	2.56 (065)	3.44 (087)	3.56 (088)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	7.71 (196)	12.31 (313)	20.22 (514)	0.88 (022)	2.13 (054)	.19(5) SO. x 1.38(35) LNG
3x4x11▲	L	3	4	10.00 (254)	9.50 (241)	5.50 (140)	7.38 (187)	2.44 (062)	2.56 (065)	3.44 (087)	3.56 (088)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	10.84 (275)	16.69 (424)	24.59 (625)	1.13 (029)	3.13 (079)	.25(6) SO. x 1.75(44) LNG
3x4x13.5▲	L	3	4	10.00 (254)	9.50 (241)	5.63 (143)	8.00 (203)	2.13 (054)	2.88 (073)	3.13 (080)	3.88 (098)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	11.28 (287)	17.12 (435)	24.84 (631)	1.13 (029)	3.13 (079)	.25(6) SO. x 1.75(44) LNG
4x5x7▲	S	4	5	8.00 (203)	7.50 (191)	4.94 (125)	5.75 (146)	2.25 (057)	2.13 (054)	3.06 (078)	2.94 (075)	0.69 (017)	0.44 (011)	4.56 (116)	11.00 (279)	8.40 (213)	12.94 (329)	20.16 (512)	0.88 (022)	2.13 (054)	.19(5) SO. x 1.38(35) LNG
4x5x7▲	L	4	5	8.00 (203)	7.50 (191)	4.94 (125)	5.75 (146)	2.25 (057)	2.13 (054)	3.06 (078)	2.94 (075)	0.69 (017)	0.44 (011)	4.56 (116)	11.00 (279)	11.28 (287)	17.06 (433)	24.28 (617)	1.13 (029)	3.13 (079)	.25(6) SO. x 1.75(44) LNG
4x5x9.5▲	S	4	5	10.00 (254)	8.00 (203)	5.00 (127)	7.00 (178)	1.88 (048)	2.50 (064)	2.69 (068)	3.31 (084)	0.75 (019)	0.44 (011)	4.56 (116)	11.00 (279)	8.52 (216)	13.12 (333)	19.97 (507)	0.88 (022)	2.13 (054)	.19(5) SO. x 1.38(35) LNG
4x5x9.5▲	L	4	5	10.00 (254)	8.00 (203)	5.00 (127)	7.00 (178)	1.88 (048)	2.50 (064)	2.69 (068)	3.31 (084)	0.75 (019)	0.44 (011)	4.56 (116)	11.00 (279)	11.43 (290)	17.25 (438)	24.12 (613)	1.13 (029)	3.13 (079)	.25(6) SO. x 1.75(44) LNG
4x5x11▲	S	4	5	10.00 (254)	9.75 (248)	5.56 (141)	7.25 (184)	2.41 (061)	2.94 (075)	3.59 (091)	3.59 (091)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	7.81 (198)	12.41 (315)	20.35 (517)	0.88 (022)	2.13 (054)	.19(5) SO. x 1.38(35) LNG
4x5x11▲	L	4	5	10.00 (254)	9.75 (248)	5.56 (141)	7.25 (184)	2.41 (061)	2.94 (075)	3.59 (091)	3.59 (091)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	10.94 (278)	16.78 (426)	24.72 (628)	1.13 (029)	3.13 (079)	.25(6) SO. x 1.75(44) LNG
4x5x11▲	XL	4	5	10.00 (254)	9.75 (248)	5.56 (141)	7.25 (184)	2.41 (061)	2.59 (066)	3.41 (087)	3.59 (091)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	15.38 (391)	24.52 (623)	32.49 (825)	2.38 (060)	5.50 (140)	.63(16) SO. x 4.00(102) LNG
4x5x13.5▲	L	4	5	11.00 (279)	10.00 (254)	6.00 (152)	8.56 (218)	2.25 (057)	2.75 (070)	3.25 (083)	3.75 (095)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	10.78 (274)	16.63 (422)	24.84 (631)	1.13 (029)	3.13 (079)	.25(6) SO. x 1.75(44) LNG
4x5x13.5▲	XL	4	5	11.00 (279)	10.00 (254)	6.00 (152)	8.56 (218)	2.25 (057)	2.75 (070)	3.25 (083)	3.75 (095)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	15.25 (387)	24.38 (619)	32.63 (829)	2.38 (060)	5.50 (140)	.63(16) SO. x 4.00(102) LNG
5x6x7▲	S	5	6	10.00 (254)	8.50 (216)	5.81 (148)	6.25 (159)	2.81 (071)	1.56 (040)	3.63 (092)	2.38 (060)	0.69 (018)	0.44 (011)	4.56 (116)	11.00 (279)	8.09 (205)	12.63 (321)	21.28 (541)	0.88 (022)	2.13 (054)	.19(5) SO. x 1.38(35) LNG
5x6x7▲	L	5	6	10.00 (254)	8.50 (216)	5.81 (148)	6.25 (159)	2.81 (071)	1.56 (040)	3.63 (092)	2.38 (060)	0.69 (018)	0.44 (011)	4.56 (116)	11.00 (279)	10.97 (279)	16.76 (426)	25.39 (645)	1.13 (029)	3.13 (079)	.25(6) SO. x 1.75(44) LNG
5x6x9.5▲	S	5	6	11.00 (279)	10.00 (254)	6.00 (152)	7.50 (191)	2.19 (056)	2.81 (071)	3.19 (081)	3.81 (097)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	8.59 (218)	13.19 (335)	21.34 (542)	0.88 (022)	2.13 (054)	.19(5) SO. x 1.38(35) LNG
5x6x9.5▲	L	5	6	11.00 (279)	10.00 (254)	6.00 (152)	7.50 (191)	2.19 (056)	2.81 (071)	3.19 (081)	3.81 (097)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	11.50 (292)	17.31 (440)	25.50 (648)	1.13 (029)	3.13 (079)	.25(6) SO. x 1.75(44) LNG
5x6x11▲	L	5	6	11.00 (279)	10.50 (267)	5.44 (138)	7.94 (202)	2.59 (066)	2.41 (061)	3.44 (087)	3.56 (091)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	10.82 (275)	16.72 (425)	24.65 (626)	1.13 (029)	3.13 (079)	.25(6) SO. x 1.75(44) LNG
5x6x13.5▲	L	5	6	12.00 (305)	13.00 (330)	6.00 (152)	9.00 (229)	4.19 (106)	4.81 (122)	5.19 (132)	5.81 (148)	1.00 (025)	0.63 (016)	10.50 (267)	23.00 (584)	9.34 (237)	15.19 (386)	25.34 (644)	1.13 (029)	3.13 (079)	.25(6) SO. x 1.75(44) LNG
6x8x9.5A*▲	L	6	8	11.00 (279)	10.50 (267)	7.00 (178)	8.25 (210)	3.13 (079)	1.88 (048)	4.13 (105)	2.88 (073)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	11.06 (281)	16.93 (430)	27.00 (686)	1.13 (029)	3.13 (079)	.25(6) SO. x 1.75(44) LNG
6x8x11▲	L	6	8	12.00 (305)	11.00 (279)	6.13 (156)	8.47 (215)	4.63 (117)	4.38 (111)	5.63 (143)	5.38 (137)	1.00 (025)	0.63 (016)	10.50 (267)	23.00 (584)	9.15 (232)	15.05 (382)	25.72 (653)	1.13 (029)	3.13 (079)	.25(6) SO. x 1.75(44) LNG
6x8x13.5▲	XL	6	8	12.63- (321)	13.38- (340)	6.50 (165)	9.31 (237)	4.50 (114)	4.50 (114)	5.50 (140)	5.50 (140)	1.00 (025)	0.63 (016)	10.50 (267)	23.00 (584)	13.44 (341)	22.56 (573)	33.57 (853)	2.38 (060)	5.50 (140)	.63(16) SO. x 4.00(102) LNG
8x10x13.5*▲	XL	8	10	15.00 (381)	14.00 (356)	8.00 (203)	11.00 (279)	4.50 (114)	4.50 (114)	5.50 (140)	5.50 (140)	1.00 (025)	0.63 (016)	10.50 (267)	23.00 (584)	13.33 (339)	22.38 (568)	34.96 (888)	2.38 (060)	5.50 (140)	.63(16) SO. x 4.00(102) LNG

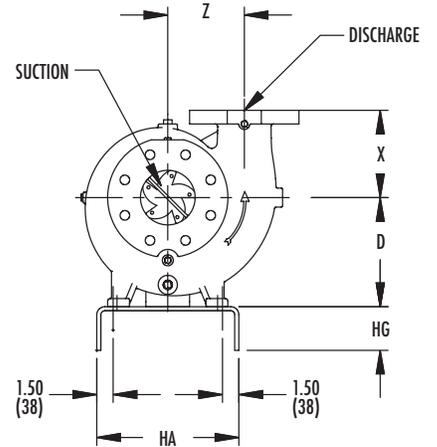
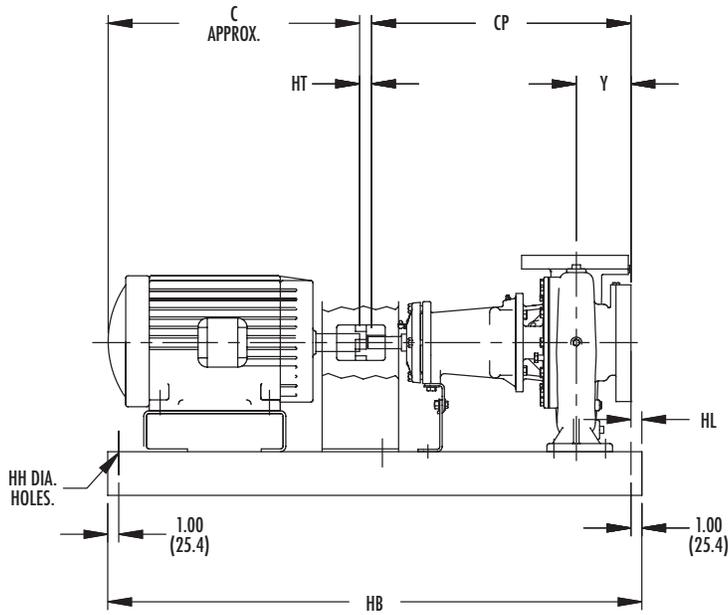
\*Temporarily unavailable until further notice.

S - denotes small power frame  
L - denotes large power frame  
XL - denotes extra large power frame

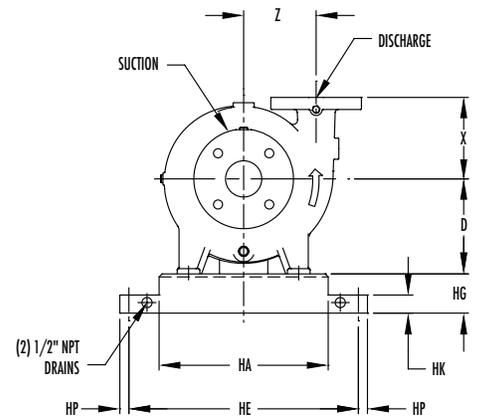
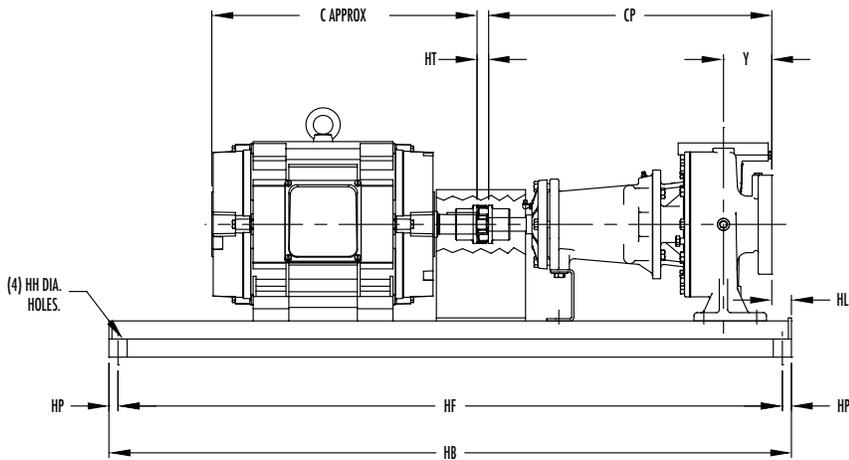
- NOTES:
- Dimensions are approximate.
  - All dimensions are in inches (mm) and may vary ± 1/4 (6).
  - Not for construction purposes unless certified.
  - Available in 250 lb./125 lb. flanges.
    - Dimensions do not match Bell & Gossett®.
  - Use Extra Large power frame with impeller diameters larger than 12.5 (318).

# PENTAIR AURORA® MODEL 3804 PUMPS

## WITH FORMED STEEL BASE, COUPLING AND MOTOR



## WITH DRIP RIM BASE, COUPLING AND MOTOR



# PENTAIR AURORA® MODEL 3804 PUMPS

## WITH OPTIONAL BASE, COUPLING AND MOTOR

Pump Size	Discharge	Suction	D	X	Y	Z	CP	Motor Frame	C Approx.	HL	P.F. 1	P.F. 2	P.F. 3	P.F. 21A	Steel Base No.	Drip Rim Base No.
1.25x1.5x7 (NPT)	1.25	1.5	7.00 (178)	5.00 (127)	3.25 (83)	4.50 (114)	17.81 (452)	56	12.00 (305)	1.00 (25)	X				1	4
								143T	13.00 (330)	1.00 (25)	X				2	5
								145T	14.00 (356)	1.00 (25)	XXX				2	5
								182T	15.00 (381)	1.00 (25)	XX				2	5
								184T	15.00 (381)	1.00 (25)	XX				2	5
								213T	18.00 (457)	1.00 (25)	XX				3	6
								215T	19.00 (483)	1.00 (25)	XX				3	6
								254T	24.00 (610)	1.00 (25)	XX				4	8
1.25x1.5x9.5 (NPT)	1.25 (32)	1.5 (38)	7.00 (178)	8.00 (203)	3.25 (83)	5.50 (140)	17.96 (456)	143T	13.00 (330)	1.00 (25)	X				2	5
								145T	14.00 (356)	1.00 (25)	X				2	5
								182T	15.00 (381)	1.00 (25)	X				3	6
								184T	15.00 (381)	1.00 (25)	X				3	6
								213T	18.00 (457)	1.00 (25)		00			5	9
								215T	19.00 (483)	1.00 (25)		00			5	9
							22.12 (562)	254T	24.00 (610)	1.00 (25)		XX			6	9
								256T	25.00 (635)	1.00 (25)		XX			6	9
								284T	27.00 (686)	1.00 (25)		XX			7	10
								284TS	25.00 (635)	1.00 (25)		XX			7	10
								286T	28.00 (711)	1.00 (25)		XX			7	10
								286TS	26.00 (660)	1.00 (25)		XX			7	10
								324T	29.00 (737)	1.00 (25)		XX			12	12
								324TS	28.00 (711)	1.00 (25)		XX			12	12
1.5x2x7 (NPT)	1.5	2	7.00 (178)	6.00 (152)	3.13 (80)	4.63 (118)	18.16 (461)	56	12.00 (305)	1.00 (25)	X				1	4
								143T	13.00 (330)	1.00 (25)	XXX				2	5
								145T	14.00 (356)	1.00 (25)	XXX				2	5
								182T	15.00 (381)	1.00 (25)	XX				2	5
								184T	15.00 (381)	1.00 (25)	XX				2	5
								213T	18.00 (457)	1.00 (25)	XX				3	6
								215T	19.00 (483)	1.00 (25)	XX				3	6
								254T	24.00 (610)	1.00 (25)	XX				4	8
								145T	14.00 (356)	1.00 (25)	X				2	5
								182T	15.00 (381)	1.00 (25)	X				3	6
1.5x2x9.5 (NPT)	1.5 (38)	2 (51)	7.00 (178)	6.50 (165)	3.11 (79)	5.75 (146)	18.01 (457)	184T	15.00 (381)	1.00 (25)	X				3	6
								213T	18.00 (457)	1.00 (25)	X				3	6
								215T	19.00 (483)	1.00 (25)		00			5	9
								254T	24.00 (610)	1.00 (25)		00			6	9
							22.17 (563)	256T	25.00 (635)	1.00 (25)		XX			6	9
								284T	27.00 (686)	1.00 (25)		XX			7	10
								284TS	25.00 (635)	1.00 (25)		XX			7	10
								286T	28.00 (711)	1.00 (25)		XX			7	10
								286TS	26.00 (660)	1.00 (25)		XX			7	10
								324T	29.00 (737)	1.00 (25)		XX			12	12
								324TS	28.00 (711)	1.00 (25)		XX			12	12
								326T	31.00 (787)	1.00 (25)		XX			12	12
								326TS	29.00 (737)	1.00 (25)		XX			12	12
								1.5x2x11 (NPT)	1.5	2	8.00 (203)	9.00 (229)	3.13 (80)	5.75 (146)	18.05 (458)	143T
145T	14.00 (356)	2.50 (64)	X				2									5
182T	15.00 (381)	2.50 (64)	X				3									6
184T	15.00 (381)	2.50 (64)	X				3									6
213T	18.00 (457)	2.50 (64)	X				3									6
23.19 (589)	213T	18.00 (457)	2.50 (64)		XX										5	9
	215T	19.00 (483)	2.50 (64)		XX										5	9
	254T	24.00 (610)	2.50 (64)		XX										6	9
	256T	25.00 (635)	2.50 (64)		XX										6	9
	284T	27.00 (686)	2.50 (64)		XX										7	10
284TS	25.00 (635)	2.50 (64)		XX			7	10								
286T	28.00 (711)	2.50 (64)		XX			7	10								
286TS	26.00 (660)	2.50 (64)		XX			7	10								
324T	29.00 (737)	2.50 (64)		XX			12	12								
324TS	28.00 (711)	2.50 (64)		XX			12	12								
326T	31.00 (787)	2.50 (64)		XX			12	12								
326TS	29.00 (737)	2.50 (64)		XX			12	12								
1.5x2x12 (NPT)	1.5	2	10.00 (254)	7.75 (197)	2.75 (70)	5.75 (146)	17.85 (453)	182T	15.00 (381)	3.00 (76)	X				3	6
								184T	15.00 (381)	3.00 (76)	X				3	6
								213T	18.00 (457)	3.00 (76)	X				4	8
								215T	19.00 (483)	3.00 (76)	X				4	8
								254T	24.00 (610)	3.00 (76)	X				5	9

**NOTES:**

- Dimensions are approximate.
- All dimensions are in inches (mm) and may vary ± 1/4 (6).
- Conduit box is shown in approximate position. Dimensions are not specified as they vary with each motor manufacturer.

- Not for construction purposes unless certified.
- ▲ Available in 250 lb./125 lb. flanges.
- X - for 1750 RPM applications  
XX - for 3550 RPM applications  
XXX - for 1750 and 3550 RPM applications

- HT is based on Aurora standard coupling. HT may vary from .25 to 3.25".
- 00 - 2950 RPM operation only.

# PENTAIR AURORA® MODEL 3804 PUMPS

## WITH OPTIONAL BASE, COUPLING AND MOTOR

Pump Size	Discharge	Suction	D	X	Y	Z	CP	Motor Frame	C Approx.	HL	P.F. 1	P.F. 2	P.F. 3	P.F. 21A	Steel Base No.	Drip Rim Base No.								
2x2.5x7A▲	2	2.5	7.00 (178)	6.50 (165)	3.50 (89)	4.75 (121)	18.70 (475)	143T	13.00 (330)	1.00 (25)	X				2	5								
								145T	14.00 (356)	1.00 (25)	X				2	5								
								182T	15.00 (381)	1.00 (25)	XXX				3	6								
								184T	15.00 (381)	1.00 (25)	XX				3	6								
								213T	18.00 (457)	1.00 (25)	XX				3	6								
								215T	19.00 (483)	1.00 (25)	XX				3	6								
								254T	24.00 (610)	1.00 (25)	XX				5	9								
								256T	25.00 (635)	1.00 (25)	XX				5	9								
2x2.5x9.5▲	2	2.5	8.00 (203)	7.00 (178)	4.00 (102)	5.88 (149)	19.07 (484)	145T	14.00 (356)	1.50 (38)	X				2	5								
								182T	15.00 (381)	1.50 (38)	X				3	6								
								184T	15.00 (381)	1.50 (38)	X				3	6								
								213T	18.00 (457)	1.50 (38)	X				3	6								
								215T	19.00 (483)	1.50 (38)		XX			5	9								
								254T	24.00 (610)	1.50 (38)		XX			6	9								
							23.22 (590)	256T	25.00 (635)	1.50 (38)		XX			6	9								
								284T	27.00 (686)	1.50 (38)		XX			7	10								
								284TS	25.00 (635)	1.50 (38)		XX			7	10								
								286T	28.00 (711)	1.50 (38)		XX			7	10								
								286TS	26.00 (660)	1.50 (38)		XX			7	10								
								324T	29.00 (737)	1.50 (38)		XX			12	12								
								324TS	28.00 (711)	1.50 (38)		XX			12	12								
								326T	31.00 (787)	1.50 (38)		XX			12	12								
								326TS	29.00 (737)	1.50 (38)		XX			12	12								
								364TS	31.00 (787)	1.50 (38)		XX			14	16								
								2x3x11▲	2	3	10.00 (254)	8.00 (203)	5.50 (140)	6.50 (165)	20.22 (514)	182T	15.00 (381)	1.00 (25)	X				8	11
																184T	15.00 (381)	1.00 (25)	X				8	11
213T	18.00 (457)	1.00 (25)	X				9									11								
215T	19.00 (483)	1.00 (25)	X				9									11								
254T	24.00 (610)	1.00 (25)	X				10									11								
24.59 (625)	284T	27.00 (686)	1.00 (25)		XX										12	12								
	284TS	25.00 (635)	1.00 (25)		XX										12	12								
	286T	28.00 (711)	1.00 (25)		XX										12	12								
	286TS	26.00 (660)	1.00 (25)		XX										12	12								
	324T	29.00 (737)	1.00 (25)		XX										12	12								
	324TS	28.00 (711)	1.00 (25)		XX										12	12								
	326T	31.00 (787)	1.00 (25)		XX										12	12								
	326TS	29.00 (737)	1.00 (25)		XX										12	12								
	364TS	31.00 (787)	1.00 (25)		XX										14	16								
	365TS	32.00 (813)	1.00 (25)		XX										14	16								
	404TS	34.00 (864)	1.00 (25)		XX										15	16								
	405TS	36.00 (914)	1.00 (25)		XX										15	16								
	444TS	41.00 (1041)	1.00 (25)		XX										18	21								
	2x3x13.5▲	2	3	10.00 (254)	9.00 (229)	5.50 (140)	7.25 (184)								24.65 (626)	184T	15.00 (381)	1.00 (25)			X		10	11
																213T	18.00 (457)	1.00 (25)			X		10	11
215T								19.00 (483)	1.00 (25)			X		10		11								
254T								24.00 (610)	1.00 (25)			X		11		12								
256T								25.00 (635)	1.00 (25)			X		11		12								
284T								27.00 (686)	1.00 (25)			X		11		12								
284TS								25.00 (635)	1.00 (25)			X		11		12								
2.5x3x7▲								2.5	3	7.00 (178)	6.00 (152)	4.25 (108)	4.69 (119)	19.38 (492)		143T	13.00 (330)	1.00 (25)	X				2	5
	145T	14.00 (356)	1.00 (25)	X											2	5								
	182T	15.00 (381)	1.00 (25)	XXX											3	6								
	184T	15.00 (381)	1.00 (25)	XXX											3	6								
	213T	18.00 (457)	1.00 (25)	XX											3	6								
	215T	19.00 (483)	1.00 (25)	XX											3	6								
	23.49 (597)	254T	24.00 (610)	1.00 (25)		XX									6	9								
		256T	25.00 (635)	1.00 (25)		XX									6	9								
		284T	27.00 (686)	1.00 (25)		XX									11	12								
		284TS	25.00 (635)	1.00 (25)		XX									11	12								
		286T	28.00 (711)	1.00 (25)		XX									11	12								
		286TS	26.00 (660)	1.00 (25)		XX									11	12								

**NOTES:**

- Dimensions are approximate.
- All dimensions are in inches (mm) and may vary ± 1/4 (6).
- Conduit box is shown in approximate position. Dimensions are not specified as they vary with each motor manufacturer.
- Not for construction purposes unless certified.
- ▲ Available in 250 lb./125 lb. flanges.
- X - for 1750 RPM applications  
XX - for 3550 RPM applications  
XXX - for 1750 and 3550 RPM applications
- HT is based on Aurora standard coupling.  
HT may vary from .25 to 3.25".
- 00 - 2950 RPM operation only.

# PENTAIR AURORA® MODEL 3804 PUMPS

## WITH OPTIONAL BASE, COUPLING AND MOTOR

Pump Size	Discharge	Suction	D	X	Y	Z	CP	Motor Frame	C Approx.	HL	P.F. 1	P.F. 2	P.F. 3	P.F. 21A	Steel Base No.	Drip Rim Base No.	
2.5x3x9.5▲	2.5	3	8.00 (203)	6.75 (171)	4.00 (102)	6.00 (152)	19.22 (488)	182T	15.00 (381)	1.50 (38)	X				3	6	
								184T	15.00 (381)	1.50 (38)	X				3	6	
								213T	18.00 (457)	1.50 (38)	X				3	6	
								215T	19.00 (483)	1.50 (38)	X				4	8	
								254T	24.00 (610)	1.50 (38)	X				5	9	
								254T	24.00 (610)	1.50 (38)			XX		6	9	
								256T	25.00 (635)	1.50 (38)			XX		6	9	
								284T	27.00 (686)	1.50 (38)			XX		7	10	
								284TS	25.00 (635)	1.50 (38)			XX		7	10	
								286T	28.00 (711)	1.50 (38)			XX		7	10	
			286TS	26.00 (660)	1.50 (38)			XX		7	10						
			23.37 (594)	324T	29.00 (737)	1.50 (38)			XX		12	12					
				324TS	28.00 (711)	1.50 (38)			XX		12	12					
				326T	31.00 (787)	1.50 (38)			XX		12	12					
				326TS	29.00 (737)	1.50 (38)			XX		12	12					
				364TS	31.00 (787)	1.50 (38)			XX		14	16					
				365TS	32.00 (813)	1.50 (38)			XX		14	16					
				404TS	34.00 (864)	1.50 (38)			XX		14	16					
				405TS	36.00 (914)	1.50 (38)			XX		14	16					
				2.5x3x13.5▲	2.5	3	10.00 (254)	9.00 (229)	6.00 (152)	8.00 (203)	25.28 (642)	184T	15.00 (381)	1.00 (25)			X
213T	18.00 (457)	1.00 (25)												X		10	11
215T	19.00 (483)	1.00 (25)											X		10	11	
254T	24.00 (610)	1.00 (25)											X		11	12	
256T	25.00 (635)	1.00 (25)											X		11	12	
284T	27.00 (686)	1.00 (25)											X		11	12	
284TS	25.00 (635)	1.00 (25)											X		11	12	
286T	28.00 (711)	1.00 (25)											X		12	12	
286TS	26.00 (660)	1.00 (25)											X		12	12	
3x4x7A▲	3	4	7.00 (178)									6.00 (152)	4.13 (105)	5.00 (127)	19.11 (485)	143T	13.00 (330)
				145T	14.00 (356)	1.00 (25)	X				2					5	
				182T	15.00 (381)	1.00 (25)	X				3					6	
				184T	15.00 (381)	1.00 (25)	X				3					6	
				213T	18.00 (457)	1.00 (25)	X				3					6	
			23.22 (590)	213T	18.00 (457)	1.00 (25)			XX		5	9					
				215T	19.00 (483)	1.00 (25)			XX		5	9					
				254T	24.00 (610)	1.00 (25)			XX		6	9					
				256T	25.00 (635)	1.00 (25)			XX		6	9					
				284T	27.00 (686)	1.00 (25)			XX		11	12					
284TS	25.00 (635)	1.00 (25)			XX		11	12									
286T	28.00 (711)	1.00 (25)			XX		11	12									
286TS	26.00 (660)	1.00 (25)			XX		11	12									
324T	29.00 (737)	1.00 (25)			XX		12	12									
324TS	28.00 (711)	1.00 (25)			XX		12	12									
3x4x9.5▲	3	4	8.00 (203)	7.50 (191)	4.75 (121)	6.13 (156)	19.72 (501)	182T	15.00 (381)	1.00 (25)	X				3	6	
								184T	15.00 (381)	1.00 (25)	X				3	6	
								213T	18.00 (457)	1.00 (25)	X				3	6	
								215T	19.00 (483)	1.00 (25)	X				4	8	
								254T	24.00 (610)	1.00 (25)	X				5	9	
			23.87 (606)	286TS	26.00 (660)	1.00 (25)			XX		7	10					
				324T	29.00 (737)	1.00 (25)			XX		12	12					
				324TS	28.00 (711)	1.00 (25)			XX		12	12					
				326T	31.00 (787)	1.00 (25)			XX		12	12					
				326TS	29.00 (737)	1.00 (25)			XX		12	12					
364TS	31.00 (787)	1.00 (25)			XX		14	16									
365TS	32.00 (813)	1.00 (25)			XX		14	16									
404TS	34.00 (864)	1.00 (25)			XX		14	16									
405TS	36.00 (914)	1.00 (25)			XX		14	16									
444TS	41.00 (1041)	1.00 (25)			XX		15	16									
445T	46.00 (1168)	1.00 (25)			XX		20	17									
445TS	42.00 (1067)	1.00 (25)			XX		15	16									

**NOTES:**

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- Not for construction purposes unless certified.
- ▲ Available in 250 lb./125 lb. flanges.
- X - for 1750 RPM applications  
XX - for 3550 RPM applications  
XXX - for 1750 and 3550 RPM applications
- HT is based on Aurora standard coupling.  
HT may vary from .25 to 3.25".
- 00 - 2950 RPM operation only.

# PENTAIR AURORA® MODEL 3804 PUMPS

## WITH OPTIONAL BASE, COUPLING AND MOTOR

Pump Size	Discharge	Suction	D	X	Y	Z	CP	Motor Frame	C Approx.	HL	P.F. 1	P.F. 2	P.F. 3	P.F. 21A	Steel Base No.	Drip Rim Base No.			
3x4x11▲	3	4	10.00 (254)	9.50 (241)	5.50 (140)	7.38 (187)	20.22 (514)	184T	15.00 (381)	1.00 (25)	X				8	11			
								213T	18.00 (457)	1.00 (25)	X		9	11					
								215T	19.00 (483)	1.00 (25)	X		9	11					
								254T	24.00 (610)	1.00 (25)	X		10	11					
								256T	25.00 (635)	1.00 (25)	X		10	11					
								284TS	25.00 (635)	1.00 (25)		XX	12	12					
								286T	28.00 (711)	1.00 (25)		XX	12	12					
								286TS	26.00 (660)	1.00 (25)		XX	12	12					
								324T	29.00 (737)	1.00 (25)		XX	12	12					
								324TS	28.00 (711)	1.00 (25)		XX	12	12					
			326T	31.00 (787)	1.00 (25)		XX	12	12										
			326TS	29.00 (737)	1.00 (25)		XX	12	12										
			364TS	31.00 (787)	1.00 (25)		XX	14	16										
			365TS	32.00 (813)	1.00 (25)		XX	14	16										
			404TS	34.00 (864)	1.00 (25)		XX	15	16										
			405TS	36.00 (914)	1.00 (25)		XX	15	16										
			444TS	41.00 (1041)	1.00 (25)		XX	18	21										
			445T	46.00 (1168)	1.00 (25)		XX	18	21										
			445TS	42.00 (1067)	1.00 (25)		XX	18	21										
			3x4x13.5▲	3	4	10.00 (254)	9.50 (241)	5.63 (143)	8.00 (203)	24.84 (631)	213T	18.00 (457)	1.00 (25)		X			10	11
215T	19.00 (483)	1.00 (25)										X	10	11					
254T	24.00 (610)	1.00 (25)										X	11	12					
256T	25.00 (635)	1.00 (25)										X	11	12					
284T	27.00 (686)	1.00 (25)										X	12	12					
284TS	25.00 (635)	1.00 (25)										X	12	12					
286T	28.00 (711)	1.00 (25)										X	12	12					
286TS	26.00 (660)	1.00 (25)										X	12	12					
324T	29.00 (737)	1.00 (25)										X	12	12					
324TS	28.00 (711)	1.00 (25)										X	12	12					
364TS	31.00 (787)	1.00 (25)						00	14	16									
365TS	32.00 (813)	1.00 (25)						00	14	16									
404TS	34.00 (864)	1.00 (25)						00	15	16									
405TS	36.00 (914)	1.00 (25)						00	15	16									
444TS	41.00 (1041)	1.00 (25)						00	18	21									
445T	46.00 (1168)	1.00 (25)						00	18	21									
445TS	42.00 (1067)	1.00 (25)						00	18	21									
447T	52.00 (1321)	1.00 (25)						00	19	21									
447TS	49.00 (1245)	1.00 (25)						00	19	21									
4x5x7A*▲	4	5				8.00 (203)	7.50 (191)	4.94 (125)	5.75 (146)	20.16 (512)	145T	14.00 (356)	1.00 (25)		X			2	5
			182T	15.00 (381)	1.00 (25)							X	3	6					
			184T	15.00 (381)	1.00 (25)							X	3	6					
			213T	18.00 (457)	1.00 (25)							X	3	6					
			215T	19.00 (483)	1.00 (25)							X	4	8					
			215T	19.00 (483)	1.00 (25)								XX	5	9				
			254T	24.00 (610)	1.00 (25)								XX	6	9				
			256T	25.00 (635)	1.00 (25)								XX	6	9				
			284T	27.00 (686)	1.00 (25)								XX	7	10				
			284TS	25.00 (635)	1.00 (25)								XX	7	10				
			286T	28.00 (711)	1.00 (25)			XX	7	10									
			286TS	26.00 (660)	1.00 (25)			XX	7	10									
			324T	29.00 (737)	1.00 (25)			XX	12	12									
			324TS	28.00 (711)	1.00 (25)			XX	12	12									
			326T	31.00 (787)	1.00 (25)			XX	12	12									
			326TS	29.00 (737)	1.00 (25)			XX	12	12									
			364TS	31.00 (787)	1.00 (25)			XX	14	16									
			365TS	32.00 (813)	1.00 (25)			XX	14	16									
			4x5x7A*▲	4	5	9.00 (229)													

\*Temporarily unavailable until further notice.

### NOTES:

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- Not for construction purposes unless certified.
- ▲ Available in 250 lb./125 lb. flanges.
- X - for 1750 RPM applications  
XX - for 3550 RPM applications  
XXX - for 1750 and 3550 RPM applications
- HT is based on Aurora standard coupling.  
HT may vary from .25 to 3.25".
- 00 - 2950 RPM operation only.

# PENTAIR AURORA® MODEL 3804 PUMPS

## WITH OPTIONAL BASE, COUPLING AND MOTOR

Pump Size	Discharge	Suction	D	X	Y	Z	CP	Motor Frame	C Approx.	HL	P.F. 1	P.F. 2	P.F. 3	P.F. 21A	Steel Base No.	Drip Rim Base No.
4x5x9.5▲	4	5	10.00 (254)	8.00 (203)	5.00 (127)	7.00 (178)	19.97 (507)	213T	18.00 (457)	1.00 (25)	X				4	8
								215T	19.00 (483)	1.00 (25)	X				4	8
								254T	24.00 (610)	1.00 (25)	X				5	9
								256T	25.00 (635)	1.00 (25)	X				5	9
								284TS	25.00 (635)	1.00 (25)		XX			12	12
								286T	28.00 (711)	1.00 (25)		XX			12	12
								286TS	26.00 (660)	1.00 (25)		XX			12	12
								324T	29.00 (737)	1.00 (25)		XX			12	12
								324TS	28.00 (711)	1.00 (25)		XX			12	12
								326T	31.00 (787)	1.00 (25)		XX			12	12
			326TS	29.00 (737)	1.00 (25)		XX			12	12					
			364TS	31.00 (787)	1.00 (25)		XX			14	16					
			365TS	32.00 (813)	1.00 (25)		XX			14	16					
			404TS	34.00 (864)	1.00 (25)		XX			15	16					
			405TS	36.00 (914)	1.00 (25)		XX			15	16					
			444TS	41.00 (1041)	1.00 (25)		XX			18	21					
			445T	46.00 (1168)	1.00 (25)		XX			18	21					
			445TS	42.00 (1067)	1.00 (25)		XX			18	21					
			447T	52.00 (1321)	1.00 (25)		XX			19	21					
			447TS	49.00 (1245)	1.00 (25)		XX			19	21					
4x5x11A▲	4	5	10.00 (254)	9.75 (248)	5.56 (141)	7.25 (184)	20.35 (517)	213T	18.00 (457)	1.00 (25)	X				9	11
								215T	19.00 (483)	1.00 (25)	X				9	11
								254T	24.00 (610)	1.00 (25)	X				10	11
								256T	25.00 (635)	1.00 (25)		X			11	12
								284T	27.00 (686)	1.00 (25)		X			12	12
								284TS	25.00 (635)	1.00 (25)		X			12	12
								286T	28.00 (711)	1.00 (25)		X			12	12
								286TS	26.00 (660)	1.00 (25)		X	00		12	12
								324T	29.00 (737)	1.00 (25)		X	00		12	12
								324TS	28.00 (711)	1.00 (25)		X	00		12	12
			326T	31.00 (787)	1.00 (25)			00		12	12					
			326TS	29.00 (737)	1.00 (25)			00		12	12					
			364TS	31.00 (787)	1.00 (25)			00		14	16					
			365TS	32.00 (813)	1.00 (25)			00		14	16					
			404TS	34.00 (864)	1.00 (25)			00		15	16					
			405TS	36.00 (914)	1.00 (25)			00		15	16					
			444TS	41.00 (1041)	1.00 (25)			00		18	21					
			445T	46.00 (1168)	1.00 (25)			00		18	21					
			445TS	42.00 (1067)	1.00 (25)			00		18	21					
			447T	52.00 (1321)	1.00 (25)			00		19	21					
447TS	49.00 (1245)	1.00 (25)			00		19	21								
4x5x13.5▲	4	5	11.00 (279)	10.00 (254)	6.00 (152)	8.56 (217)	24.84 (631)	254T	24.00 (610)	1.00 (25)			X		11	12
								256T	25.00 (635)	1.00 (25)			X		11	12
								284T	27.00 (686)	1.00 (25)			X		12	12
								284TS	25.00 (635)	1.00 (25)			X		12	12
								286T	28.00 (711)	1.00 (25)			X		12	12
								286TS	26.00 (660)	1.00 (25)			X		12	12
								324T	29.00 (737)	1.00 (25)			X		12	12
								324TS	28.00 (711)	1.00 (25)			X		12	12
								326T	31.00 (787)	1.00 (25)			X		12	12
								326TS	29.00 (737)	1.00 (25)			X		12	12
4x5x13.5▲	4	5	11.00 (279)	10.00 (254)	6.00 (152)	8.56 (217)	32.63 (829)	364TS	31.00 (787)	1.00 (25)			X		14	16
								365TS	32.00 (813)	1.00 (25)				00	15	16
								404TS	34.00 (864)	1.00 (25)				00	18	21
								405TS	36.00 (914)	1.00 (25)				00	18	21
								444TS	41.00 (1041)	1.00 (25)				00	19	21
								445T	46.00 (1168)	1.00 (25)				00	19	21
								445TS	42.00 (1067)	1.00 (25)				00	19	21
								447T	52.00 (1321)	1.00 (25)				00	23	23
								447TS	49.00 (1245)	1.00 (25)				00	23	23
								449TS	49.00 (1245)	1.00 (25)				00	23	23



# PENTAIR AURORA® MODEL 3804 PUMPS

## WITH OPTIONAL BASE, COUPLING AND MOTOR

Pump Size	Discharge	Suction	D	X	Y	Z	CP	Motor Frame	C Approx.	HL	P.F. 1	P.F. 2	P.F. 3	P.F. 21A	Steel Base No.	Drip Rim Base No.					
5x6x7A▲	5	6	10.00 (254)	8.50 (216)	5.81 (148)	6.25 (159)	21.28 (541)	182T	15.00 (381)	1.00 (25)	X				3	6					
								184T	15.00 (381)	1.00 (25)	X				3	6					
							25.39 (645)	213T	18.00 (457)	1.00 (25)		X								10	11
								215T	19.00 (483)	1.00 (25)		X								10	11
								254T	24.00 (610)	1.00 (25)			XX							11	12
								256T	25.00 (635)	1.00 (25)			XX							11	12
								284T	27.00 (686)	1.00 (25)			XX							12	12
								284TS	25.00 (635)	1.00 (25)			XX							12	12
								286T	28.00 (711)	1.00 (25)			XX							12	12
								286TS	26.00 (660)	1.00 (25)			XX							12	12
								324T	29.00 (737)	1.00 (25)			XX							13	13
								324TS	28.00 (711)	1.00 (25)			XX							13	13
								326T	31.00 (787)	1.00 (25)			XX							13	13
								326TS	29.00 (737)	1.00 (25)			XX							13	13
								364TS	31.00 (787)	1.00 (25)			XX							14	16
								365TS	32.00 (813)	1.00 (25)			XX							14	16
5x6x9.5A▲	5	6	11.00 (279)	10.00 (254)	6.00 (152)	7.50 (191)	21.34 (542)	213T	18.00 (457)	1.00 (25)	X				9	11					
								215T	19.00 (483)	1.00 (25)	X				9	11					
							25.50 (648)	254T	24.00 (610)	1.00 (25)		X								10	11
								256T	25.00 (635)	1.00 (25)			X							11	12
								284T	27.00 (686)	1.00 (25)			X							12	12
								284TS	25.00 (635)	1.00 (25)			X							12	12
								286T	28.00 (711)	1.00 (25)			X							12	12
								286TS	26.00 (660)	1.00 (25)			X							12	12
								324TS	28.00 (711)	1.00 (25)				00						13	13
								326T	31.00 (787)	1.00 (25)				00						13	13
								326TS	29.00 (737)	1.00 (25)				00						13	13
								364TS	31.00 (787)	1.00 (25)				00						14	16
								365TS	32.00 (813)	1.00 (25)				00						14	16
								404TS	34.00 (864)	1.00 (25)				00						15	16
								405TS	36.00 (914)	1.00 (25)				00						15	16
								444TS	41.00 (1041)	1.00 (25)				00						18	21
445T	46.00 (1168)	1.00 (25)				00						18	21								
445TS	42.00 (1067)	1.00 (25)				00						18	21								
5x6x11▲	5	6	11.00 (279)	10.50 (267)	5.44 (138)	7.94 (202)	24.65 (626)	254T	24.00 (610)	1.00 (25)		X			11	12					
								256T	25.00 (635)	1.00 (25)		X						11	12		
								284T	27.00 (686)	1.00 (25)		X						12	12		
								284TS	25.00 (635)	1.00 (25)		X						12	12		
								286T	28.00 (711)	1.00 (25)		X						12	12		
								286TS	26.00 (660)	1.00 (25)		X						12	12		
								324T	29.00 (737)	1.00 (25)		X						12	12		
								324TS	28.00 (711)	1.00 (25)		X						12	12		
								326T	31.00 (787)	1.00 (25)		X						12	12		
								326TS	29.00 (737)	1.00 (25)		X						12	12		
								365TS	32.00 (813)	1.00 (25)			00					14	16		
								404TS	34.00 (864)	1.00 (25)			00					15	16		
								405TS	36.00 (914)	1.00 (25)			00					15	16		
								444TS	41.00 (1041)	1.00 (25)			00					18	21		
								445T	46.00 (1168)	1.00 (25)			00					18	21		
								445TS	42.00 (1067)	1.00 (25)			00					18	21		
447T	52.00 (1321)	1.00 (25)			00					19	21										
447TS	49.00 (1245)	1.00 (25)			00					19	21										
449TS	49.00 (1245)	1.00 (25)			00					19	21										

**NOTES:**

- Dimensions are approximate.
- All dimensions are in inches (mm) and may vary ± 1/4 (6).
- Conduit box is shown in approximate position. Dimensions are not specified as they vary with each motor manufacturer.
- Not for construction purposes unless certified.
- ▲ Available in 250 lb./125 lb. flanges.
- X - for 1750 RPM applications  
XX - for 3550 RPM applications  
XXX - for 1750 and 3550 RPM applications
- HT is based on Aurora standard coupling.  
HT may vary from .25 to 3.25".
- 00 - 2950 RPM operation only.

# PENTAIR AURORA® MODEL 3804 PUMPS

## WITH OPTIONAL BASE, COUPLING AND MOTOR

Pump Size	Discharge	Suction	D	X	Y	Z	CP	Motor Frame	C Approx.	HL	P.F. 1	P.F. 2	P.F. 3	P.F. 21A	Steel Base No.	Drip Rim Base No.
5x6x13.5▲	5	6	12.00 (305)	13.00 (330)	6.00 (152)	9.00 (229)	25.34 (644)	256T	25.00(635)	2.00(51)				X	16	22
								284T	27.00(686)	2.00(51)			X	16	22	
								284TS	25.00(635)	2.00(51)			X	16	22	
								286T	28.00(711)	2.00(51)			X	16	22	
								286TS	26.00(660)	2.00(51)			X	16	22	
								324T	29.00(737)	2.00(51)			X	17	21	
								324TS	28.00(711)	2.00(51)			X	17	21	
								326T	31.00(787)	2.00(51)			X	17	21	
								326TS	29.00(737)	2.00(51)			X	17	21	
								364TS	31.00(787)	2.00(51)			X	17	21	
								365TS	32.00(813)	2.00(51)			X	17	21	
								404TS	34.00(864)	2.00(51)			X	18	21	
								405TS	36.00(914)	2.00(51)			X	18	21	
6x8x9.5A▲	6	8	11.00 (279)	10.50 (267)	7.00 (178)	8.25 (210)	27.00 (686)	254T	24.00(610)	1.00(25)		X			12	12
								256T	25.00(635)	1.00(25)		X	12	12		
								284T	27.00(686)	1.00(25)		X	12	12		
								284TS	25.00(635)	1.00(25)		X	12	12		
								286T	28.00(711)	1.00(25)		X	12	12		
								286TS	26.00(660)	1.00(25)		X	12	12		
								324T	29.00(737)	1.00(25)		X	13	13		
								324TS	28.00(711)	1.00(25)		X	13	13		
								326T	31.00(787)	1.00(25)		X	13	13		
								326TS	29.00(737)	1.00(25)		X	13	13		
								6x8x11A▲	6	8	12.00 (305)	11.00 (279)	6.13 (156)	8.47 (215)	25.72 (653)	254T
256T	25.00(635)	2.00(51)		X	16	22										
284T	27.00(686)	2.00(51)		X	16	22										
284TS	25.00(635)	2.00(51)		X	16	22										
286T	28.00(711)	2.00(51)		X	16	22										
286TS	26.00(660)	2.00(51)		X	16	22										
324T	29.00(737)	2.00(51)		X	17	21										
324TS	28.00(711)	2.00(51)		X	17	21										
326T	31.00(787)	2.00(51)		X	17	21										
326TS	29.00(737)	2.00(51)		X	17	21										
364TS	31.00(787)	2.00(51)		X	17	21										
365TS	32.00(813)	2.00(51)		X	17	21										
6x8x13.5▲	6	8	12.00 (305)	13.38 (340)	6.50 (165)	9.31 (236)	33.57 (853)									286T
								286TS	26.00(660)	1.00(25)		X	18	21		
								324T	29.00(737)	1.00(25)		X	18	21		
								324TS	28.00(711)	1.00(25)		X	18	21		
								326T	31.00(787)	1.00(25)		X	18	21		
								326TS	29.00(737)	1.00(25)		X	18	21		
								364TS	31.00(787)	1.00(25)		X	18	21		
								365TS	32.00(813)	1.00(25)		X	18	21		
								404TS	34.00(864)	1.00(25)		X	19	21		
								405TS	36.00(914)	1.00(25)		X	19	21		
								444TS	41.00(1041)	1.00(25)		X	19	21		
								445T	46.00(1168)	1.00(25)		X	23	23		
								8x10x13.5▲	8	10	15.00 (381)	14.00 (356)	8.00 (203)	11.00 (279)	34.96 (888)	286T
286TS	26.00(660)	1.00(25)		X	18	21										
324T	29.00(737)	1.00(25)		X	18	21										
324TS	28.00(711)	1.00(25)		X	18	21										
326T	31.00(787)	1.00(25)		X	18	21										
326TS	29.00(737)	1.00(25)		X	18	21										
364TS	31.00(787)	1.00(25)		X	18	21										
365TS	32.00(813)	1.00(25)		X	18	21										
404TS	34.00(864)	1.00(25)		X	19	21										
405TS	36.00(914)	1.00(25)		X	19	21										
444TS	41.00(1041)	1.00(25)		X	19	21										
445T	46.00(1168)	1.00(25)		X	23	23										
445TS	42.00(1067)	1.00(25)		X	19	21										
447T	52.00(1321)	1.00(25)		X	23	23										

\*Temporarily unavailable until further notice.

### NOTES:

- Dimensions are approximate.
- All dimensions are in inches(mm) and may vary ± 1/4(6).
- Conduit box is shown in approximate position. Dimensions are not specified as they vary with each motor manufacturer.
- Not for construction purposes unless certified.
- ▲ Available in 250 lb./125 lb. flanges.
- X - for 1750 RPM applications  
XX - for 3550 RPM applications  
XXX - for 1750 and 3550 RPM applications
- HT is based on Aurora standard coupling.  
HT may vary from .25 to 3.25".
- 00 - 2950 RPM operation only.

# PENTAIR AURORA® MODEL 3804 PUMPS

## WITH FORMED STEEL BASE, COUPLING AND MOTOR

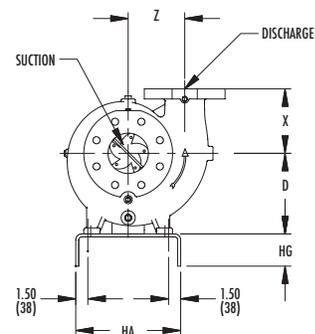
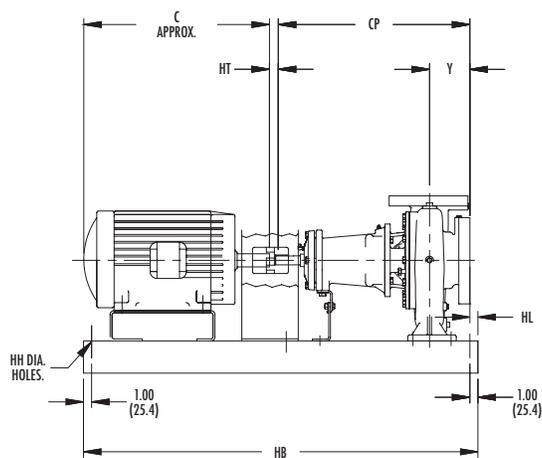
BASE	SIZE	HA	HB	HG	HH
1	12 x 30	12.00 (305)	30.00 (762)	3.00 (76)	0.63 (16)
2	12 x 34	12.00 (305)	34.00 (864)	3.00 (76)	0.63 (16)
3	12 x 38	12.00 (305)	38.00 (965)	3.00 (76)	0.63 (16)
4	13 x 42	13.00 (330)	42.00 (1067)	4.00 (102)	0.75 (19)
5	13 x 45	13.00 (330)	45.00 (1143)	4.00 (102)	0.75 (19)
6	15 x 48	15.00 (381)	48.00 (1219)	3.38 (86)	0.75 (19)
7	15 x 52	15.00 (381)	52.00 (1321)	4.13 (105)	0.75 (19)
8	18 x 38	18.00 (457)	38.00 (965)	4.00 (102)	0.75 (19)
9	18 x 42	18.00 (457)	42.00 (1067)	4.00 (102)	0.75 (19)
10	18 x 44	18.00 (457)	44.00 (1118)	4.00 (102)	0.75 (19)
11	18 x 50	18.00 (457)	50.00 (1270)	4.00 (102)	0.75 (19)
12	18 x 54	18.00 (457)	54.00 (1372)	4.00 (102)	0.75 (19)
13	18 x 60	18.00 (457)	60.00 (1524)	4.00 (102)	0.75 (19)
14	22 x 60	22.00 (559)	60.00 (1524)	4.00 (102)	0.75 (19)
15	22 x 64	22.00 (559)	64.00 (1626)	4.00 (102)	0.75 (19)
20	22 x 72	22.00 (559)	72.00 (1829)	4.00 (102)	0.75 (19)
16	26 x 54	26.00 (660)	54.00 (1372)	4.00 (102)	0.75 (19)
17	26 x 60	26.00 (660)	60.00 (1524)	4.50 (114)	0.75 (19)
18	26 x 66	26.00 (660)	66.00 (1676)	4.50 (114)	0.75 (19)
19	26 x 72	26.00 (660)	72.00 (1829)	4.50 (114)	0.75 (19)
23	26 x 84	26.00 (660)	84.00 (2134)	4.50 (114)	0.75 (19)

HORSEPOWER	MOTOR HORSEPOWER AND FRAME DESIGNATION					
	3600 RPM		1800 RPM		1200 RPM	
RATING	ODP	TEFC	ODP	TEFC	ODP	TEFC
1/2	56	-	56	56	56	56
3/4	56	56	56	56	143T	143T
1	56	56	143T	143T	145T	145T
1-1/2	143T	143T	145T	145T	182T	182T
2	145T	145T	145T	145T	184T	184T
3	145T	182T	182T	182T	213T	213T
5	182T	184T	184T	184T	215T	215T
7-1/2	184T	213T	213T	213T	254T	254T
10	213T	215T	215T	215T	256T	256T
15	215T	254T	254T	254T	284T	284T
20	254T	256T	256T	256T	286T	286T
25	256T	284TS	284T	284T	324T	324T
30	284TS	286TS	286T	286T	326T	326T
40	286TS	324TS	324T	324T	364T	364T
50	324TS	326TS	326T	326T	365T	365T
60	326TS	364TS	364TS	364TS	404T	404T
75	364TS	365TS	365TS	365TS	405T	405T
100	365TS	405TS	404TS	405TS	444T	444T
125	404TS	444TS	405TS	444TS	445T	445T
150	405TS	445TS	444TS	445TS	-	-
200	444TS	-	445TS	-	-	-

Power Frame	U	V	KEY
1	.88 (22)	2.13 (54)	.19(5) SQ. x 1.38(35) LNG
2 & 3	1.13 (28)	3.13 (79)	.25(6) SQ. x 1.75(44) LNG
21A	2.38 (60)	5.50 (139)	.63(16) SQ. x 4.00(101) LNG

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4. Not for construction purposes unless certified.



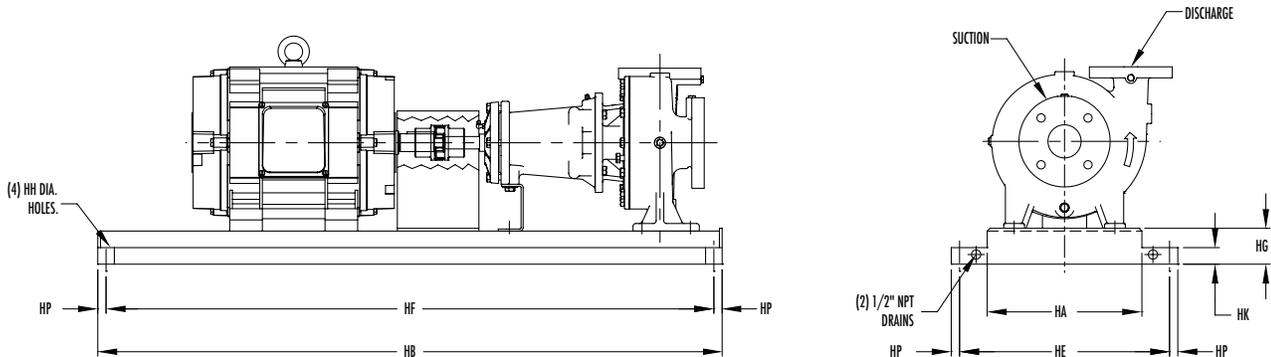
# PENTAIR AURORA® MODEL 3804 PUMPS

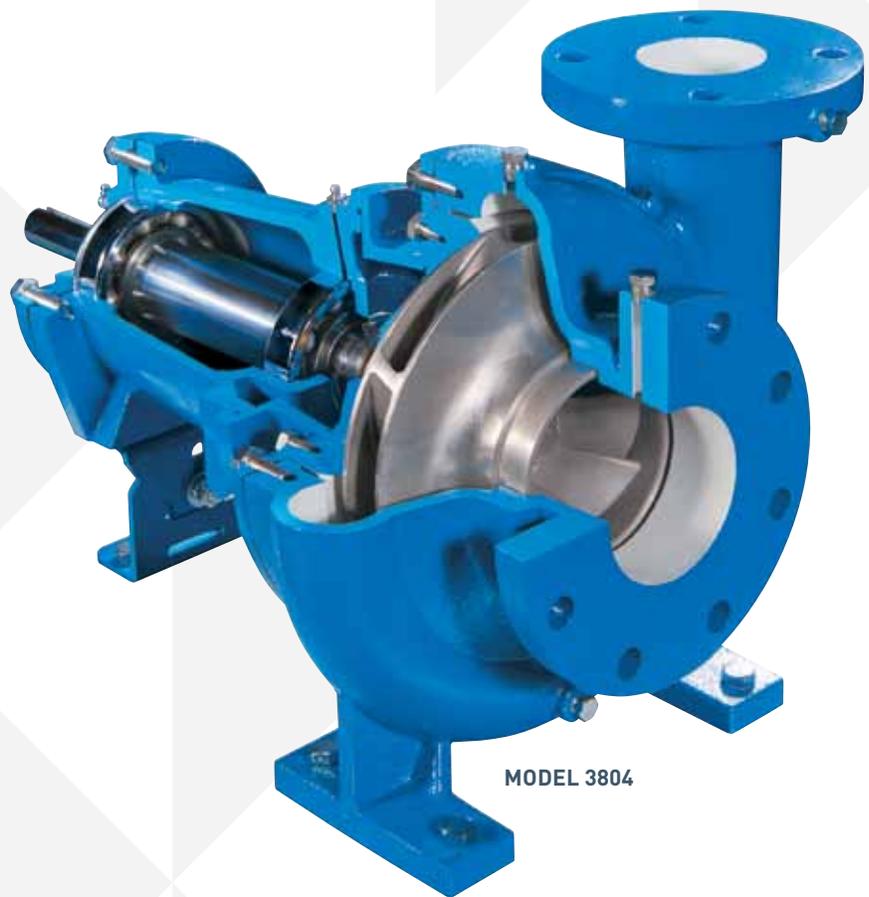
## WITH DRIP RIM BASE, COUPLING AND MOTOR

BASE	SIZE	HA	HB	HE	HF	HG	HH	HK	HP
4	11 x 30	11.00 (279)	30.50 (775)	15.88 (403)	29.13 (740)	3.00 (76)	.88 (22)	1.50 (38)	0.69 (17)
5	11 x 36	11.00 (279)	36.50 (927)	15.88 (403)	35.13 (892)	3.00 (76)	.88 (22)	1.50 (38)	0.69 (17)
6	11 x 42	11.00 (279)	42.50 (1080)	15.88 (403)	41.13 (1045)	3.00 (76)	.88 (22)	1.50 (38)	0.69 (17)
8	14 x 42	14.00 (356)	42.50 (1080)	19.00 (483)	41.00 (1041)	3.00 (76)	1.00 (25)	1.50 (38)	0.75 (19)
9	14 x 48	14.00 (356)	48.50 (1232)	19.00 (483)	47.00 (1194)	3.00 (76)	1.00 (25)	1.50 (38)	0.75 (19)
10	14 x 56	14.00 (356)	56.50 (1435)	19.00 (483)	55.00 (1397)	3.00 (76)	1.00 (25)	1.50 (38)	0.75 (19)
11	18 x 46	18.00 (457)	46.50 (1181)	25.13 (638)	44.88 (1140)	4.00 (102)	1.13 (29)	2.00 (51)	0.81 (21)
12	18 x 54	18.00 (457)	54.50 (1384)	25.13 (638)	52.88 (1343)	4.00 (102)	1.13 (29)	2.00 (51)	0.81 (21)
13	18 x 64	18.00 (457)	64.50 (1638)	25.13 (638)	62.88 (1597)	4.00 (102)	1.13 (29)	2.00 (51)	0.81 (21)
16	22 x 64	22.00 (559)	64.50 (1638)	29.13 (740)	62.88 (1597)	4.50 (114)	1.13 (29)	2.00 (51)	0.81 (21)
17	22 x 74	22.00 (559)	74.50 (1892)	29.13 (740)	72.88 (1851)	4.50 (114)	1.13 (29)	2.00 (51)	0.81 (21)
22	26 x 54	26.00 (660)	54.50 (1384)	33.13 (841)	52.88 (1343)	4.50 (114)	1.13 (29)	2.00 (51)	0.81 (21)
21	26 x 72	26.00 (660)	72.50 (1842)	33.13 (841)	70.88 (1800)	4.50 (114)	1.13 (29)	2.00 (51)	0.81 (21)
23	26 x 84	26.00 (660)	84.50 (2146)	33.13 (841)	82.88 (2105)	4.50 (114)	1.13 (29)	2.00 (51)	0.81 (21)

### NOTES:

1. Dimensions are approximate.
2. All dimensions are in inches (mm) and may vary  $\pm 1/4$  (6).
3. Conduit box is shown in approximate position. Dimensions are not specified as they vary with each motor manufacturer.
4. Not for construction purposes unless certified.





MODEL 3804

# AURORA<sup>®</sup> 3800 SERIES SINGLE STAGE END SUCTION PUMPS

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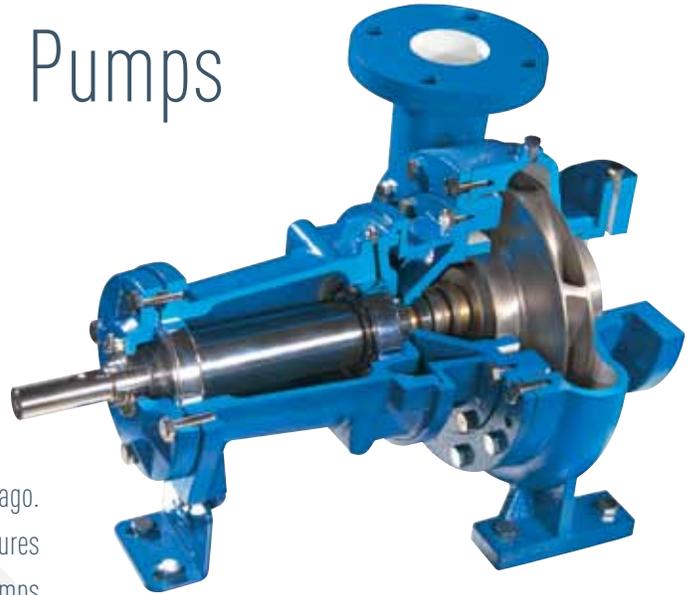
# AURORA® 3800 SERIES

## Single Stage End Suction Pumps

Capacities to 4200 G.P.M. (954 m<sup>3</sup>/hr)  
 Heads to 520 Feet (158 Meters)  
 Temperatures to 300°F (149°C)

### Setting New Standards of Efficiency

Liquid handling requirements are much more involved than they were years ago. The variety of liquids being handled has increased along with temperatures and pressures. Today's installations demand quiet, smooth running pumps with long life. Aurora Pump's 90 years of experience with design, sales and manufacturing of centrifugal pumps has led to the 3800 Series. These modern pumps with a clean, straightforward design were developed with maximum interchangeability in mind. Aurora's highly reliable 3800 pumps offer an economical solution to your liquid handling problems.



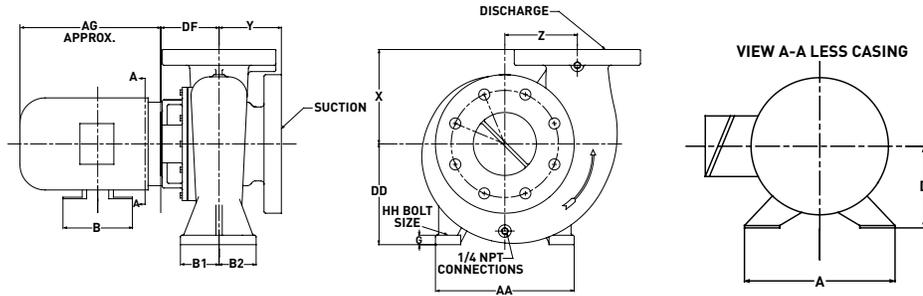
### Standard Features

- Offered in two models:
  - 3801 close coupled
  - 3804 flexible coupled-frame mounted
- 316 stainless steel impeller
- Double volute on 4" discharge and larger to reduce bearing loads
- Gauge taps on suction and discharge on flanged models
- 4 power frame sizes
- Casing feet for easy back pullout
- Regreaseable bearings (3804 only)
- Coupling guard (flex coupled design)
- Formed steel base (flex coupled design)

### Optional Features

- 316 stainless steel shaft
- 316 stainless steel shaft sleeve
- Drip rim base
- Drip pan (3804 only)
- Flush lines
- Epoxy coating
- Several mechanical seal options  
(required for temperatures over 225°F)
- Oil lube bearings (flex coupled only)
- Case wear ring

# Model 3801 Product Offering



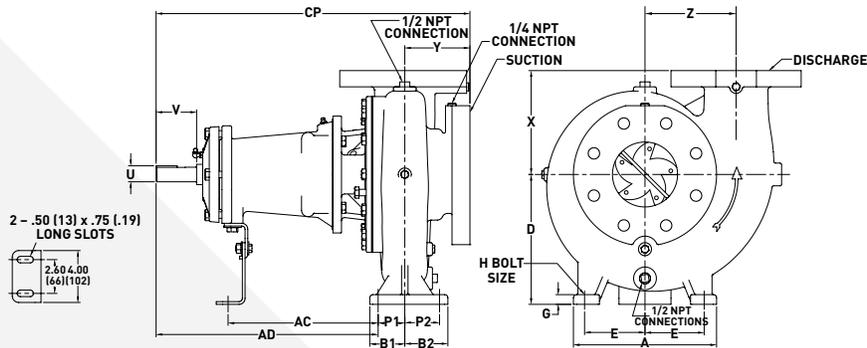
**Notes:**

1. Dimensions are approximate.
2. All dimensions are in inches (mm) and may vary ± 1/4 (6).
3. Not for construction purposes unless certified.
- ▲ Available in 250 lb./125 lb. flanges.
- Dimensions do not match Bell & Gossett.
4. Conduit box is shown in approximate location. Dimensions are not specified as they may vary with each motor manufacturer.
5. There are two mounting holes on the rear foot for the noted pumps.

Pump Size	Disch.	Suct.	DD	X	Y	Z	B1	B2	G	HH	AA	Motor Frame					
												143-184JM	213-215JM	254-256JM	284-326JM	364-404TCZ	444-449TCZ
1.25x1.5x7 (NPT)	1.25	1.5	7.00 (178)	5.00 (127)	3.25 (083)	4.50 (114)	2.63 (067)	2.38 (060)	0.63 (016)	0.44 (011)	8.00 (203)	4.25 (108)	4.25 (108)	N/A	N/A	N/A	N/A
1.5x2x7 (NPT)	1.5	2	7.00 (178)	6.00 (152)	3.13 (079)	4.63 (117)	2.44 (062)	2.56 (065)	0.63 (016)	0.44 (011)	8.00 (203)	4.75 (121)	4.75 (121)	5.31 (135)	N/A	N/A	N/A
1.5x2x11 (NPT)	1.5	2	8.00 (203)	9.00● (229)	3.13 (079)	5.75 (146)	2.25 (057)	3.75 (095)	0.69 (017)	0.44 (011)	11.00 (279)	4.63 (118)	4.63 (118)	5.63 (143)	5.63 (143)	N/A	N/A
1.5x2x12 (NPT)	1.5	2	10.00 (254)	7.75 (197)	2.75 (070)	5.75 (146)	2.87 (073)	3.75 (095)	0.69 (017)	0.44 (011)	11.00 (279)	4.81 (122)	4.81 (122)	N/A	N/A	N/A	N/A
2x2.5x7▲	2	2.5	7.00 (178)	6.50 (165)	3.50 (089)	4.75 (121)	2.56 (065)	2.44 (062)	0.63 (016)	0.44 (011)	8.00 (203)	4.88 (124)	4.88 (124)	5.5 (140)	5.5 (140)	N/A	N/A
2x2.5x9.5▲	2	2.5	8.00 (203)	7.00 (178)	4.00 (102)	5.88 (149)	2.38 (060)	3.63 (092)	0.69 (017)	0.44 (011)	11.00 (279)	4.75 (121)	4.75 (121)	5.44 (138)	5.44 (138)	N/A	N/A
2x3x11▲	2	3	10.00 (254)	8.00 (203)	5.50 (140)	6.50 (165)	3.23 (082)	3.77 (096)	0.88 (022)	0.50 (013)	16.00 (406)	4.44 (113)	4.44 (113)	5.31 (135)	5.31 (135)	9.13 (232)	9.13 (232)
2x3x13.5▲	2	3	10.00 (254)	9.00 (229)	5.50 (140)	7.25 (184)	3.00 (076)	4.00 (102)	0.88 (022)	0.50 (013)	16.00 (406)	N/A	5.38 (137)	5.38 (137)	5.38 (137)	N/A	N/A
2.5x3x7▲	2.5	3	7.00 (178)	6.00 (152)	4.25 (108)	4.69 (120)	2.63 (067)	2.38 (060)	0.63 (016)	0.44 (011)	8.00 (203)	4.81 (122)	4.81 (122)	4.44 (113)	4.44 (113)	N/A	N/A
2.5x3x9.5▲	2.5	3	8.00 (203)	6.75 (171)	4.00 (102)	6.00 (152)	2.44 (062)	3.56 (090)	0.69 (017)	0.44 (011)	11.00 (279)	4.94 (125)	4.94 (125)	5.56 (141)	5.56 (141)	9.56 (243)	9.56 (243)
2.5x3x13.5▲	2.5	3	10.00 (254)	9.00 (229)	6.00 (152)	8.00 (203)	3.00 (076)	4.00 (102)	0.88 (022)	0.50 (013)	16.00 (406)	N/A	5.5 (140)	5.5 (140)	5.5 (140)	N/A	N/A
3x4x7▲	3	4	7.00 (178)	6.00 (152)	4.13 (105)	5.00 (127)	2.69 (068)	2.31 (059)	0.63 (016)	0.44 (011)	8.00 (203)	4.69 (119)	4.69 (119)	5.31 (135)	5.31 (135)	N/A	N/A
3x4x9.5▲	3	4	8.00 (203)	7.50 (191)	4.75 (121)	6.13 (156)	2.69 (068)	3.31 (084)	0.75 (019)	0.44 (011)	11.00 (279)	4.69 (119)	4.69 (119)	5.31 (135)	5.31 (135)	9.31 (236)	9.31 (236)
3x4x11▲	3	4	10.00 (254)	9.50 (241)	5.50 (140)	7.38 (187)	3.44 (087)	3.56 (091)	0.88 (022)	0.50 (013)	16.00 (406)	4.44 (113)	4.44 (113)	5.31 (135)	5.31 (135)	9.13 (232)	9.13 (232)
3x4x13.5▲	3	4	10.00 (254)	9.50 (241)	5.63 (143)	8.00 (203)	3.13 (080)	3.88 (098)	0.88 (022)	0.50 (013)	16.00 (406)	N/A	N/A	5.44 (138)	5.44 (138)	9.31 (236)	9.31 (236)
4x5x7▲	4	5	8.00 (203)	7.50 (191)	4.94 (125)	5.75 (146)	3.06 (078)	2.94 (075)	0.69 (017)	0.44 (011)	11.00 (279)	4.94 (125)	4.94 (125)	5.56 (141)	5.56 (141)	N/A	N/A
4x5x9.5▲	4	5	10.00 (254)	8.00 (203)	5.00 (127)	7.00 (178)	2.69 (068)	3.31 (084)	0.75 (019)	0.44 (011)	11.00 (279)	4.69 (119)	4.69 (119)	5.31 (135)	5.31 (135)	9.31 (236)	9.31 (236)
4x5x11▲	4	5	10.00 (254)	9.75 (248)	5.56 (141)	7.25 (184)	3.41 (087)	3.59 (091)	0.88 (022)	0.50 (013)	16.00 (406)	4.5 (114)	4.5 (114)	5.38 (137)	5.38 (137)	9.19 (233)	9.19 (233)
4x5x13.5▲	4	5	11.00 (279)	10.00 (254)	6.00 (152)	8.56 (218)	3.25 (083)	3.75 (095)	0.88 (022)	0.50 (013)	16.00 (406)	N/A	N/A	5.06 (129)	5.06 (129)	8.88 (226)	8.88 (226)
5x6x7▲	5	6	10.00 (254)	8.50 (216)	5.81 (148)	6.25 (159)	3.63 (092)	2.38 (060)	0.69 (018)	0.44 (011)	11.00 (279)	5.18 (132)	5.18 (132)	5.81 (148)	5.81 (148)	9.5 (241)	N/A
5x6x9.5▲	5	6	11.00 (279)	10.00 (254)	6.00 (152)	7.50 (191)	3.19 (081)	3.81 (097)	0.88 (022)	0.50 (013)	16.00 (406)	5.06 (129)	5.06 (129)	5.69 (145)	5.69 (145)	9.69 (246)	9.69 (246)
5x6x11▲	5	6	11.00 (279)	10.50 (267)	5.44 (138)	7.94 (202)	3.44 (087)	3.56 (091)	0.88 (022)	0.50 (013)	16.00 (406)	N/A	N/A	5.44 (138)	5.44 (138)	9.25 (235)	9.25 (235)
5x6x13.5▲	5	6	12.00 (305)	13.00 (330)	6.00 (152)	9.00 (229)	5.19 (132)	5.81 (148)	1.00 (025)	0.63 (016)	23.00 (584)	N/A	N/A	5.56 (141)	5.56 (141)	9.38 (238)	9.38 (238)
6x8x9.5▲	6	8	11.00 (279)	10.50 (267)	7.00 (178)	8.25 (210)	4.13 (105)	2.88 (073)	0.88 (022)	0.50 (013)	16.00 (406)	N/A	N/A	6.19 (157)	6.19 (157)	N/A	N/A
6x8x11▲	6	8	12.00 (305)	11.00 (279)	6.13 (156)	8.47 (215)	5.63 (143)	5.38 (137)	1.00 (025)	0.63 (016)	23.00 (584)	N/A	N/A	5.81 (148)	5.81 (148)	N/A	N/A
6x8x13.5▲	6	8	12.63● (321)	13.38● (340)	6.50 (165)	9.31 (237)	5.50 (140)	5.50 (140)	1.00 (025)	0.63 (016)	23.00 (584)	N/A	N/A	8.38 (213)	8.38 (213)	9.44 (240)	9.44 (240)
8x10x13.5▲	8	10	15.00 (381)	14.00 (356)	8.00 (203)	11.00 (279)	5.50 (140)	5.50 (140)	1.00 (025)	0.63 (016)	23.00 (584)	N/A	N/A	8.19 (208)	8.19 (208)	9.25 (235)	9.25 (235)

Frame	Motor Frame		
	AG Approx.	A	D
143JM	10.00 (254)	7.00 (178)	3.50 (089)
145JM	11.00 (279)	7.00 (178)	3.50 (089)
182JM	11.00 (279)	9.00 (229)	4.50 (114)
184JM	12.00 (305)	9.00 (229)	4.50 (114)
213JM	14.00 (356)	10.50 (267)	5.25 (133)
215JM	15.00 (381)	10.50 (267)	5.25 (133)
254JM	17.50 (445)	12.50 (318)	6.25 (159)
256JM	19.00 (483)	12.50 (318)	6.25 (159)
284JM	19.00 (483)	14.00 (356)	7.00 (178)
286JM	21.00 (533)	14.00 (356)	7.00 (178)
324JM	22.00 (559)	16.00 (406)	8.00 (203)
326JM	23.00 (584)	16.00 (406)	8.00 (203)
364JM	26.00 (660)	17.17 (436)	9.00 (229)
365JM	26.00 (660)	17.17 (436)	9.00 (229)
404JM	32.00 (813)	19.92 (506)	10.00 (254)
405JM	32.00 (813)	19.92 (506)	10.00 (254)
364TCZ	24.00 (610)	18.00 (457)	9.00 (229)
365TCZ	24.00 (610)	18.00 (457)	9.00 (229)
404TCZ	27.25 (692)	20.00 (508)	10.00 (254)
405TCZ	28.75 (730)	20.00 (508)	10.00 (254)
444TCZ	31.13 (791)	22.00 (559)	11.00 (279)
445TCZ	31.13 (791)	22.00 (559)	11.00 (279)
447TCZ	39.63 (1006)	22.00 (559)	11.00 (279)
449TCZ	39.63 (1006)	22.00 (559)	11.00 (279)

# Model 3804 Pump End Only Product Offering



Pump Size	Disch	Suct	D	X	Y	Z	P1	P2	B1	B2	G	H	E	A	AC	AD	CP	U	V	Key
1.25x1.5x7S (NPT)	1.25	1.5	7.00 (178)	5.00 (127)	3.25 (083)	4.50 (114)	1.63 (041)	1.38 (035)	2.63 (067)	2.38 (060)	0.63 (016)	0.44 (011)	3.25 (083)	8.00 (203)	8.35 (212)	12.93 (328)	17.81 (452)	0.88 (022)	2.13 (054)	.19(5) SQ. x 1.38(35) LNG
1.5x2x7S (NPT)	1.5	2	7.00 (178)	6.00 (152)	3.13 (079)	4.63 (117)	1.44 (037)	1.56 (040)	2.44 (062)	2.56 (065)	0.63 (016)	0.44 (011)	3.25 (083)	8.00 (203)	9.03 (229)	13.59 (345)	18.16 (461)	0.88 (022)	2.13 (054)	.19(5) SQ. x 1.38(35) LNG
1.5x2x11S (NPT)	1.5	2	8.00 (203)	9.00 (229)	3.13 (079)	5.75 (146)	1.44 (037)	2.94 (075)	2.25 (057)	3.75 (095)	0.69 (017)	0.44 (011)	4.56 (116)	11.00 (279)	8.92 (227)	13.48 (342)	18.05 (458)	0.88 (022)	2.13 (054)	.19(5) SQ. x 1.38(35) LNG
1.5x2x11L (NPT)	1.5	2	8.00 (203)	9.00 (229)	3.13 (079)	5.75 (146)	1.44 (037)	2.94 (075)	2.25 (057)	3.75 (095)	0.69 (017)	0.44 (011)	4.56 (116)	11.00 (279)	12.19 (310)	18.62 (473)	23.19 (589)	1.13 (029)	3.13 (079)	.25(6) SQ. x 1.75(45) LNG
1.5x2x12S (NPT)	1.5	2	10.00 (254)	7.75 (197)	2.75 (070)	5.75 (146)	1.94 (049)	2.94 (075)	2.87 (073)	3.75 (095)	0.69 (017)	0.44 (011)	4.56 (116)	11.00 (279)	8.60 (218)	13.16 (334)	17.85 (453)	0.88 (022)	2.13 (054)	.19(5) SQ. x 1.38(35) LNG
2x2.5x7S◆	2	2.5	7.00 (178)	6.50 (165)	3.50 (089)	4.75 (121)	1.56 (040)	1.44 (037)	2.56 (065)	2.44 (062)	0.63 (016)	0.44 (011)	3.25 (083)	8.00 (203)	9.08 (231)	13.63 (346)	18.70 (475)	0.88 (022)	2.13 (054)	.19(5) SQ. x 1.38(35) LNG
2x2.5x9.5S◆	2	2.5	8.00 (203)	7.00 (178)	4.00 (102)	5.88 (149)	1.56 (040)	2.81 (071)	2.38 (060)	3.63 (092)	0.69 (017)	0.44 (011)	4.56 (116)	11.00 (279)	8.94 (227)	13.50 (343)	19.07 (484)	0.88 (022)	2.13 (054)	.19(5) SQ. x 1.38(35) LNG
2x2.5x9.5L◆	2	2.5	8.00 (203)	7.00 (178)	4.00 (102)	5.88 (149)	1.56 (040)	2.81 (071)	2.38 (060)	3.63 (092)	0.69 (017)	0.44 (011)	4.56 (116)	11.85 (301)	17.69 (449)	23.22 (590)	23.22 (590)	1.13 (029)	3.13 (079)	.25(6) SQ. x 1.75(45) LNG
2x3x11S◆	2	3	10.00 (254)	8.00 (203)	5.50 (140)	6.50 (165)	2.23 (057)	2.77 (070)	3.23 (082)	3.77 (096)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	7.93 (201)	12.52 (318)	20.22 (514)	0.88 (022)	2.13 (054)	.19(5) SQ. x 1.38(35) LNG
2x3x11L◆	2	3	10.00 (254)	8.00 (203)	5.50 (140)	6.50 (165)	2.23 (057)	2.77 (070)	3.23 (082)	3.77 (096)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	11.06 (281)	16.87 (428)	24.59 (625)	1.13 (029)	3.13 (079)	.25(6) SQ. x 1.75(45) LNG
2x3x13.5L◆	2	3	10.00 (254)	9.00 (229)	5.50 (140)	7.25 (184)	2.00 (051)	3.00 (076)	3.00 (076)	4.00 (102)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	11.34 (288)	17.25 (438)	24.65 (626)	1.13 (029)	3.13 (079)	.25(6) SQ. x 1.75(45) LNG
2.5x3x7S◆	2.5	3	7.00 (178)	6.00 (152)	4.25 (108)	4.69 (120)	1.63 (041)	1.38 (035)	2.63 (067)	2.38 (060)	0.63 (016)	0.44 (011)	3.25 (083)	8.00 (203)	8.94 (227)	13.50 (343)	19.38 (492)	0.88 (022)	2.13 (054)	.19(5) SQ. x 1.38(35) LNG
2.5x3x9.5S◆	2.5	3	8.00 (203)	6.75 (171)	4.00 (102)	6.00 (152)	1.63 (041)	2.75 (070)	2.44 (062)	3.56 (090)	0.69 (017)	0.44 (011)	4.56 (116)	11.00 (279)	9.03 (229)	13.62 (346)	19.22 (488)	0.88 (022)	2.13 (054)	.19(5) SQ. x 1.38(35) LNG
2.5x3x9.5L◆	2.5	3	8.00 (203)	6.75 (171)	4.00 (102)	6.00 (152)	1.63 (041)	2.75 (070)	2.44 (062)	3.56 (090)	0.69 (017)	0.44 (011)	4.56 (116)	11.93 (279)	11.93 (303)	17.75 (451)	23.37 (594)	1.13 (029)	3.13 (079)	.25(6) SQ. x 1.75(45) LNG

S – denotes small power frame  
 L – denotes large power frame  
 XL – denotes extra large power frame

- Notes:
- Dimensions are approximate.
  - All dimensions are in inches (mm) and may vary  $\pm 1/4$  (6).
  - Not for construction purposes unless certified.
    - ◆ Available in 250 lb./125 lb. Flanges
    - Dimensions do not match Bell & Gossett
  - Use extra large power frame with impeller diameters larger than 12.5 (318).
  - See 3800 dimension pages for base mount information.



# Model 3804 Pump End Only Product Offering

Pump Size	Disch	Suct	D	X	Y	Z	P1	P2	B1	B2	G	H	E	A	AC	AD	CP	U	V	Key
2.5x3x13.5L◆	2.5	3	10.00 (254)	9.00 (229)	6.00 (152)	8.00 (203)	2.00 (051)	3.00 (076)	3.00 (076)	4.00 (102)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	11.47 (291)	17.28 (439)	25.28 (642)	1.13 (029)	3.13 (079)	.25(6) SQ. x 1.75(45) LNG
3x4x7S◆	3	4	7.00 (178)	6.00 (152)	4.13 (105)	5.00 (127)	1.69 (043)	1.31 (033)	2.69 (068)	2.31 (059)	0.63 (016)	0.44 (011)	3.25 (083)	8.00 (203)	8.73 (222)	13.24 (336)	19.11 (485)	0.88 (022)	2.13 (054)	.19(5) SQ. x 1.38(35) LNG
3x4x7L◆	3	4	7.00 (178)	6.00 (152)	4.13 (105)	5.00 (127)	1.69 (043)	1.31 (033)	2.69 (068)	2.31 (059)	0.63 (016)	0.44 (011)	3.25 (083)	8.00 (203)	11.60 (295)	17.43 (443)	23.22 (590)	1.13 (029)	3.13 (079)	.25(6) SQ. x 1.75(45) LNG
3x4x9.5S◆	3	4	8.00 (203)	7.50 (191)	4.75 (121)	6.13 (156)	1.81 (046)	2.56 (065)	2.69 (068)	3.31 (084)	0.75 (019)	0.44 (011)	4.56 (116)	11.00 (279)	8.54 (217)	13.19 (335)	19.72 (501)	0.88 (022)	2.13 (054)	.19(5) SQ. x 1.38(35) LNG
3x4x9.5L◆	3	4	8.00 (203)	7.50 (191)	4.75 (121)	6.13 (156)	1.81 (046)	2.56 (065)	2.69 (068)	3.31 (084)	0.75 (019)	0.44 (011)	4.56 (116)	11.50 (292)	11.50 (440)	17.32 (440)	23.87 (606)	1.13 (029)	3.13 (079)	.25(6) SQ. x 1.75(45) LNG
3x4x11S◆	3	4	10.00 (254)	9.50 (241)	5.50 (140)	7.38 (187)	2.44 (062)	2.56 (065)	3.44 (087)	3.56 (091)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	7.71 (196)	12.31 (313)	20.22 (514)	0.88 (022)	2.13 (054)	.19(5) SQ. x 1.38(35) LNG
3x4x11L◆	3	4	10.00 (254)	9.50 (241)	5.50 (140)	7.38 (187)	2.44 (062)	2.56 (065)	3.44 (087)	3.56 (091)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	10.84 (275)	16.69 (424)	24.59 (625)	1.13 (029)	3.13 (079)	.25(6) SQ. x 1.75(45) LNG
3x4x13.5L◆	3	4	10.00 (254)	9.50 (241)	5.63 (143)	8.00 (203)	2.13 (054)	2.88 (073)	3.13 (080)	3.88 (098)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	11.28 (287)	17.12 (435)	24.84 (631)	1.13 (029)	3.13 (079)	.25(6) SQ. x 1.75(45) LNG
4x5x7S◆	4	5	8.00 (203)	7.50 (191)	4.94 (125)	5.75 (146)	2.25 (057)	2.13 (054)	3.06 (078)	2.94 (075)	0.69 (017)	0.44 (011)	4.56 (116)	11.00 (279)	8.40 (213)	12.94 (329)	20.16 (512)	0.88 (022)	2.13 (054)	.19(5) SQ. x 1.38(35) LNG
4x5x7L◆	4	5	8.00 (203)	7.50 (191)	4.94 (125)	5.75 (146)	2.25 (057)	2.13 (054)	3.06 (078)	2.94 (075)	0.69 (017)	0.44 (011)	4.56 (116)	11.00 (279)	11.28 (287)	17.06 (433)	24.28 (617)	1.13 (029)	3.13 (079)	.25(6) SQ. x 1.75(45) LNG
4x5x9.5S◆	4	5	10.00 (254)	8.00 (203)	5.00 (127)	7.00 (178)	1.88 (048)	2.50 (064)	2.69 (068)	3.31 (084)	0.75 (019)	0.44 (011)	4.56 (116)	11.00 (279)	8.52 (216)	13.12 (333)	19.97 (507)	0.88 (022)	2.13 (054)	.19(5) SQ. x 1.38(35) LNG
4x5x9.5L◆	4	5	10.00 (254)	8.00 (203)	5.00 (127)	7.00 (178)	1.88 (048)	2.50 (064)	2.69 (068)	3.31 (084)	0.75 (019)	0.44 (011)	4.56 (116)	11.00 (279)	11.43 (290)	17.25 (438)	24.12 (613)	1.13 (029)	3.13 (079)	.25(6) SQ. x 1.75(45) LNG
4x5x11S◆	4	5	10.00 (254)	9.75 (248)	5.56 (141)	7.25 (184)	2.41 (061)	2.94 (075)	3.59 (091)	3.59 (091)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	7.81 (198)	12.41 (315)	20.35 (517)	0.88 (022)	2.13 (054)	.19(5) SQ. x 1.38(35) LNG
4x5x11L◆	4	5	10.00 (254)	9.75 (248)	5.56 (141)	7.25 (184)	2.41 (061)	2.94 (075)	3.59 (091)	3.59 (091)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	10.94 (278)	16.78 (426)	24.72 (628)	1.13 (029)	3.13 (079)	.25(6) SQ. x 1.75(45) LNG
4x5x11XL◆	4	5	10.00 (254)	9.75 (248)	5.56 (141)	7.25 (184)	2.41 (061)	2.59 (066)	3.41 (087)	3.59 (091)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	15.38 (391)	24.52 (623)	32.49 (825)	2.38 (060)	5.50 (140)	.63(16) SQ. x 4.00(102) LNG
4x5x13.5L◆	5	5	11.00 (279)	10.00 (254)	6.00 (152)	8.56 (218)	2.25 (057)	2.75 (070)	3.25 (083)	3.75 (095)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	10.78 (274)	16.63 (422)	24.84 (631)	1.13 (029)	3.13 (079)	.25(6) SQ. x 1.75(45) LNG
4x5x13.5XL◆	5	5	11.00 (279)	10.00 (254)	6.00 (152)	8.56 (218)	2.25 (057)	2.75 (070)	3.25 (083)	3.75 (095)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	15.25 (387)	24.38 (619)	32.63 (829)	2.38 (060)	5.50 (140)	.63(16) SQ. x 4.00(102) LNG
5x6x7S◆	5	6	10.00 (254)	8.50 (216)	5.81 (148)	6.25 (159)	2.81 (071)	1.56 (040)	3.63 (092)	2.38 (060)	0.69 (018)	0.44 (011)	4.56 (116)	11.00 (279)	8.09 (205)	12.63 (321)	21.28 (541)	0.88 (022)	2.13 (054)	.19(5) SQ. x 1.38(35) LNG
5x6x7L◆	5	6	10.00 (254)	8.50 (216)	5.81 (148)	6.25 (159)	2.81 (071)	1.56 (040)	3.63 (092)	2.38 (060)	0.69 (018)	0.44 (011)	4.56 (116)	11.00 (279)	10.97 (279)	16.76 (426)	25.39 (645)	1.13 (029)	3.13 (079)	.25(6) SQ. x 1.75(45) LNG
5x6x9.5S◆	5	6	11.00 (279)	10.00 (254)	6.00 (152)	7.50 (191)	2.19 (056)	2.81 (071)	3.19 (081)	3.81 (097)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	8.59 (218)	13.19 (335)	21.34 (542)	0.88 (022)	2.13 (054)	.19(5) SQ. x 1.38(35) LNG
5x6x9.5L◆	5	6	11.00 (279)	10.00 (254)	6.00 (152)	7.50 (191)	2.19 (056)	2.81 (071)	3.19 (081)	3.81 (097)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	11.50 (292)	17.31 (440)	25.50 (648)	1.13 (029)	3.13 (079)	.25(6) SQ. x 1.75(45) LNG
5x6x11L◆	5	6	11.00 (279)	10.50 (267)	5.44 (138)	7.94 (202)	2.59 (066)	2.41 (061)	3.44 (087)	3.56 (091)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	10.82 (275)	16.72 (425)	24.65 (626)	1.13 (029)	3.13 (079)	.25(6) SQ. x 1.75(45) LNG
5x6x13.5L◆	5	6	12.00 (305)	13.00 (330)	6.00 (152)	9.00 (229)	4.19 (106)	4.81 (122)	5.19 (132)	5.81 (148)	1.00 (025)	0.63 (016)	10.50 (267)	23.00 (584)	9.34 (237)	15.19 (386)	25.34 (644)	1.13 (029)	3.13 (079)	.25(6) SQ. x 1.75(45) LNG
5x6x13.5XL◆	5	6	12.00 (305)	13.00 (330)	6.00 (152)	9.00 (229)	4.19 (106)	4.81 (122)	5.19 (132)	5.81 (148)	1.00 (025)	0.63 (016)	10.50 (267)	23.00 (584)	13.81 (351)	22.94 (583)	33.13 (842)	2.38 (060)	5.50 (140)	.63(16) SQ. x 4.00(102) LNG
6x8x9.5L◆	6	8	11.00 (279)	10.50 (267)	7.00 (178)	8.25 (210)	3.13 (079)	1.88 (048)	4.13 (105)	2.88 (073)	0.88 (022)	0.50 (013)	7.00 (178)	16.00 (406)	11.06 (281)	16.93 (430)	27.00 (686)	1.13 (029)	3.13 (079)	.25(6) SQ. x 1.75(45) LNG
6x8x11L◆	6	8	12.00 (305)	11.00 (279)	6.13 (156)	8.47 (215)	4.63 (117)	4.38 (111)	5.63 (143)	5.38 (137)	1.00 (025)	0.63 (016)	10.50 (267)	23.00 (584)	9.15 (232)	15.05 (382)	25.72 (653)	1.13 (029)	3.13 (079)	.25(6) SQ. x 1.75(45) LNG
6x8x13.5XL◆	6	8	12.63◆ (321)	13.38◆ (340)	6.50 (165)	9.31 (237)	4.50 (114)	4.50 (114)	5.50 (140)	5.50 (140)	1.00 (025)	0.63 (016)	10.50 (267)	23.00 (584)	13.44 (341)	22.56 (573)	33.57 (853)	2.38 (060)	5.50 (140)	.63(16) SQ. x 4.00(102) LNG
8x10x13.5XL◆	8	10	15.00 (381)	14.00 (356)	8.00 (203)	11.00 (279)	4.50 (114)	4.50 (114)	5.50 (140)	5.50 (140)	1.00 (025)	0.63 (016)	10.50 (267)	23.00 (584)	13.33 (339)	22.38 (568)	34.96 (888)	2.38 (060)	5.50 (140)	.63(16) SQ. x 4.00(102) LNG

S - denotes small power frame

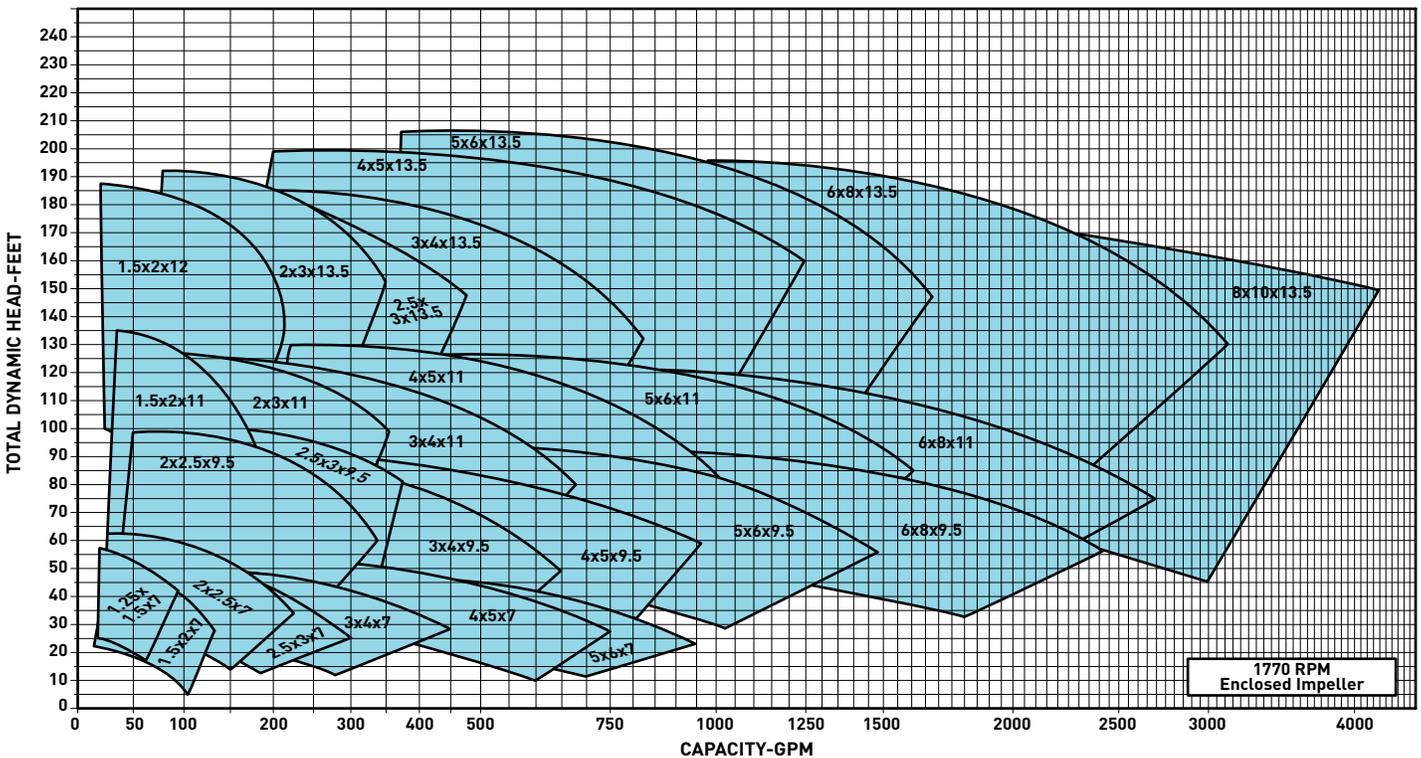
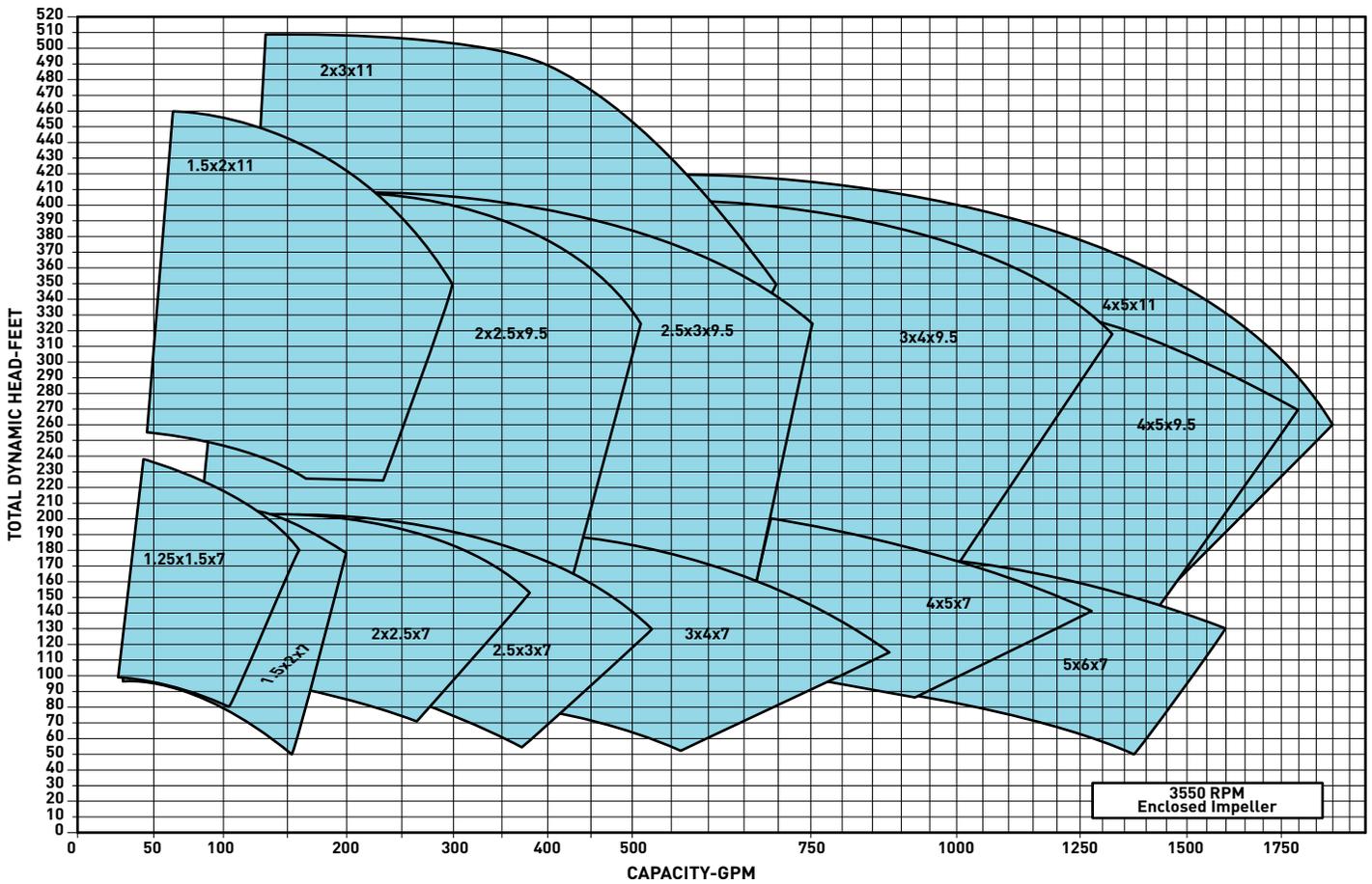
L - denotes large power frame

XL - denotes extra large power frame

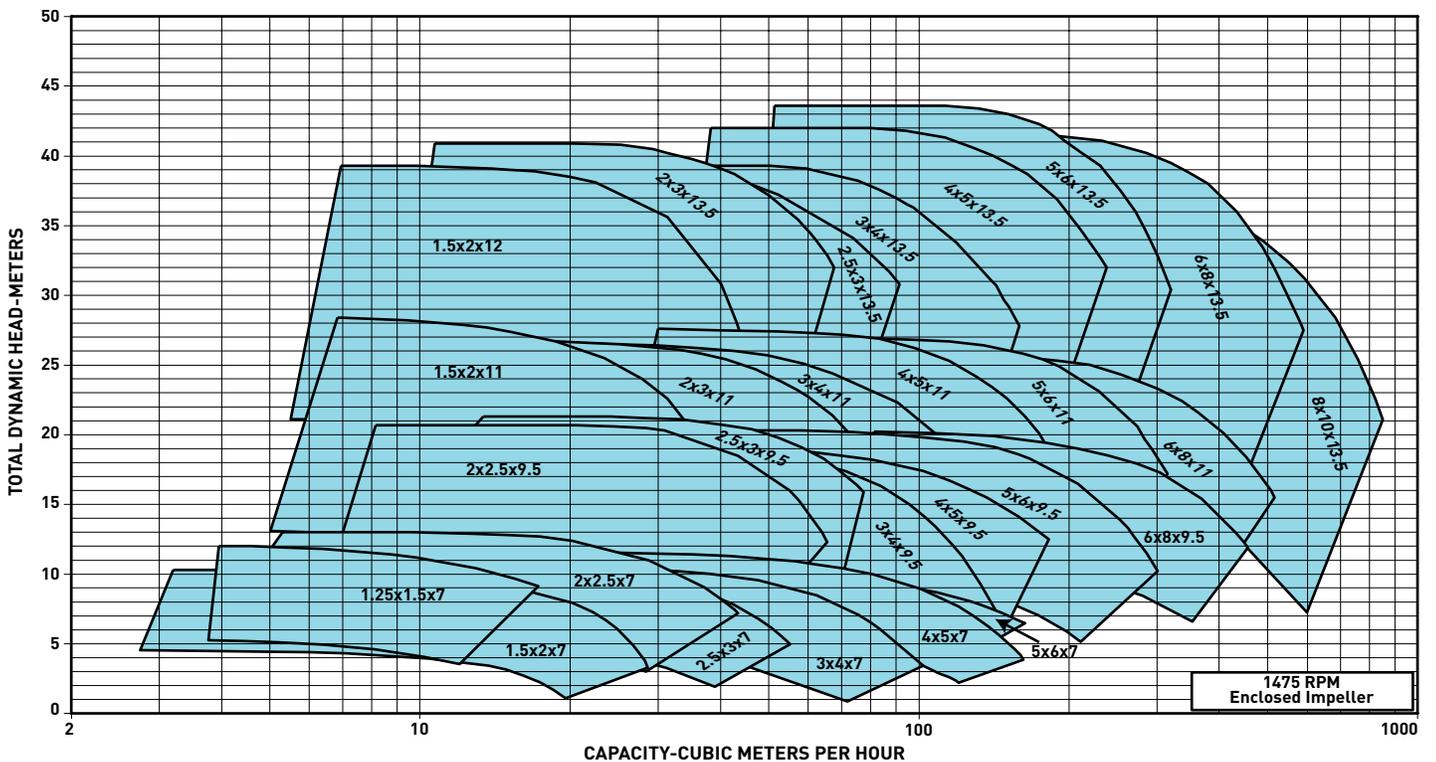
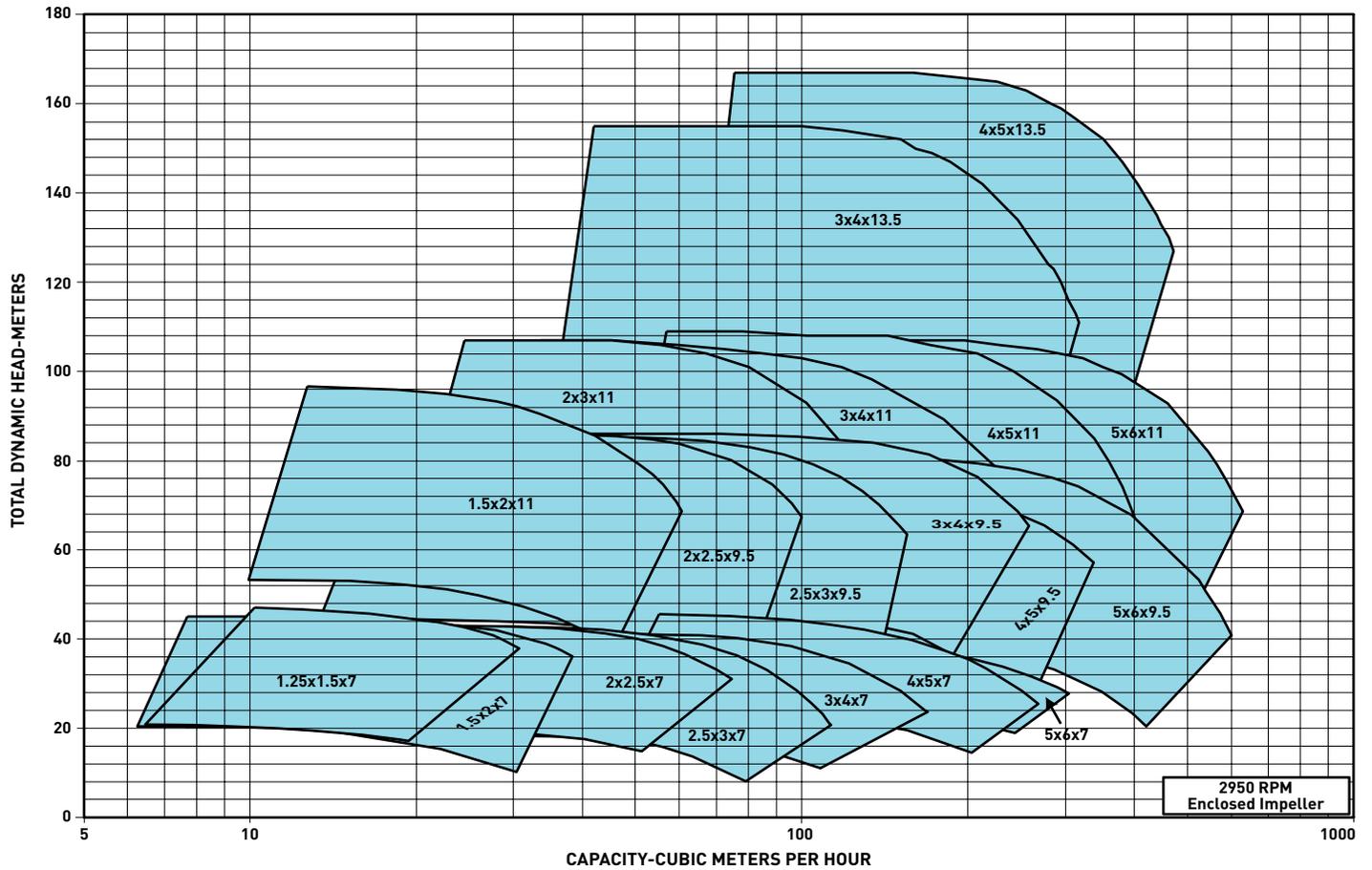
Notes:

- Dimensions are approximate.
- All dimensions are in inches (mm) and may vary ± 1/4 (6).
- Not for construction purposes unless certified.
  - ◆ Available in 250 lb./125 lb. Flanges
  - Dimensions do not match Bell & Gossett
- ◆ Use extra large power frame with impeller diameters larger than 12.5 (318).
- See 3800 dimension pages for base mount information.

# 3550 and 1770 RPM Range Charts



# 2950 and 1475 RPM Range Charts



# Engineering Specifications

## 3800 Series Specifications

The contractor shall furnish (and install as shown on the plans) Aurora® model (3801 horizontal close coupled) (3804 horizontal flexible coupled) back pullout centrifugal pump size \_\_\_ x \_\_\_ x \_\_\_ of stainless fitted construction.

Each pump shall have a capacity of \_\_\_ GPM at \_\_\_ ft. of total head, with a temperature of \_\_\_ F°, \_\_\_ specific gravity. Each pump is to be furnished with a mechanical seal with all metal parts to be 303 stainless steel with Buna-N elastomers, ceramic seat and carbon washer. The unit must be equipped with bronze shaft sleeve that extends the length of the seal plate. The pump shaft extension shall be gasket sealed from the pumped liquid. Impellers to be 316 stainless steel, dynamically balanced and key locked to the shaft.

## Flexible Coupled–Frame Mounted (3804)

Pump and motor are to be mounted on a common fabricated steel base plate. The shaft is to be steel, installed in a cast iron power frame. Pumps shall have a shaft design of .002" deflection at the seal face with the pump running under maximum load condition. Grease ball bearings have a 3-year minimum life (AFBMA B10) under the maximum condition of load. The pump shall be flexible coupled to a standard horizontal NEMA \_\_\_ HP, \_\_\_ phase, \_\_\_ Hertz, \_\_\_ volts, \_\_\_ RPM (open drip-proof) (totally enclosed fan cooled) motor. Alignment shall be checked in accordance with the standards of the Hydraulic Institute after installation and there shall be no strain transmitted to the pumps.

## Materials of Construction

Pump Part	Stainless Fitted
Casing	Cast iron ASTM A48
Impeller	316 stainless steel
Seal plate/motor bracket	Cast iron ASTM A48
Shaft	Steel AISI 1018
Sleeve	Bronze ASTM B62
Power frame (3804) (PF1, PF2, PF3 or PF21A)	Cast iron ASTM A48
Mechanical seal	303 stainless steel metal parts, Buna-N elastomer parts, ceramic seat and carbon washer

## Design Details

Area	Description	Power Frame			
		1	2	3	21A
Pump Shaft	Rotation—from driver end	CW	CW	CW	CW
	Diameter at impeller	0.88	1.25	1.25	1.63
	Diameter at shaft sleeve	1	1.38	1.38	1.75
	Diameter between bearings	1.38	1.94	2.38	3.25
	Diameter at coupling end	0.88	1.13	1.13	2.38
	Coupling key—square	0.19	0.25	0.25	0.63
	Max. deflection at seal face	0.002	0.002	0.002	0.002
Ball Bearings	Bearing (inboard radial)	206K	308K	310K	313
	Bearing (outboard thrust)	206KG	308KG	310KG	5313
	Bearing centers	5.69	7.69	7.69	9.63
	Bearing type	Ball	Ball	Ball	Ball
	Min B10 bearing life under maximum load	3 years	3 years	3 years	3 years
Sleeve	Outside diameter of sleeve	1.13	1.50	1.50	2



# AUTOMATIC POOL FILLER

## MODEL T40-F

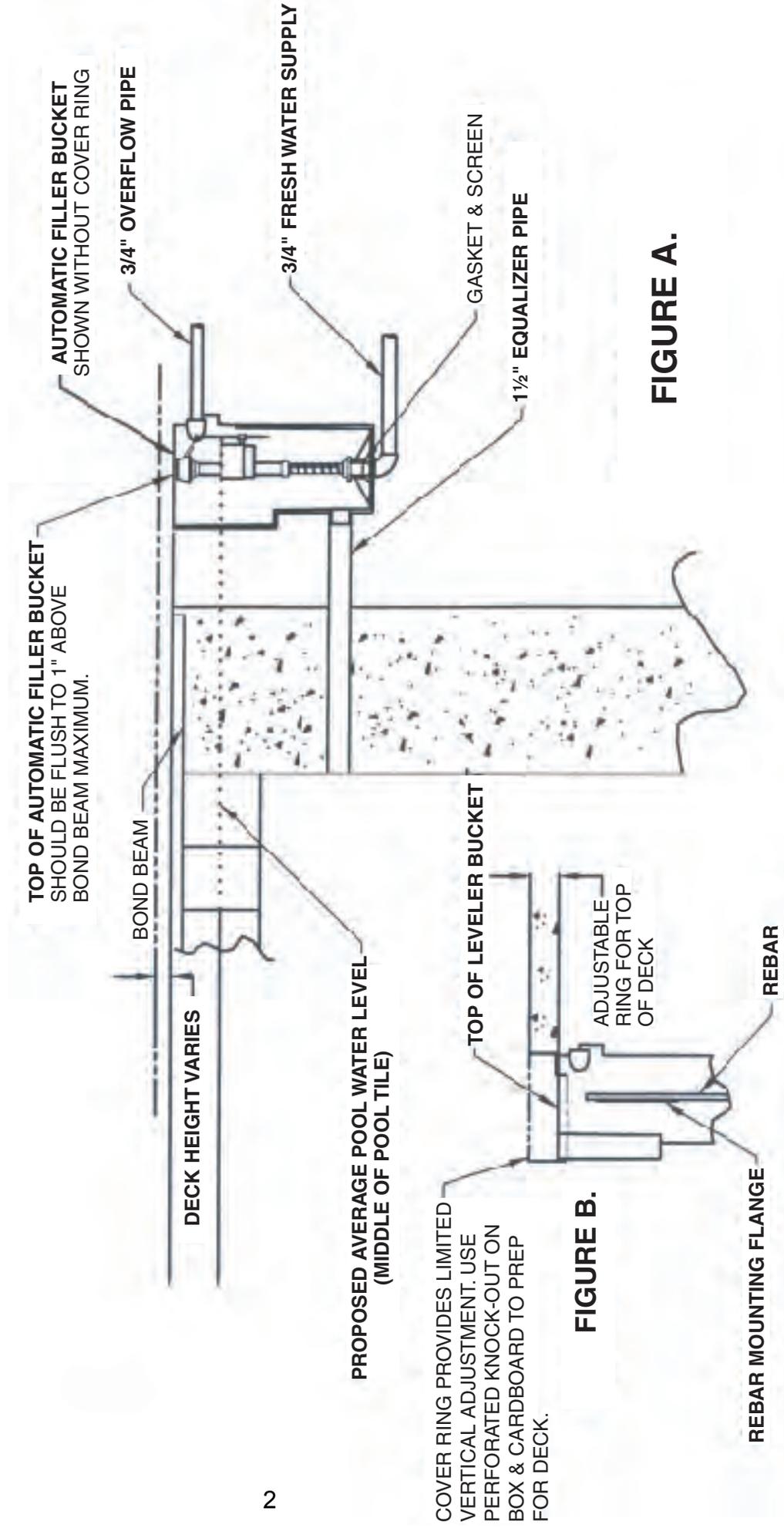
### Installation Instructions

Prior to installation, check local building codes for exceptions to these instructions.

1. Install leveler bucket so top of bucket is flush with bond beam of pool (See Fig. A). Ring and Lid then should be installed flush with deck. Use rebar mounting flanges provided on bucket to insure and aid in keeping bucket level during concrete pour.
2. Install 1½" equalizer pipe. **IMPORTANT:** Equalizer pipe must be straight, as shown in Figure A. The use of any 45° or 90° pipe could cause air lock and void warranty. Use only PVC to ABS transition cement for this application.
3. Connect ¾" fresh water supply pipe to side leveler bucket. (See Fig. A). Special Note: Please allow adequate cure time as per cement manufacturer before applying pressure.
4. You can pressure test auto-fill with supplied fitting P/N 210067. (See Fig. D). **CAUTION:** Do not over tighten.
5. Remove test plug and flush supply line for approximately 60 seconds or until all debris has cleared.
6. Connect ¾" overflow pipe in port (See Fig. A), using a PVC to ABS transition cement.
7. Install valve assembly, Fluidmaster® Valve with PTFE thread seal tape. **IMPORTANT:** Do not use liquid or paste sealers. Pentair Water Pool and Spa, Inc. does not cover warranty if damaged because of over tightening or cross threading.
8. To adjust float height of Fluidmaster® valve, lightly press down the top of fill valve with one hand, while turning clockwise or counter-clockwise to adjust valve. Continue turning until water level is achieved. (See Figure E).

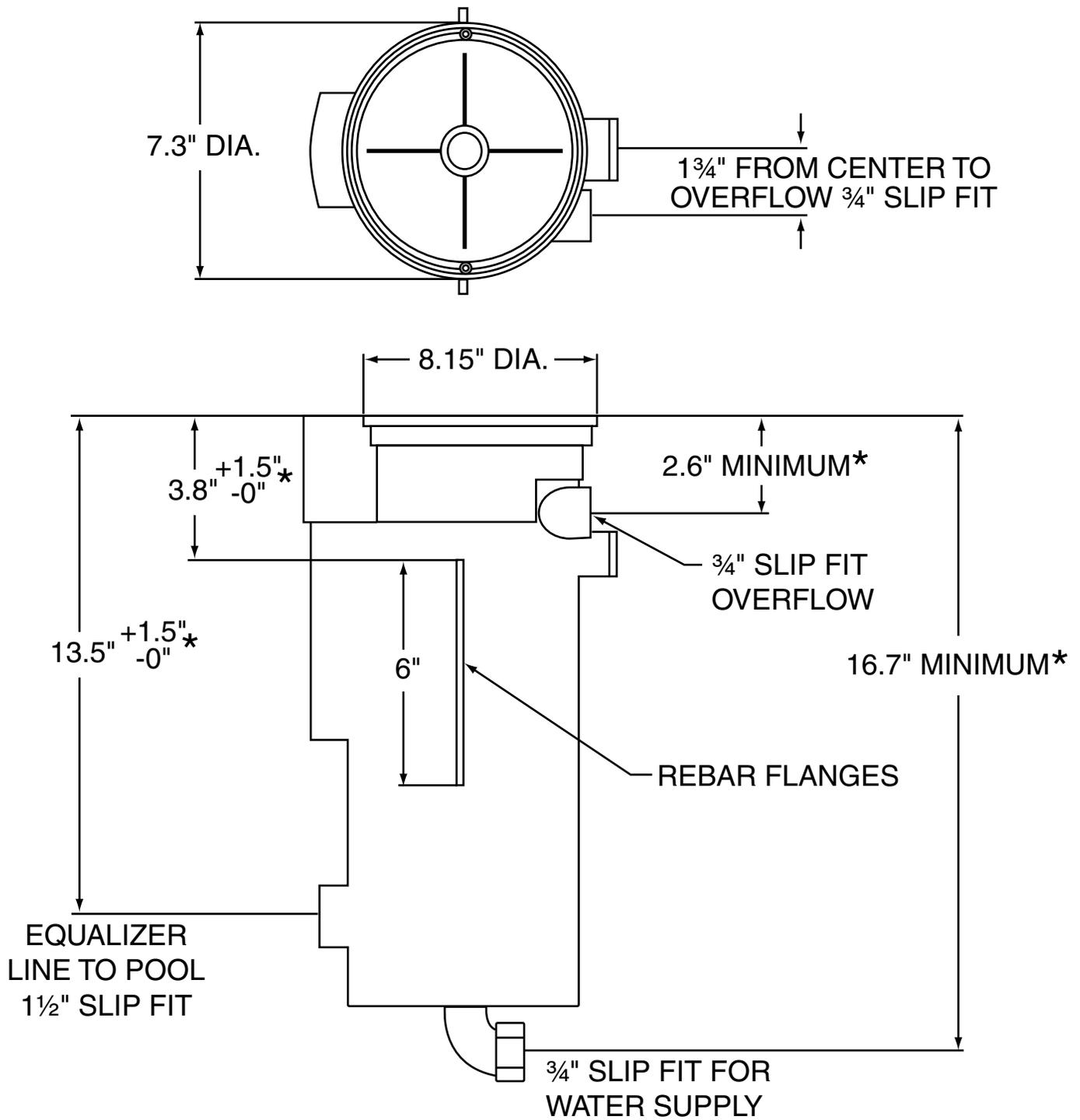
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10951 West Los Angeles Ave., Moorpark, CA 93021 • (800) 831-7133 • (805) 553-5000  
[www.pentairpool.com](http://www.pentairpool.com) or [www.staritepool.com](http://www.staritepool.com)

# AUTOMATIC POOL FILLER INSTALLATION GUIDES Model # T40-F



**FIGURE A.**

**FIGURE B.**



**FIGURE C.**

\* REFER TO FIGURE A OF INSTALLATION INSTRUCTIONS FOR HEIGHT OF DECK CONSIDERATIONS.

## Teat Plug

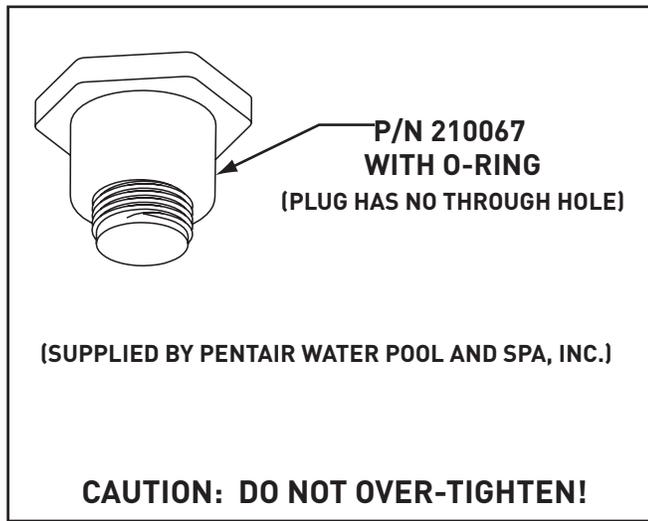
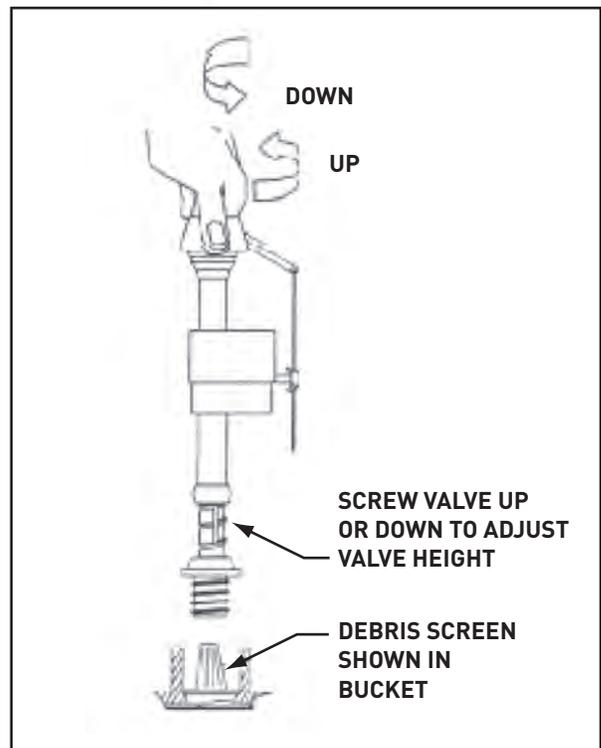
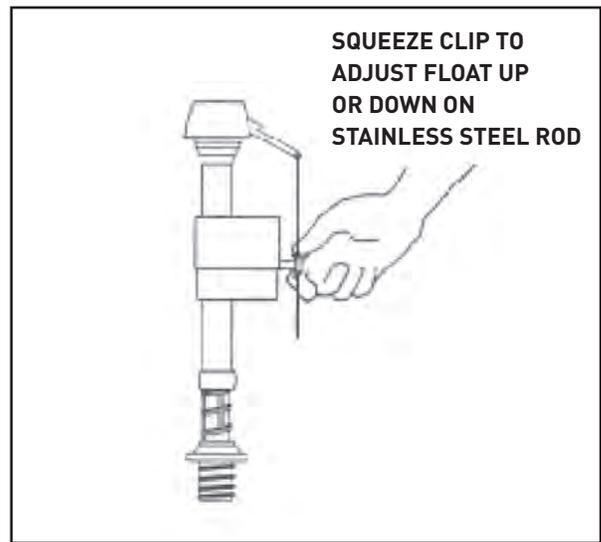


Figure D



**TO CLEAR SAND AND DEBRIS FROM SUPPLY LINE,  
REMOVE DEBRIS SCREEN, AND CLEAN SCREEN.  
THEN REINSTALL SCREEN AND VALVE.**

Figure E

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# BIOSHIELD®

## UV STERILIZER

Neutralize harmful bacteria while using less chlorine.





## GIVE YOURSELF THE PEACE OF MIND OF CLEANER POOL WATER.

Pool water can be a breeding ground for several kinds of harmful bacteria and pathogens that can cause Recreation Water Illnesses (RWIs). That's why Pentair has harnessed the power of UV light to neutralize bacteria and prevent its reproduction. The BioShield® UV Sterilizer provides instant protection as it "zaps" those harmful waterborne pathogens, providing cleaner, safer pool water for friends and family.



Neutralizes harmful bacteria and pathogens instantly



Reduces chlorine use



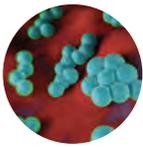
Commercial-grade sterilization power



## KEEP UNINVITED GUESTS OUT OF YOUR POOL.

You want your backyard oasis to be relaxing, enjoyable and protected. Keeping your pool water sparkling clean and virtually bacteria free is your top priority, and BioShield is the proven way to do it—without producing harmful byproducts. With the power of UV light, you'll neutralize harmful bacteria while using less chlorine, for less hassle and reduced odors.

Here are some of the unwanted guests you'll kick out of your pool:



**Cryptosporidium** is a leading cause of waterborne illness and is highly resistant to chlorine disinfection.



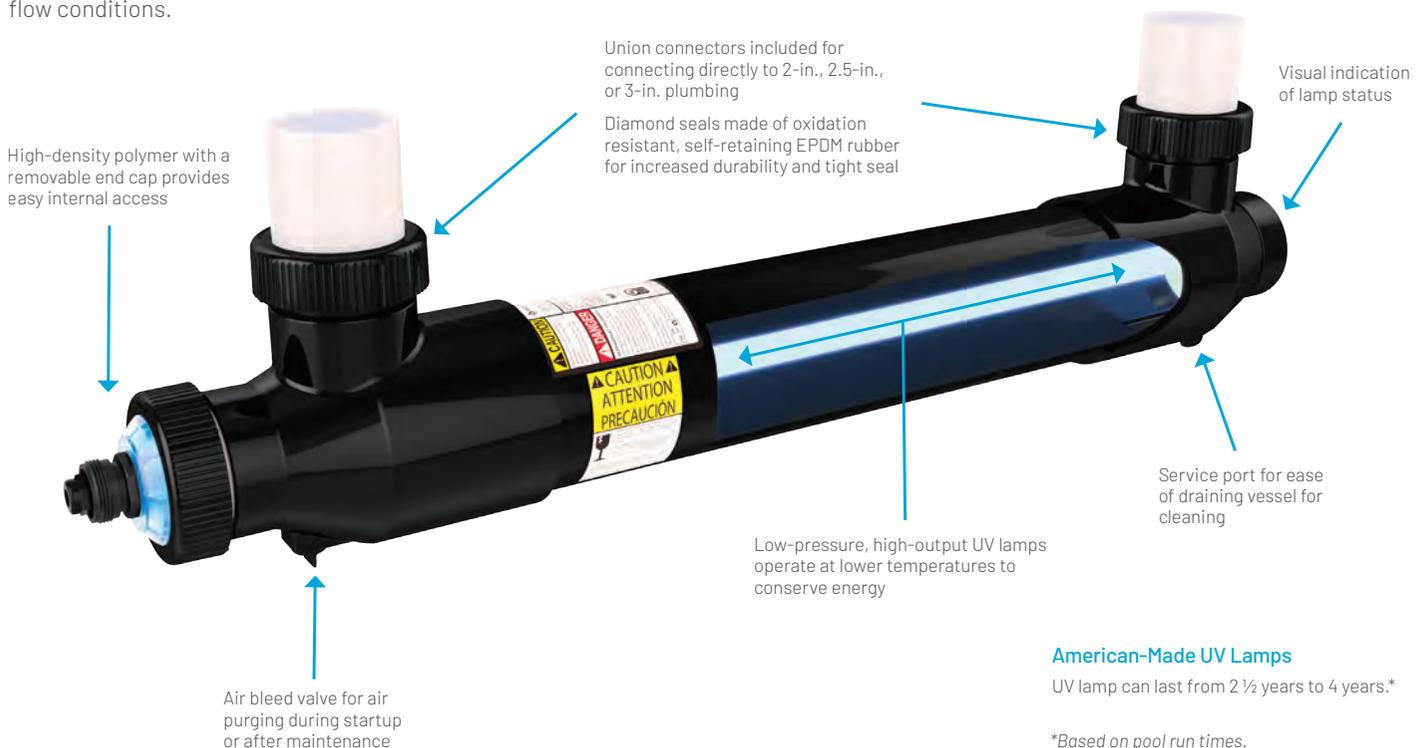
**Giardia** is a microscopic parasite that causes severe intestinal discomfort.



**E.coli bacteria** can cause urinary tract infections, respiratory illness and other health issues.

## AUTOMATION READY.

BioShield UV Sterilizer pairs perfectly with IntelliTouch® or EasyTouch® Pool Control Systems and IntelliChlor® Salt Chlorine Generators and/or IntelliChem® Water Chemistry Controllers for ultimate pool control and operation ease. Automatic shut-off feature protects the unit and prolongs the lamp life under low flow conditions.



# BIOSHIELD®

## UV STERILIZER



### DECADES OF LEADING THE WAY TO CLEANER WATER.

Pentair has a long history of managing and treating water with advanced technology in water filtration and purification serving commercial, municipal and residential customers around the world.

We've made safe drinking water more accessible by treating and purifying water for reuse and desalination. Our comprehensive line of compatible water filtration and purification products help make water cleaner, clearer and safer for everything from agriculture to industry to the refreshing pool in your backyard.



The BioShield® UV Sterilizer has earned the Eco Select® brand distinction as one of the greenest and most efficient choices from Pentair.



The TradeGrade family of products is exclusively made for and sold by the world's most demanding pool professionals.

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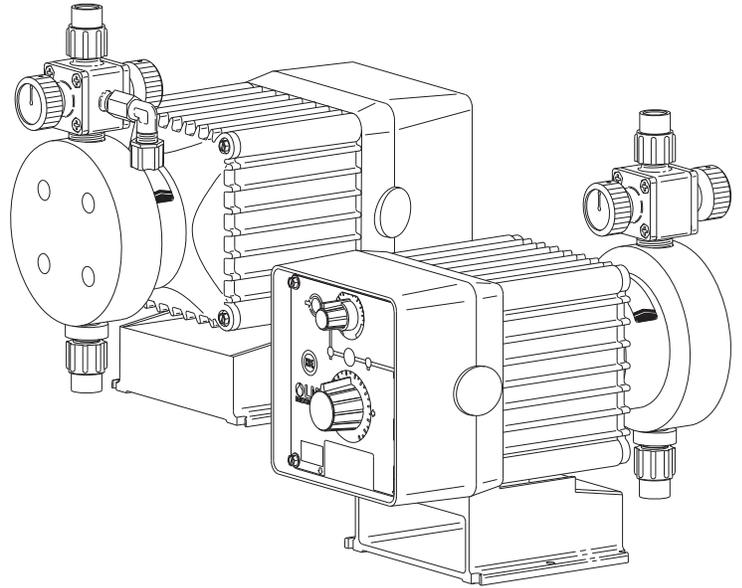




### Configuration Data

Model **C92** **1** - **363SI**

### Electronic Metering Pumps

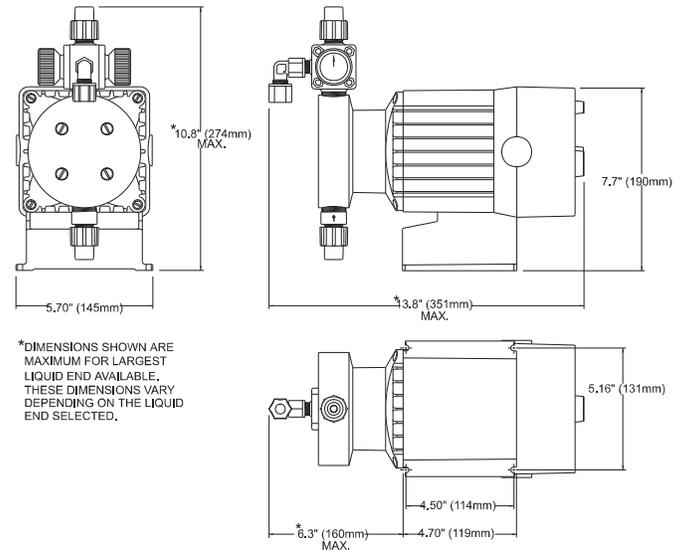


Control & Output Code	
<b>Manual Control</b>	
Speed (stroking frequency) and stroke length manually adjustable.	
C10	--- 1.3 GPH (4.9 l/h) ... 300 psi (20.7 Bar)
C11	--- 2.5 GPH (9.5 l/h) ... 150 psi (10.3 Bar)
C12	--- 4.0 GPH (15.1 l/h) ... 100 psi (6.9 Bar)
C13	--- 8.0 GPH (30 l/h) ..... 60 psi (4.1 Bar)
C14	--- 20 GPH (76 l/h) ..... 25 psi (1.7 Bar)
<b>Instrument Responsive/Manual Control</b>	
Manual adjustment features of C1 Series plus switch conversion to external control for automatic systems.	
C70	--- 1.3 GPH (4.9 l/h) ... 300 psi (20.7 Bar)
C71	--- 2.5 GPH (9.5 l/h) ... 150 psi (10.3 Bar)
C72	--- 4.0 GPH (15.1 l/h) ... 100 psi (6.9 Bar)
C73	--- 8.0 GPH (30 l/h) ..... 60 psi (4.1 Bar)
C74	--- 20 GPH (76 l/h) ..... 25 psi (1.7 Bar)
C76*	--- 4.0 GPH (15.1 l/h) ... 175 psi (12.1 Bar)
C77*	--- 10 GPH (38 l/h) ..... 80 psi (5.5 Bar)
C78*	--- 25 GPH (95 l/h) ..... 30 psi (2.07 Bar)
C90	--- 1.3 GPH (4.9 l/h) ... 300 psi (20.7 Bar)
C91	--- 2.5 GPH (9.5 l/h) ... 150 psi (10.3 Bar)
C92	--- 4.0 GPH (15.1 l/h) ... 100 psi (6.9 Bar)
C93	--- 8.0 GPH (30 l/h) ..... 60 psi (4.1 Bar)
C94	--- 20 GPH (76 l/h) ..... 25 psi (1.7 Bar)

Voltage Code	
1	----- 120 VAC US Plug
2	----- 240 VAC US Plug
3	----- 220-240 VAC DIN Plug
5	----- 240-250 VAC, UK Plug
6	----- 240-250 VAC, AUST/NZ Plug
7	----- 220-240 VAC, SWISS Plug

**Liquid End**  
See next page for complete liquid end specifications and selection.

### Dimensions



### Specifications

Series	Strokes Per Minute (Adjustable)		Stroke Length (Adjustable) Recommended Minimum	Average Input Power @Max Speed	Shipping Weight
	Min	Max			
C10, C70, C90 C11, C71, C91 C12, C72, C92 C13, C73, C93 C14, C74, C94	1	100	10%	44 watts	20 lbs (9.1 kg)
C76 C77 C78	1	100	10%	87 watts	28 lbs (12.7 kg)



201 Ivyland Road  
Ivyland, PA 18974 USA  
TOLL FREE: (800) 564-1097  
TEL: (215) 293-0401  
FAX: (215) 293-0445  
<http://www.lmipumps.com>

## Standard Liquid End Configuration Data & Materials of Construction

Drive Assembly	Liquid End No.	Size Code	Materials of Construction				Accessory	Tubing & Connections	
			Head & Fittings	Balls	Liquifram™	Check Valve		Discharge	Suction
C90, C70 C10	498SP	0.9	PVC	Ceramic	Fluorofilm™	PVDF / PTFE	4FV	Pipe 1/2" NPT M	
	297	0.9	316 S.S.	316 S.S.	Fluorofilm™	316 S.S.		Pipe 1/4" NPT M	
C92 C91	468SI	1.8	PVC / PVC	Ceramic	Fluorofilm™	PVDF / Polyprel®	4FV	PE .375" O.D.	
	460SI	1.8	Acrylic / PVC	Ceramic	Fluorofilm™	PVDF / Polyprel®	4FV	PE .375" O.D.	
C72	469SI	1.8	Acrylic / PVDF	PTFE	Fluorofilm™	PVDF / Polyprel®	4FV	PE .375" O.D.	
C71	368SI†	1.8	PVC / PVC	Ceramic	Fluorofilm™	PVDF / Polyprel®	4FV	PE .375" O.D.	
C12	362SI†	1.8	PVDF / PVDF	Ceramic	Fluorofilm™	PVDF / Polyprel®	4FV	PE .375" O.D.	
C11	363SI†	1.8	PVDF / PVDF	Ceramic	Fluorofilm™	PVDF / PTFE	4FV	PE .375" O.D.	
C93 C73 C13	465SI	1.8	Polypropylene	Ceramic	Fluorofilm™	PVDF / PTFE	4FV	PE .375" O.D.	
	75HV	1.8	Polypropylene	316 S.S.	Fluorofilm™	PTFE		PE .5" O.D. Vinyl .938" O.D.	
C94 C78 C74 C14	76HV	1.8	Acrylic/PP	316 S.S.	Fluorofilm™	Hypalon®		PE .5" O.D. Vinyl .938" O.D.	
	277	1.8	316 S.S.	316 S.S.	Fluorofilm™	316 S.S.		Pipe 1/4" NPT M	
C94 C78 C74 C14	312SI#	3.0	PVDF / PVDF	Ceramic	Fluorofilm™	PVDF / Polyprel®	4FV	PE .5" O.D.	
	313SI#	3.0	PVDF / PVDF	Ceramic	Fluorofilm™	PVDF / PTFE	4FV	PE .5" O.D.	
C94 C78 C74 C14	318SI#	3.0	PVC / PVC	Ceramic	Fluorofilm™	PVDF / Polyprel®	4FV	PE .5" O.D.	
	410SI#	3.0	Acrylic / PVC	Ceramic	Fluorofilm™	PVDF / Polyprel®	4FV	PE .5" O.D.	
C94 C78 C74 C14	415SI#	3.0	Polypropylene	Ceramic	Fluorofilm™	PVDF / PTFE	4FV	PE .5" O.D.	
	418SI#	3.0	PVC / PVC	Ceramic	Fluorofilm™	PVDF / Polyprel®	4FV	PE .5" O.D.	
C94 C78 C74 C14	419SI#	3.0	Acrylic / PVDF	PTFE	Fluorofilm™	PVDF / Polyprel®	4FV	PE .5" O.D.	
	20	3.0	Acrylic / PVC	Ceramic	Fluorofilm™	Hypalon®		PE .5" O.D.	
C94 C78 C74 C14	20HV	3.0	Acrylic/PP	316 S.S.	Fluorofilm™	Hypalon®		PE .5" O.D. Vinyl .938" O.D.	
	20S	3.0	Acrylic/PVC	Ceramic	Fluorofilm™	Hypalon®	4FV	PE .5" O.D. Vinyl .5" O.D.	
C94 C78 C74 C14	24	3.0	PVC	Ceramic	Fluorofilm™	PTFE		Pipe 1/2" NPT M	
	25HV	3.0	Polypropylene	316 S.S.	Fluorofilm™	PTFE		PE .5" O.D. Vinyl .938" O.D.	
C94 C78 C74 C14	26	3.0	PVC	Ceramic	Fluorofilm™	Viton®		PE .5" O.D.	
	26S	3.0	PVC	Ceramic	Fluorofilm™	Viton®	4FV	PE .5" O.D.	
C94 C78 C74 C14	27	3.0	316 S.S.	316 S.S.	Fluorofilm™	PTFE		Pipe 1/2" NPT M	
	29	3.0	UHMW PE	Ceramic	Fluorofilm™	Hypalon®		PE .5" O.D.	
C94 C78 C74 C14	30	6.0	Acrylic/PVC	Ceramic	Fluorofilm™	PTFE		PE .5" O.D. Vinyl .5" O.D.	
	34	6.0	PVC	Ceramic	Fluorofilm™	PTFE		Pipe 1/2" NPT M	
C94 C78 C74 C14	35P	6.0	Polypropylene	Ceramic	Fluorofilm™	PTFE		Pipe 1/2" NPT M	
	35T	6.0	Polypropylene	Ceramic	Fluorofilm™	PTFE		PE .5" O.D.	
C94 C78 C74 C14	36	6.0	PVC	Ceramic	Fluorofilm™	PTFE		PE .5" O.D.	
	37	6.0	316 S.S.	316 S.S.	Fluorofilm™	PTFE		Pipe 1/2" NPT M	
C76	468SP	1.8	PVC/PVC	Ceramic	Fluorofilm™	PVDF / Polyprel®	4FV	Pipe 1/2" NPT M	
	74S	1.8	PVC	Ceramic	Fluorofilm™	PTFE	4FV	Pipe 1/4" NPT M	
C77	277	1.8	316 S.S.	316 S.S.	Fluorofilm™	316 S.S.		Pipe 1/4" NPT M	
	20HV	3.0	Acrylic/PP	316 S.S.	Fluorofilm™	Hypalon®		PE .5" O.D. Vinyl .938" O.D.	
C77	20S**	3.0	Acrylic/PVC	Ceramic	Fluorofilm™	Hypalon®	4FV	PE .5" O.D. Vinyl .5" O.D.	
	24	3.0	PVC	Ceramic	Fluorofilm™	PTFE		Pipe 1/2" NPT M	
C77	25HV	3.0	Polypropylene	316 S.S.	Fluorofilm™	PTFE		PE .5" O.D. Vinyl .938" O.D.	
	25P	3.0	Polypropylene	Ceramic	Fluorofilm™	PTFE		Pipe 1/2" NPT M	
C77	25T	3.0	Polypropylene	Ceramic	Fluorofilm™	PTFE		PE .5" O.D.	
	26S**	3.0	PVC	Ceramic	Fluorofilm™	Viton®	4FV	PE .5" O.D.	
C77	27	3.0	316 S.S.	316 S.S.	Fluorofilm™	PTFE		Pipe 1/2" NPT M	
	29	3.0	UHMW PE	Ceramic	Fluorofilm™	Hypalon®		PE .5" O.D.	

## Output Information

Series	Gallons per Hour		Liters per Hour		mL/cc per Minute		mL/cc per Stroke		Maximum Injection Pressure	
	Min	Max	Min	Max	Min	Max	Min	Max		
C10, C70*, C90*	0.001	1.3	0.005	4.9	0.08	82	0.08	0.82	300 psi	(20.7 Bar)
C11, C71*, C91*	0.003	2.5	0.010	9.5	0.16	158	0.16	1.58	150 psi	(10.3 Bar)
C12, C72*, C92*	0.004	4.0	0.015	15.1	0.25	252	0.25	2.52	100 psi	(6.9 Bar)
C13, C73*, C93*	0.008	8.0	0.030	30.0	0.51	505	0.51	5.05	60 psi	(4.1 Bar)
C14, C74*, C94*	0.020	20.0	0.076	76.0	1.26	1262	1.26	12.62	25 psi	(1.7 Bar)
C76*	0.004	4.0	0.015	15.1	0.25	252	0.25	2.52	175 psi	(12.1 Bar)
C77*	0.010	10.0	0.038	38.0	0.63	631	0.63	6.31	80 psi	(5.5 Bar)
C78*	0.025	25.0	0.095	95.0	1.58	1577	1.58	15.77	30 psi	(2.07 Bar)

\* Minimum output is based on 1 stroke per minute and 10% stroke setting, minimum output can be reduced further in external mode. Series C9 pumps may be programmed for strokes per hour for lower outputs.

## AutoPrime Liquid End Configuration Data & Materials of Construction

Drive Assembly	Liquid End No.	Size Code	Head & Fittings	Balls	Liquifram™	Check Valve	Accessory	Tubing & Connections
C11 C71 C91	D60HI	1.8	Acrylic / PVC	Ceramic	Fluorofilm™	PVDF / Polyprel®	4FV	PE .375" O.D.
C12 C72 C92	D68HI	1.8	PVC / PVC	Ceramic	Fluorofilm™	PVDF / Polyprel®	4FV	PE .375" O.D.

## Output Information - AutoPrime Liquid Ends (Liquid end models beginning with "D")

Series	Maximum Output			Maximum Pressure		
	GPH	Liters/hr	mL/cc per minute	mL/cc per stroke	PSI	Bar
C11, C71, C91	2	7.5	125.0	1.25	150 psi	10.3
C12, C72, C92	2.5	9.5	158.3	1.58	100 psi	6.9

Auto prime liquid ends have 3 check valves: Suction on the bottom; Discharge on the front; AutoPrime bleed on the top. By design, a repeatable portion of the process fluid continuously bleeds through the top check valve to be returned to the chemical supply. The result is the assurance that any gas in the head is automatically relieved thus eliminating air-binding. The maximum output per the tables above is reduced to account for the continuous bleed.

See front page for voltage code specifications.

Plastic heads with tubing connection include 1/2" NPT and 1/2" BSP.

\*\*These Liquid Ends are available without a 4FV, simply drop the 'S' at the end of the Liquid End number to order the model without a 4FV.

#These liquid ends use 3/8" diameter balls. Pump output may be reduced in some applications.

\*To specify 1/4" NPT male, change 'I' to 'P'.

To specify black, UV resistant tubing, change "I" to "U".

To specify 3FV, change "S" to "T".

**3FV** indicates that the pump is equipped with an LMI Three Function Valve (pressure relief, priming aid, line drain).

**4FV** indicates that the pump is equipped with an LMI Four Function Valve. This diaphragm type, anti-siphon/pressure relief valve is installed on the pump head. It provides

anti-siphon protection and aids priming, even under pressure.

Fluorofilm™ is a copolymer of PTFE and PFA. Polyprel® is an elastomeric PTFE copolymer.

Polyprel is a registered trademark of the Milton Roy Company.

Fluorofilm and Liquifram are trademarks of the Milton Roy Company.

Hypalon is a registered trademark of E. I. du Pont de Nemours & Co., Inc.

## Description

BECSys CO<sub>2</sub> Feed Systems provide a rugged and reliable solution to pH control in aquatics facilities. CO<sub>2</sub> is recognized as a safe and easy-to-use method for pH control.

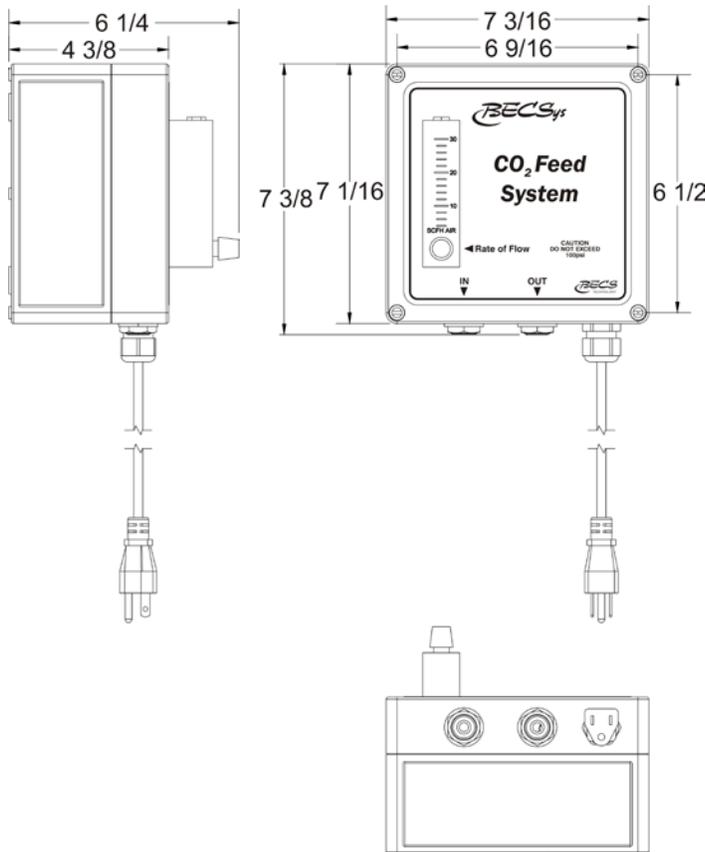
The BECSys CO<sub>2</sub> Feeder comes in two sizes of adjustable flow control:

- 4-30 SCFH
- 20-200 SCFH

There are also two injection methods available: diffuser or venturi eductor. The diffuser assembly is simple and effective. A check valve is included to prevent CO<sub>2</sub> tanks from filling with pool water as the CO<sub>2</sub> is depleted. The venturi eductor assembly is ideal for more demanding applications, requiring minimal maintenance. Internal mixing vanes assure optimal delivery of CO<sub>2</sub> into pool water with maximum gas-to-water transfer efficiency.

A full line of accessories is also available for the BECSys CO<sub>2</sub> Feed System including regulators, heaters and tank switchover units.

## BECSys CO<sub>2</sub> Feeder

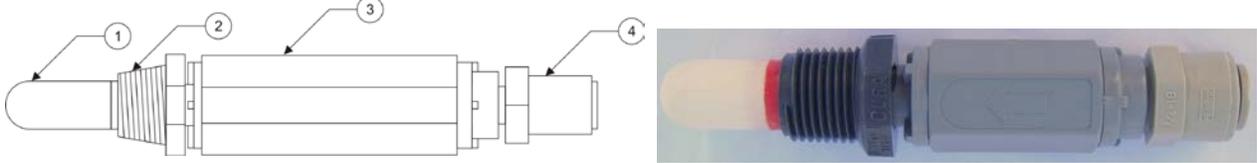


## Features

- NEMA housing
- 3/8" tubing included (10')
- 3/8" press fittings
- Two models available
  - 4-30 SCFH
  - 20-200 SCFH
- Two CO<sub>2</sub> injection technologies
  - Diffuser
  - Venturi eductor
- 230 VAC version also available

**Diffuser Assembly**

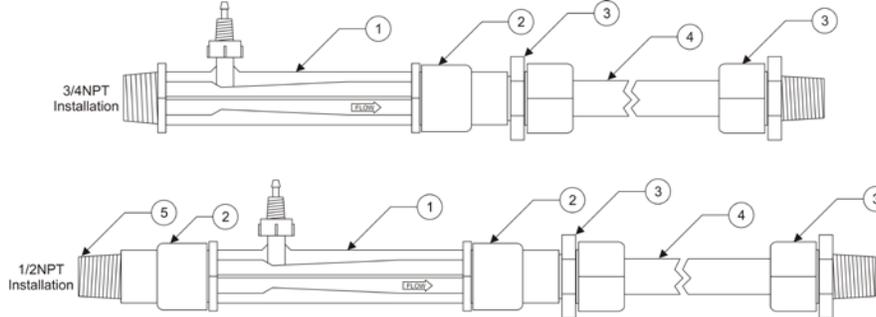
- Micro porous polyethylene diffuser
- Diffuser bushing with 1/2" NPT Process connection
- Check-valve included in assembly
- Push fitting for 3/8" OD tubing



Diffuser Assembly (Part Number 2210326)		
Item	Part Number	Description
1	8060794	Diffuser
2	2220353	Diffuser Bushing, 1/2" NPT
3	8060792	Check Valve, 1/4NPT
4	8060757	1/4NPT Straight Adapter, 3/8 Tube

**Eductor Assembly**

- High-efficiency, venturi-type, differential pressure injector
- Internal mixing vanes
- Integral check valve
- Trouble-free operation; no moving parts
- Includes parts for either 3/4NPT or 1/2NPT installation



Eductor Assembly (Part Number 2210327)		
Item	Part Number	Description
1	8060795	Eductor
2	8060796	3/4NPT x 1/2NPT Reducer Coupling (2)
3	8060797	Compression Fitting, 1/2NPT x 5/8 Tube (2)
4	8060802	5/8 OD Tubing, 15 ft
5	8060541	Pipe Nipple, 1/2NPT x Close





## Specifications

### Physical

Enclosure Material	Glass Reinforced Polycarbonate, NEMA 4X (IP66)
Overlay Material	UV Stabilized Polyester
Input Power Cord (110VAC only)	SJTW Type, 6' length
Enclosure Dimensions	Width: 7.17" Height: 7.09" Depth: 4.37"

### Environmental

Storage Temperature	-30 to 60 °C
Ambient Operating Temperature	-18 to 40 °C
Ambient Humidity	95% non condensing maximum

### Electrical

Voltage	115/230 VAC, 50/60 Hz
Phase	Single
Current	0.1 amps full load

## Ordering/Specification Guide

Part Number	Description & Options
2100298-	4 – 30 SCFH CO <sub>2</sub> Feeder
↓	<b>Injector Type</b>
	<b>D</b> Diffuser Assembly
	<b>E</b> Eductor Assembly
↓	<b>Input Voltage</b>
	<b>1</b> 115 VAC Input Power
	<b>2</b> 230 VAC Input Power
2100298-D1	<b>Sample Part Number</b> 4-30 SCFH CO <sub>2</sub> Feeder with diffuser assembly for 115 VAC input power
Part Number	Description & Options
2100299-	20 – 200 SCFH CO <sub>2</sub> Feeder
↓	<b>Injector Type</b>
	<b>D</b> Diffuser Assembly
	<b>E</b> Eductor Assembly (recommended)
↓	<b>Input Voltage</b>
	<b>1</b> 115 VAC Input Power
	<b>2</b> 230 VAC Input Power
↓	<b>Heaters</b>
	<b>O</b> One Heater (rated for up to 100 SCFH)
	<b>T</b> Two Heaters (in parallel, will handle up to 200 SCFH)
	<b>X</b> No Heaters
2100299-E1T	<b>Sample Part Number</b> 20-200 SCFH CO <sub>2</sub> Feeder with eductor assembly for 115 VAC input power with two heaters

## CO<sub>2</sub> Accessories

### Single Tank Regulator

- BECS PN: 9680043
- Forged brass body and housing cap
- 2" gauges
- Stem type seat mechanism
- Diaphragm: 1 3/4"
- Delrin cap bushing for smooth adjustments
- External self-seating relief valve (not designed to protect downstream apparatus)
- Sintered inlet filter
- Inlet fitting: CGA 320
- Weight: 2 lb 15 oz
- Maximum inlet: 3000 PSIG
- Delivery Range: 4-80 PSIG



Regulator – PN 9680043

### Heater

- Two versions available: 120VAC and 240VAC
  - 120VAC, 60 Hertz, single phase
    - PN: 9680045
  - 240VAC, 60 Hertz, single phase
    - PN: 9680046
- Case: Aluminum
- Expansion Chamber: Solid Brass
- Dimensions: 2" Diameter, 6" Overall length
- Fittings: Solid Brass for CO<sub>2</sub> cylinders, CGA 320
- Power Consumption: 100 Watts
- Capacity: 90 scfh



120VAC Heater  
PN 9680045



240VAC Heater  
PN 9680046

**Dual Tank Switchover**

- BECS PN: 2210343
- Dual tank manual switchover
- Includes pressure regulator with gauges



CO2 Dual Tank Switchover  
PN 2210343



**Automatic Dual Tank Switchover**

- BECS PN: 9680044
- Automatically switches to full CO<sub>2</sub> tank when the tank in use becomes empty
- Cylinder in use indicator
- Output is unregulated; requires Single Tank Regulator (9680043)
- Inlet Pressure: 3000 psig max
- Changeover Pressure: 185 psig +/- 15 psig
- Flow Rate: 2625 cfh @2000 psig inlet, 525 cfh @250 psig inlet



Automatic Dual CO<sub>2</sub> Tank Switchover  
PN 9680044



# ETi® 400 HIGH EFFICIENCY HEATER

## INSTALLATION AND USER'S GUIDE

**⚠ WARNING**

### FOR YOUR SAFETY - READ BEFORE OPERATING

If you do not follow these instructions exactly, a fire or explosion may result, causing property damage, personal injury or loss of life. For additional free copies of this manual; call USA (800) 831-7133

**FOR YOUR SAFETY** - This product must be installed and serviced by authorized personnel, qualified in pool/spa heater installation. Improper installation and/or operation can create carbon monoxide gas, fire or explosion, and flue gases which can cause serious injury, property damage, or death. For indoor installations, as an additional measure of safety, Pentair Water Pool and Spa, Inc. strongly recommends installation of suitable **Carbon Monoxide detectors** in the vicinity of this appliance and in any adjacent occupied spaces. Improper installation and/or operation will void the warranty.

**⚠ WARNING**

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or death. Installation and service must be performed by a qualified installer, service agency or the gas supplier.

**120 / 240 VAC NATURAL GAS / LP GAS**

Model	Natural
ETi® 400 NA - ASME	461113



**OWNER:  
Retain For  
Future  
Reference**

## FOR YOUR SAFETY

### WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

DO NOT store or use gasoline or other flammable vapors and liquids in the vicinity of this or other appliances.

## **Customer Service and Technical Support**

If you have questions about ordering Pentair Water Pool and Spa, Inc. replacement parts, and pool products, please call:

**Phone: (800) 831-7133**

**Fax: (800) 284-4151**

(8 AM to 7:30 PM Eastern Time/Pacific Time)

Web sites: [www.pentair.com](http://www.pentair.com)

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# Warning and Safety Instructions

## IMPORTANT SAFETY INSTRUCTIONS READ AND FOLLOW ALL INSTRUCTIONS SAVE THESE INSTRUCTIONS

### ETi® 400 High Efficiency Pool and Spa Heater

Thanks you for choosing the Pentair ETi® 400 High Efficiency Pool and Spa Heater. With proper installation and service of your new heating system, and correct chemical maintenance of the water will ensure years of heater operation. The ETi 400 High Efficiency heater is equipped with Pentair advanced heater technology which includes a multifunction temperature controller to continuously monitor the heater for proper operation. ETi 400 High Efficiency heaters are designed with direct spark ignition (DSI) for on demand heat, which eliminates the need for a standing pilot.

**SPECIAL INSTRUCTIONS TO OWNER:** Retain this manual for future reference. This instruction manual provides operating instructions, installation and service information for the heater. **READ AND REVIEW THIS MANUAL COMPLETELY**, it is very important that the owner/installer read and understand the section covering installation instructions, and recognize the local and state codes before installing the ETi 400 High Efficiency heater. Its use will reduce service calls and chance of injury and will lengthen product life. History and experience has shown that most heater damage is caused by improper installation practices.

## IMPORTANT NOTICES

**For the installer and operator of the ETi 400 High Efficiency Heater:** The manufacturer's warranty may be void if, for any reason, the heater is improperly installed and/or operated. Be sure to follow the instructions set forth in this manual. If you need any more information, or if you have any questions regarding to this pool heater, please contact Pentair Water Pool and Spa Customer Support at (800) 831-7133.

## HEATER APPLICATION INFORMATION

The ETi 400 Heater is sold with a limited factory warranty. Pentair Water Pool and Spa high standards of excellence include a policy of continuous product improvement resulting in your advanced technology pool and spa heater. Pentair reserves the right to make improvements which change the specifications of the heater without incurring an obligation to update the current heater equipment.

The ETi 400 Heater is designed for the heating of chlorine, bromine or salt system swimming pools and spas. The heater should never be employed for use as space heating boilers or general purpose water heaters. The manufacturer's warranty may be void if, for any reason, the heater is improperly installed and/or operated. Be sure to follow the instructions set forth in this manual.

## CODE REQUIREMENTS

Installation must be in accordance with all local codes and/or the latest edition of the National Fuel Gas Code, ANSI Z223.1 and the latest edition of the National Electrical Code, NFPA 70 (US).

Installation in Canada must be in accordance with the latest CAN/CGA-B149.1 or .2 and CSA C22.1 Canadian Electric Code, part 1.

The heater, when installed, must be electrically grounded and bonded in accordance with local codes, or, in absence of local codes, with the National Electrical Code, ANSI/NFPA70 (US) or in Canada in accordance with the Canadian Electric Code, part 1 as applicable.

The ETi 400 Pool Heater meets the requirements of the ASME Boiler and Pressure Vessel Code.





## CONSUMER INFORMATION AND SAFETY

### **WARNING**

**The U.S. Consumer Product Safety Commission warns that elevated water temperature can be hazardous. See below for water temperature guidelines before setting temperature.**

1. Spa or hot tub water temperatures should never exceed 104° F (40° C). A temperature of 100° F (38° C) is considered safe for a healthy adult. Special caution is suggested for young children.
2. Drinking of alcoholic beverages before or during spa or hot tub use can cause drowsiness which could lead to unconsciousness and subsequently result in drowning.
3. Pregnant women beware! Soaking in water above 102° F (39° C) can cause fetal damage during the first three months of pregnancy (resulting in the birth of a brain-damaged or deformed child). Pregnant women should stick to the 100° F (38° C) maximum rule.
4. Before entering the spa or hot tub, the user should check the water temperature with an accurate thermometer. Spa or hot tub thermostats may error in regulating water temperatures by as much as 4° F (2.2° C).
5. Persons with a medical history of heart disease, circulatory problems, diabetes or blood pressure problems should obtain their physician's advice before using spas or hot tubs.
6. Persons taking medication which induce drowsiness, such as tranquilizers, antihistamines or anticoagulants should not use spas or hot tubs.

### **WARNING**

**Should overheating occur or the gas supply fail to shut off, turn off the manual gas control valve to the heater. Do not use this heater if any part has been under water. Immediately call a qualified service technician to inspect the heater and to replace any part of control system and gas control which has been under water.**

### **WARNING**

**The U.S. Consumer Product Safety Commission warns that carbon monoxide is an "invisible killer". Carbon monoxide is a colorless and odorless gas.**

1. Carbon monoxide is produced by burning fuel, including natural gas and propane.
2. Proper installation, operation and maintenance of fuel-burning appliances in the home is the most important factor in reducing carbon monoxide poisoning.
3. Be sure that fuel burning appliances such as heaters are installed by professionals according to manufacturer's instructions and codes.
4. Always follow the manufacturer's directions for safe operation.
5. Have the heating system (including vents) inspected and serviced annually by a trained service technician.
6. Examine vents regularly for improper connections, visible cracks, rust or stains.
7. Install battery-operated carbon monoxide alarms. The alarms should be certified to the requirements of the most recent UL, IAS, CSA and IAPMO standard for carbon monoxide alarms. Test carbon monoxide alarms regularly and replace dead batteries.

## SAFETY INFORMATION

The ETi® 400 High Efficiency Pool and Spa Heater is designed and manufactured to provide many years of safe and reliable service when installed, operated and maintained according to the information in this manual. Throughout this manual, safety warnings and cautions are identified by the “” symbol. Be sure to read and comply with all of the warnings and cautions.

### **DANGER — CARBON MONOXIDE GAS IS DEADLY READ OWNERS MANUAL COMPLETELY BEFORE OPERATING**

THIS PRODUCT MUST BE INSTALLED AND SERVICED BY A PROFESSIONAL SERVICE TECHNICIAN, QUALIFIED IN POOL HEATER INSTALLATION. Some jurisdictions require that installers be licensed. Check with your local building authority about contractor licensing requirements. Improper installation and/or operation could create carbon monoxide gas and flue gases which could cause serious injury or death. Improper installation and/or operation will void the warranty.

Exhaust from this pool heater contains toxic levels of carbon monoxide, a dangerous, poisonous gas you cannot see or smell. Symptoms of carbon monoxide exposure or poisoning include dizziness, headache, nausea, weakness, sleepiness, muscular twitching, vomiting and inability to think clearly. IF YOU EXPERIENCE ANY OF THE ABOVE SYMPTOMS, IMMEDIATELY TURN OFF THE POOL HEATER, LEAVE THE VICINITY OF THE POOL OR SPA AND GET INTO FRESH AIR IMMEDIATELY. THE POOL HEATER MUST BE THOROUGHLY TESTED BY A GAS PROFESSIONAL BEFORE RESUMING OPERATION.

**EXCESSIVE CARBON MONOXIDE EXPOSURE CAN CAUSE BRAIN DAMAGE OR DEATH.**

- NEVER use this pool heater indoors without specified ventilation system (and properly installed vent pipe).
- NEVER use this pool heater in the home or in partly enclosed areas (such as garages), unless the specified ventilation system is used. If used outdoors, install far from open windows, doors, vents and other openings.
- Pentair strongly recommends that all vents, pipes and exhaust systems be initially and periodically tested for proper operation. This testing can be accomplished by using a hand-held carbon monoxide meter and/or by consulting with a gas professional.
- Pool heaters must be used in conjunction with carbon monoxide detectors installed near the pool heater. The carbon monoxide detectors must be periodically inspected for proper operation so as to insure continued safety. Broken or malfunctioning carbon monoxide detectors must be replaced immediately.

### **WARNING — FOR YOUR SAFETY**

This product must be installed and serviced by a professional service technician, qualified in pool heater installation. Some jurisdictions require that installers be licensed. Check with your local building authority about contractor licensing requirements. Improper installation and/or operation could create carbon monoxide gas and flue gases which could cause serious injury or death. Improper installation and/or operation will void the warranty.

 **WARNING — This heater is equipped with an unconventional gas control valve that is factory set at a pressure of -.2 inches wc.** Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation or service must be performed by a qualified installer, service agency or the gas supplier. If this control is replaced, it must be replaced with an identical control.

**Do not attempt to adjust the gas flow by adjusting the regulator setting.**

## **SAFETY INFORMATION (continued)**

**⚠ WARNING** — **Risk of fire or explosion from incorrect fuel use.** Do not try to run a heater set up for natural gas on propane gas or vice versa. Only qualified service technicians should attempt to convert heater from one fuel to the other. Do not attempt to alter the rated input or type of gas by changing the orifice. If it is necessary to convert to a different type of gas, consult your Pentair dealer. Serious malfunction of the burner can occur which may result in loss of life. Any additions, changes, or conversions required in order for the appliance to satisfactorily meet the application needs must be made by a Pentair dealer or other qualified agency using factory specified and approved parts. The heater is available for use with natural gas or LP (propane) gas only. It is not designed to operate with any other fuels. Refer to the nameplate for the type of gas the heater is equipped to use.

- Use heater only with the fuel for which it is designed.
- If an LP (propane) gas conversion is necessary, this **MUST** be done by a qualified professional service technician qualified in pool heater installation or by qualified gas supplier before the heater is operational.

**⚠ WARNING** — **Risk of fire or explosion from flammable vapors.** Do not store gasoline, cleaning fluids, varnishes, paints, or other volatile flammable liquids near heater or in the same room with heater.

**⚠ WARNING** — **Risk of explosion if unit is installed near propane gas storage.** Propane (LP) gas is heavier than air. Consult local codes and fire protection authorities about specific installation requirements and restrictions. Locate the heater away from propane gas storage and filling equipment as specified by the Standard for the Storage and Handling of Liquefied Petroleum Gases, CAN/CSA B149.2 (latest edition) or ANSI/NFPA 58 (latest edition).

**⚠ WARNING** — **Risk of fire, carbon monoxide poisoning, or asphyxiation if exhaust venting system leaks.** Only qualified service technicians should attempt to service the heater, as leakage of exhaust products or flammable gas may result from incorrect servicing.

**⚠ WARNING** — **Risk of asphyxiation if exhaust is not correctly vented. Follow venting instructions exactly when installing heater.** Do not use a draft hood with this heater, as the exhaust is under pressure from the burner blower and a draft hood will allow exhaust fumes to blow into the room housing the heater. The heater is supplied with an integral venting system for indoor installation. **Canada:** In Canada, this pool heater can only be installed outdoors or in an enclosure that is not normally occupied and has no openings directly into occupied areas. See Page 25 - 29 for enclosure venting requirements.

**⚠ CAUTION** — **Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Wiring errors can also destroy the control board.**

- Connect heater to **120 or 240 Volt, 60 Hz., Single Phase** power only.
- Verify proper operation after servicing.
- Do not allow children to play on or around heater or associated equipment.
- Never allow children to use the pool or spa without adult supervision.

### **⚠ DANGER**

**CARBON MONOXIDE GAS IS DEADLY** – Exhaust from this pool heater contains toxic levels of carbon monoxide, a dangerous, poisonous gas you cannot see or smell.

## GENERAL SPECIFICATIONS

### NOTICE

- Combustion air contaminated by corrosive chemical fumes can damage the heater and will void the warranty.
- The Combination Gas Control Valve on this heater differs from most appliance gas controls. If it must be replaced, for safety reasons replace it only with an identical gas control valve.
- The heater's access side panels must be in place to provide proper ventilation and to avoid water intrusion. **Do not operate the heater for more than five (5) minutes with the side panels removed.**
- This heater is certified by CSA International as complying with the Standard for Gas Fired Pool Heaters, ANSI Z21.56/CSA 4.7, and is intended for use in heating fresh water swimming pools or spas.
- The ETi® 400 Heater is designed for the heating of chlorine, bromine or salt system swimming pools and spas. It should **NOT** be used as a space heating boiler, or general purpose water heater.
- The heater should be located in an area where leakage of the heater or connections will not result in damage to the area adjacent to the heater or to the structure. When such locations cannot be avoided, it is recommended that a suitable drain pan, adequately drained, be installed under the heater. The pan must not restrict air flow.
- The heater may not be installed within 5 ft. (1.5M ) of the inside surface of a pool or spa unless it is separated by a solid fence, wall or other permanent barrier.
- In the United States, installation must be in accordance with local codes and the most recent edition of the National Fuel Gas Code, ANSI Z223.1/NFPA-54. The Code can be obtained from: National Fire Protection Association 1 Batterymarch Park Quincy, MA 02169 www.nfpa.org
- In Canada, install the heater in accordance with local codes and the most recent edition of the Natural Gas and Propane Installation Code, CAN/CSA B149.1.

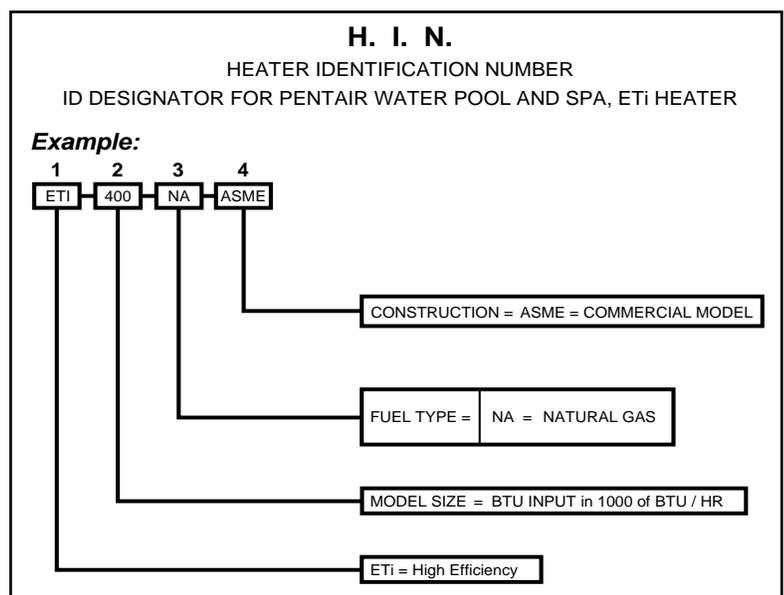
## Heater Identification Information (HIN)

To identify the heater, see rating plate on the inner front panel of the heater. There are two designators for each heater, one is the Model Number and the other is the Heater Identification Number (HIN).

### Heater Identification Number (HIN)

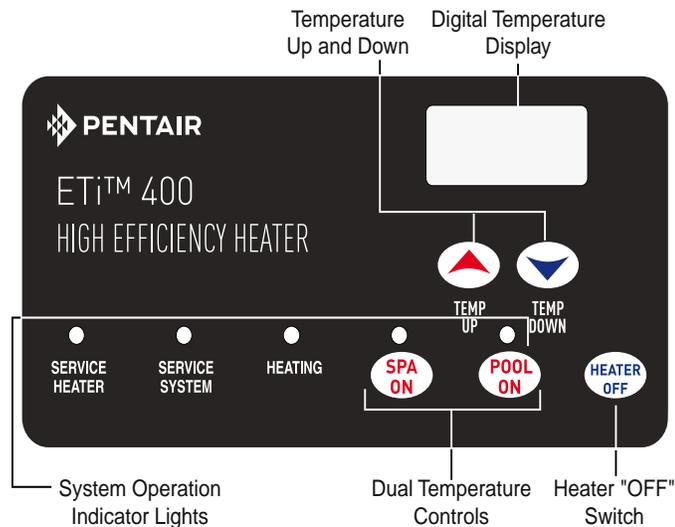
The following example simplifies the identification system:

- 1) ETi
- 2) Model Size : (400) : Input rating (Btu/hr)  
X 1000
- 3) Fuel Type : NA = Natural gas
- 4) Construction : ASME = Commercial Model



# Section 1: Operation Instructions

## OPERATOR CONTROL PANEL



## TEMPERATURE SETTING

The ETi® 400 Heater is shipped factory set at 70° F (35° C) for pool mode and 95° F (21° C) for spa mode. Using the up and down arrows, you can set the thermostats to a minimum temperature of 65° F (18.3° C), or a maximum of 104° F (40° C).

The heater operator controls are as follows:

- POOL ON** Press this button to control the heater operation by the pool temperature setting.
- SPA ON** Press this button to control the heater operation by the spa temperature setting.
- HEATER OFF** Press this button to switch off the heater.
- ▲ TEMP** Press this button to raise the temperature setting.
- ▼ TEMP** Press this button to lower the temperature setting.

To toggle the display between degrees Centigrade (°C) and degrees Fahrenheit (°F):

1. Press the HEATER OFF button to switch the heater OFF.
2. Press **▲ TEMP** or **▼ TEMP** for 5 seconds. The display will flash once and change modes (°C to °F or vice versa).
3. Press the HEATER OFF button to switch the heater ON.

When either the **▲ TEMP** or **▼ TEMP** buttons are depressed, the digital display will indicate the temperature setting. After five seconds, the display will return to the actual pool/spa temperature.

In addition to the digital temperature display, there are five indicator lights:

The **POOL ON** light indicates the pool water temperature is controlling the heater operation.

The **SPA ON** light indicates the spa water temperature is controlling the heater operation.

The **HEATING** light comes on and stays on when the heater's burner chamber is firing. This light should be on whenever the burner is on. This light blinks when the heater is calling for heat but not firing. If this light is on but the burner fails to come on, one of the "service" lights should come on, indicating a fault in the system.

The **SERVICE SYSTEM** light indicates that there is insufficient water flow to the heater. If the pump is operating, this usually indicates that the filter and/or skimmers should be cleaned (some filters may require back-washing). If the light remains on after the filter/skimmers have been serviced, the system should be checked by a qualified service technician.

The **SERVICE HEATER** light indicates a fault in the heater or its controls. If this light comes on, shut down the heater (See **TO TURN OFF GAS TO THE APPLIANCE on page 13**), and have a qualified service technician check the system.

## **OPERATOR CONTROL PANEL**

**VIEW FAULT CODES:** Press the POOL ON button and the ▲ **TEMP** button to view the last fault code. Press the ▲ **TEMP** button to scroll up to view the previous 4th. fault codes. The next message displayed after the 5th. fault code is END.

**VIEW STACK FLUE GAS TEMPERATURE:** Press and hold the POOL ON (or SPA ON) button for more than 5 seconds to view the current Stack Flue Gas temperature. Each heat exchange has one temperature sensor (SF1 and (SF2), the SF1 temperature is displayed on the heater's LCD with a dot on the upper left corner of the LCD. Scroll up or down to display the SF2 current temperature and the dot will not be displayed on the LCD.

## **BASIC SYSTEM OPERATION**

Start the pump. Be sure the pump is running and primed to close the water pressure switch and supply power to heater. Be sure the pool and/or spa is properly filled with water. Follow the Lighting and Operating instructions below.

### **⚠WARNING**

Risk of explosion or fire causing burns or death if safety interlocks are disabled. DO NOT attempt to operate heater when SERVICE HEATER light is on or if blower or burner will not start. Instead, follow instructions under "To Switch Off Gas to the Appliance," and call a qualified service technician to repair unit.

## **HEATER DSI ELECTRONIC IGNITION LIGHTING/OPERATION**

### **FOR YOUR SAFETY: READ BEFORE LIGHTING**

### **⚠WARNING**



If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

Do not attempt to light the heater if you suspect a gas leak. Lighting the heater can result in a fire or explosion which can cause personal injury, death, and property damage.

## **BASIC SYSTEM OPERATION (CONTINUED)**

### **START-UP AND OPERATION**

**START-UP AND SHUTDOWN INSTRUCTIONS ARE ON THE LABEL ATTACHED TO THE INSIDE COVER OF THE APPLIANCE WATER CONNECTION PANEL.**

#### **BEFORE START-UP**

A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burners. **DO NOT** try to light the burners by hand.

B. **BEFORE OPERATING**, smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

#### **WHAT TO DO IF YOU SMELL GAS**

- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the Fire Department.

C. Use only your hand to turn the gas control on or off. Never use tools. If you cannot change the ON/OFF setting by hand, don't try to repair it, call a qualified service technician. Forced or attempted repair may result in a fire or explosion.

D. Do not use this heater if any part has been under water. Immediately call a qualified service technician to inspect the heater and to replace any part of the control system and any gas control which has been under water.

E. Do not operate the pool heater unless the pool or spa is properly filled with water.

F. Before operating the appliance for the first time or after it has been off for an extended time, perform the following checklist:

1. Remove debris or other articles from inside the heater and the area around the heater and its exhaust vent. Make sure the ventilation openings are clear of debris or obstruction. For installations in an enclosed space, make sure openings for combustion and ventilation air are unobstructed.
2. Keep heater area clear and free from combustibles, flammable liquids and chemicals.
3. Check that all water connections are tight.
4. Water must be flowing through the heater during operation. Make sure that pool/spa is filled with water and have pump operating. Check that water flow is unobstructed from the appliance. When operating for the first time or after an extended shut-down, run filter pump for several minutes to clear all air from the system.

### **PUTTING THE HEATER INTO SERVICE**

If the heater's **Water Pressure Switches (PS)** are below or above the water level by 1 ft (30 cm), after the heater installation the Water Pressure Switch setting should be adjusted. See **WATER PRESSURE SWITCH, in SAFETY CONTROLS on page 14.**

**Note: Before putting the heater into service for the first time, follow the instructions under BEFORE START-UP on page 12. Check for proper operation of the heater by following the steps under OPERATING INSTRUCTIONS on page 13. Damage to equipment caused by improper installation or repair will void the warranty.**

## HEATER OPERATING INSTRUCTIONS

1. **STOP!** Read the safety information on (page 12).
2. Set both pool and spa thermostats to the lowest settings.
3. Turn off all electric power to the appliance.
4. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
5. Remove the access door panels by unfastening the latch located on each door, then lift up and out from the bottom of the panel to remove.
6. **Toggle-Style Valve:** Pull toggle toward you to turn gas off , see Figure 1.
7. Wait five (5) minutes to clear out any gas. If you then smell gas, **STOP! Follow B in the BEFORE START-UP instructions on page 12. If you don't smell gas, go to the next step.**
8. Push the toggle switch away from you to switch the gas on.
9. Replace the Door Access Panels. All panels must be in place when operating the heater.
10. Set 3-way valves on inlet and outlet to pool or spa, as appropriate.
11. Turn on all electric power to the appliance.
12. Press either the POOL ON or SPA ON button switch on the operating control.
13. Set the thermostat to desired setting. **NOTICE: Setpoint must be above actual water temperature or burner will not fire. See OPERATOR CONTROL PANEL on page 11.**
14. The blower should come on immediately, and after about 15 seconds, the burner should fire. When operating for the first time, the burner may not fire on the first try because of air in the gas line. If it does not fire at first, push the OFF switch, wait five minutes, and again push the POOL or SPA ON switch. The burner should fire after about 15 seconds. You may have to repeat this until all of the air has cleared the gas line.
15. The burner should fire until the pool/spa temperature reaches the desired temperature set on the thermostat. The blower will continue to run for about 45 seconds after the burner shuts off. If any of the safety interlocks should open during burner operation, the burner shuts off immediately, but the blower continues to run for about 45 seconds. Should overheating occur or the gas supply fail to shut off, turn off the manual gas control valve to the appliance.
16. If the appliance will not operate, follow the instructions **TO TURN OFF GAS TO THE APPLIANCE** below, and call your service technician or gas supplier.
17. If the electrical power is shut off to the heater while it is running, once power is restored, the heater will power up with the previous programmed settings.

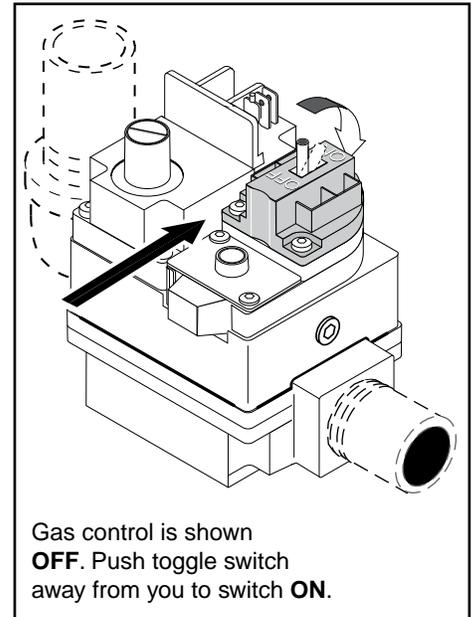


Figure 1.

## TO TURN OFF GAS TO APPLIANCE

1. Press the OFF button on operating control.
2. Switch off all electric power to the unit.
3. Remove the access door panels.
4. **Toggle-Style Valve:** Pull toggle toward you to turn gas off, see Figure 1.
5. Replace the Access Door Panels.



## SAFETY CONTROLS

### AIR FLOW SWITCH (AFS)

There are two air flow switches, (see Figure 2), designed as a safety device to ensure the two combustion air blowers (fans) are operating and are monitoring the differential (negative) pressure within the blower housing. These air pressure switches are factory set. The switches (see page 63 #29) are connected upstream of the ignition module. The ignition module does not operate unless the air flow switches and all safety switches are closed.

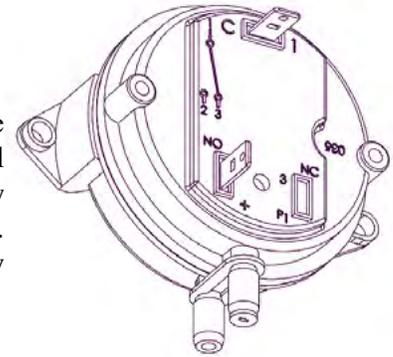


Figure 2. Air Flow Switch

### WATER PRESSURE SWITCHES

#### **⚠ WARNING**

**Hazardous pressure. Do not bypass the Water Pressure Switches or render it inoperable.**

The heater has two Water Pressure switches, see Figure 3. If the water flow is restricted, the water pressure switches may prevent the burner from firing and cause the Service System LED indicator to go on. **Note: If the light remains on after the filter has been serviced, have a qualified service technician check the system.**

For deck-level heater installations, the Water Pressure switches are factory set at 3.00 psi (20.6 kPa). **Note: See Below Pool Level Installation, on page 21.** If the pressure switches are 1 ft (0.3M) below or above the pool water level, reset the switches so that it is open when the pump is off and closed when the pump is running. Turn the star-wheel on the switch clockwise (↻) to raise setting (heater below the pool level) and counterclockwise (↺) to lower the setting (heater above the pool level), see Figure 4. Test each switch after resetting.

**NOTICE:** When the heater is mounted more than 1 ft (30 m) above or 1 ft (30 cm) below the deck level, a pressure switch is no longer adequate. A Flow Switch must be installed instead.

**CAUTION!** Heater operation with an incorrect water pressure switch setting, may cause the heater to operate without sufficient water flow, and may cause severe heater damage.

### HIGH LIMIT SWITCH AND AUTOMATIC GAS SHUT-OFF SWITCHES (AG1 AND AG2)

A High Limit Switch (HLS), is a safety device that opens the electrical circuit and shuts off the heater based on a water temperature set point within the HLS. The heater contains two AGS switches and one HLS switch. The AGS switches are located in the outlet plumbing assembly, and the HLS switch is located on the main Inlet/Outlet Header (see page 16).

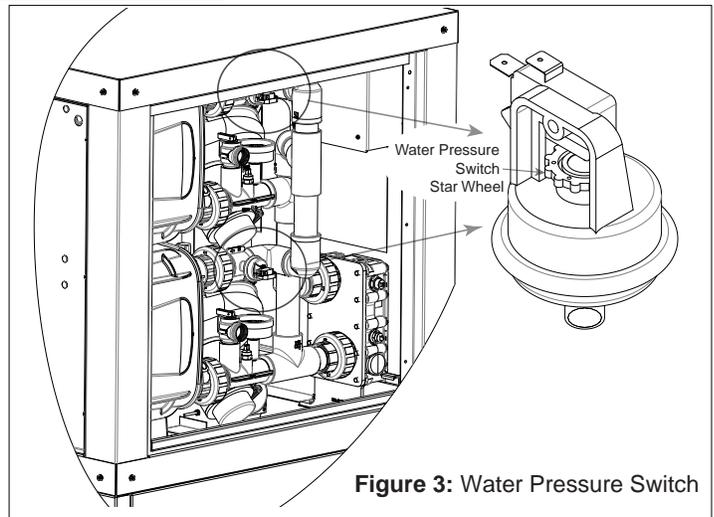
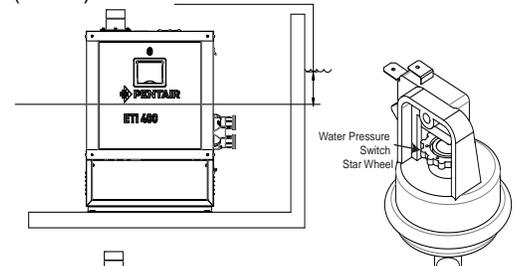


Figure 3: Water Pressure Switch

Turn star wheel **clockwise** to raise pressure set point if water pressure switch is more than 1 ft (30 cm) below water level



Turn star wheel **counterclockwise** to lower pressure set point if pressure switch is more than 1 ft (30 cm) above water level

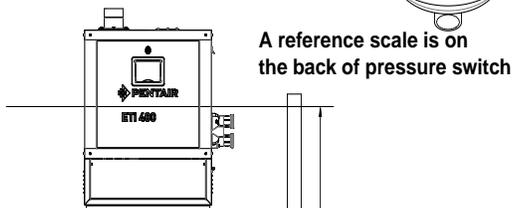


Figure 4.

## **SAFETY CONTROLS (continued)**

### **STACK FLUE SENSORS (SF1, SF2)**

The heater is equipped with two Stack Flue sensors; one for each heat exchanger. These sensors monitor the stack flue temperature and if needed will shut down the heater if the stack flue temperature exceeds 170° F (77° C).

### **THERMAL FUSE**

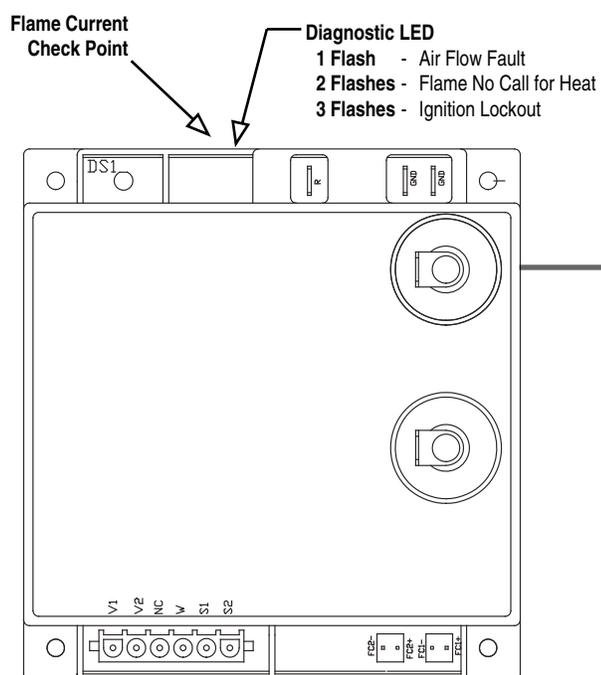
A Thermal Fuse (TF) is a safety protection device that opens the electrical circuit if the temperature reaches 187° F (86° C). The fuse cannot be reset, it must be replaced. See page 17 for more information.

### **FLOAT SWITCH**

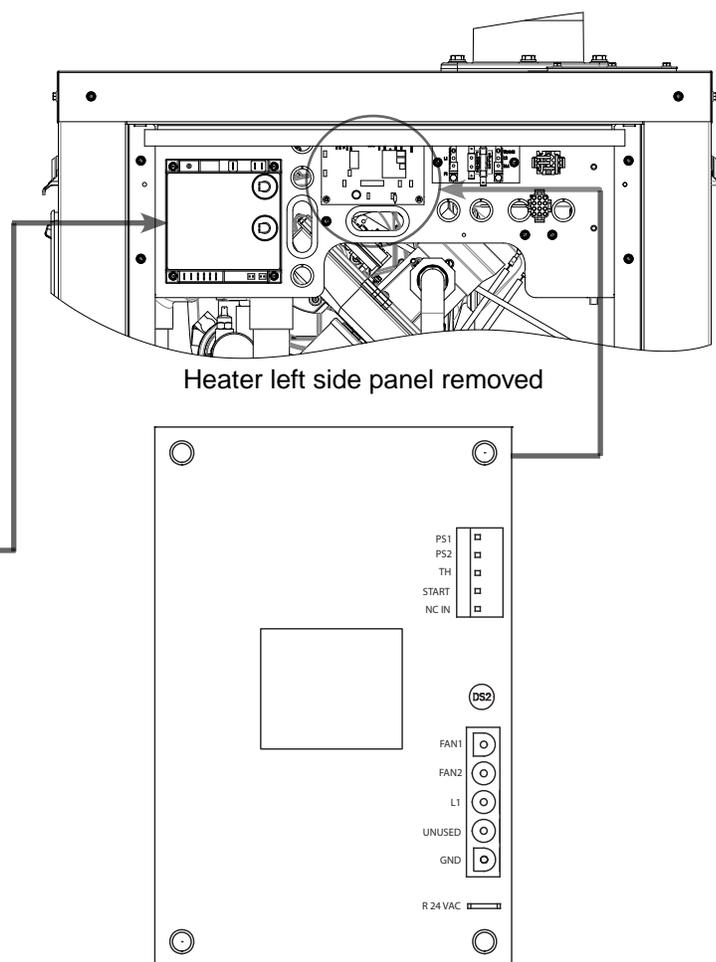
The Float Switch (FS) is a sensing application that shuts down the heater once the condensate level exceeds the permitted level in the condensate container. See page 17 for more information.

## **IGNITION MODULE OPERATION**

The Ignition Module, (Figure 5), is microprocessor based and operates on 24VAC supplied by the transformer. The control works in conjunction with a fan control board (Figure 6), and utilizes a microprocessor to continually safely monitor, analyze, and control the proper operation of the gas flame holder. The module with the presence of the flame sensor, using flame rectification, allows the heater to operate.



**Figure 5. Ignition Control Module**



**Figure 6. Fan Control Circuit Board**

# Section 2: Installation Instructions

**THIS HEATER MUST BE INSTALLED AND SERVICED BY A PROFESSIONAL SERVICE TECHNICIAN, QUALIFIED IN POOL HEATER INSTALLATION.**

Pentair strongly recommends that all vents, pipes and exhaust systems be initially and periodically tested for proper operation. This testing can be accomplished by using a **hand-held carbon monoxide meter** and/or by consulting with a gas professional. Pool and spa heaters must be used in conjunction with **carbon monoxide detectors** installed near the pool heater. The carbon monoxide detectors must be periodically inspected for proper operation so as to insure continued safety. Broken or malfunctioning carbon monoxide detectors must be replaced immediately.

## HEATER DESCRIPTION

The ETi® 400 Heater has precisely matched orifice plates to meter the air and gas into the mixer. The blower draws the air and gas through the mixer and forces it into the burner's flame holder. A sealed TitanTough™ Heat Exchanger surrounds the flame holder, discharging exhaust gases out the flue (See Figure 7 & 8). **Use a 2 in fitting to connect to the 2 in PVC slip unions provided with the heater.** The outer manifold remains cool; no heat sinks are required. The heater operator control panel is located on the side of the heater.

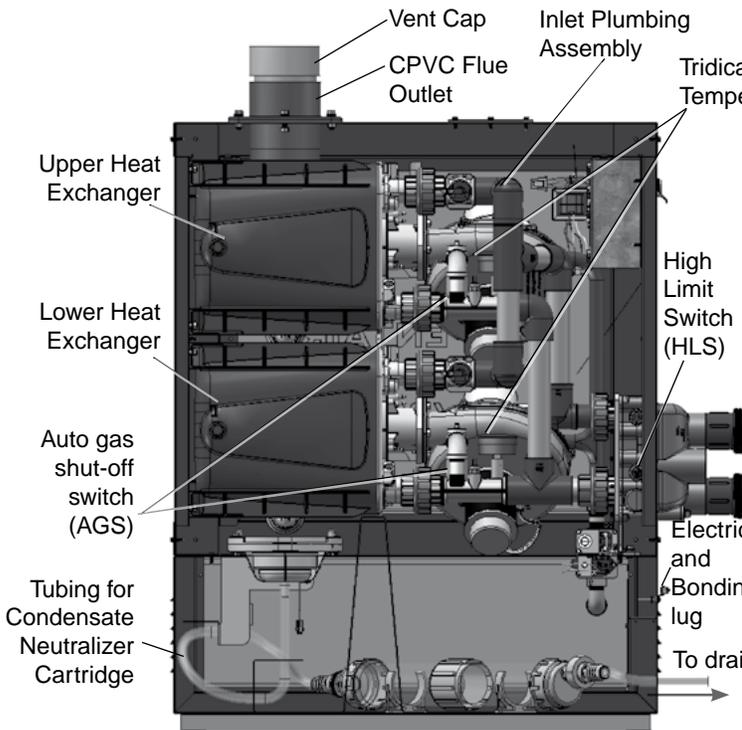


Figure 7. ETi® 400 Heater (Left Side View)

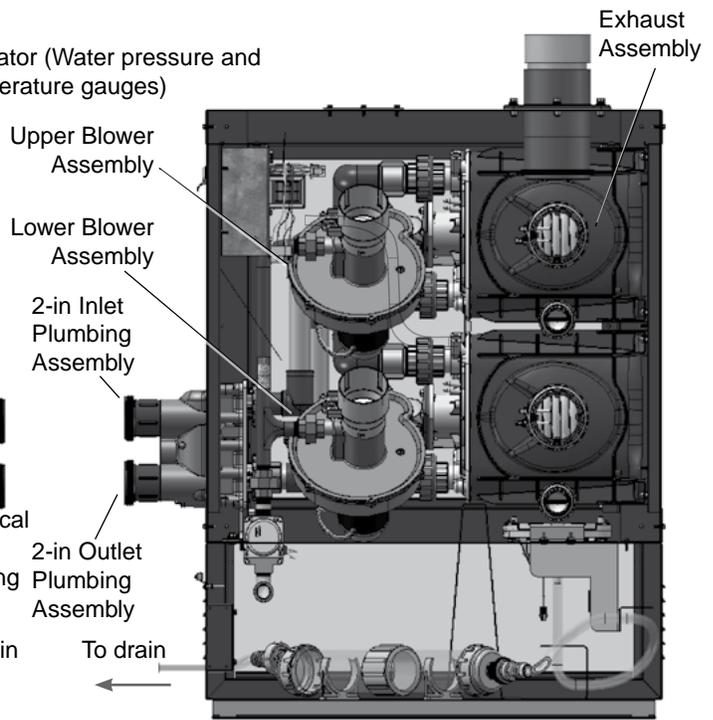
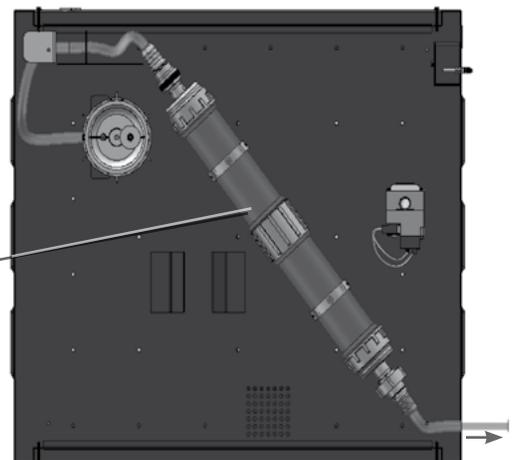


Figure 8. ETi® 400 Heater (Right Side View)

Condensate Neutralizer Cartridge (Optional, P/N 475612 sold separately). The cartridge may be mounted onto the heater base for heater outdoor installation.



Heater Base (Top View)

## SEQUENCE OF OPERATION

An electronic temperature sensing **thermistor** in the manifold adapter inlet controls the heater operation. When the inlet water temperature drops below the temperature set on the **operator control panel**, the **control board** supplies power to the combustion **air blowers** through a series of **safety interlocks**. The heater interlocks consist of:

- the **two water pressure switches (PS)**, which senses that the pump is running,
- the **tridicator gauges (2)** which monitors the water temperature in degree Fahrenheit and pressure in psi.
- the **high limit switch (HLS)**, which opens if the heat exchanger outlet temperature goes above 135° F (57° C), and
- the **two air flow switch (AFS)**, sense the pressure drop across the air metering orifices.
- the **two thermal fuses (TF)** open if the flue gas temperature reaches 187° F (86° C).
- the **automatic gas shut-off (AG1, AG2)** switches, which open if the heat exchanger outlet temperature goes above 150° F (66° C).
- the **float switch (FS)** which opens if the condensate overflows at the float switch due to blockage in the condensate drain hose or neutralizer cartridge.
- the **stack flue sensor (SF1, SF1)**, which shut down the heater if the flue gas temperature reaches 170° F (77° C).

The air flow switches (AFS) sense the pressure differential between both of the air metering orifices. As soon as there is sufficient air flow, the AFS closes, completing the circuit to the Fan Control board. The gas ignition control then opens the gas valve and the fuel mixture is ignited by the Direct Spark Ignition (DSI). On a call for heat, the blowers are energized for 15 seconds, the gas valve opens simultaneously as the direct spark igniters are energized, then ignition occurs. The heater is equipped with a digital operating control that enables the user to pre-set the desired pool and spa water temperatures. The control enables the user to select between pool and spa heating, and features a digital display

## SPECIFICATIONS

The installation instructions contained in this manual are designed for use by qualified personnel only, trained especially for installation of this type of heating equipment and related components. Some states require installation and repair by licensed personnel. If this applies in your state, be sure your contractor bears the appropriate license. See Figure 9, 10 & 11 for Outdoor and Indoor installations, dimensions and orientation of the heater.

### Dimensions in Millimeters / Inches

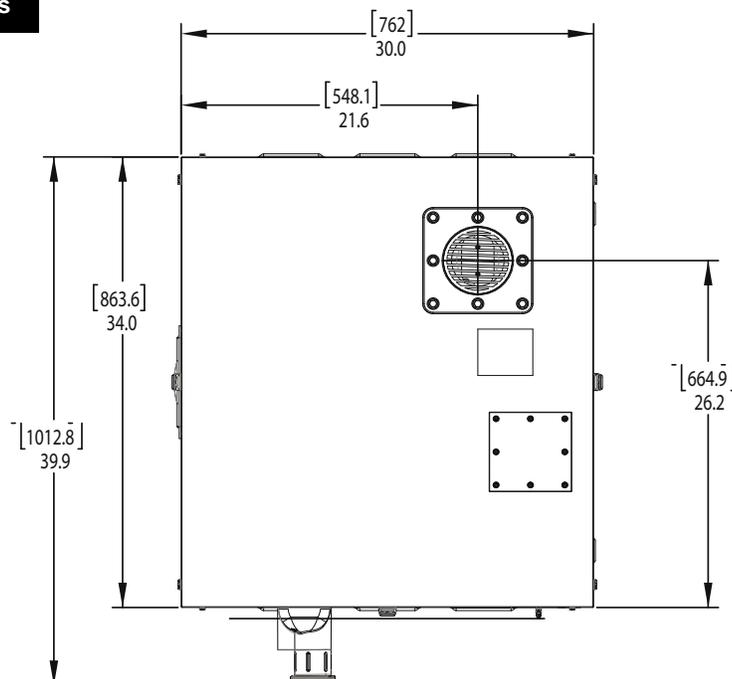


Figure 9. Heater Top View

# SPECIFICATIONS (CONTINUED)

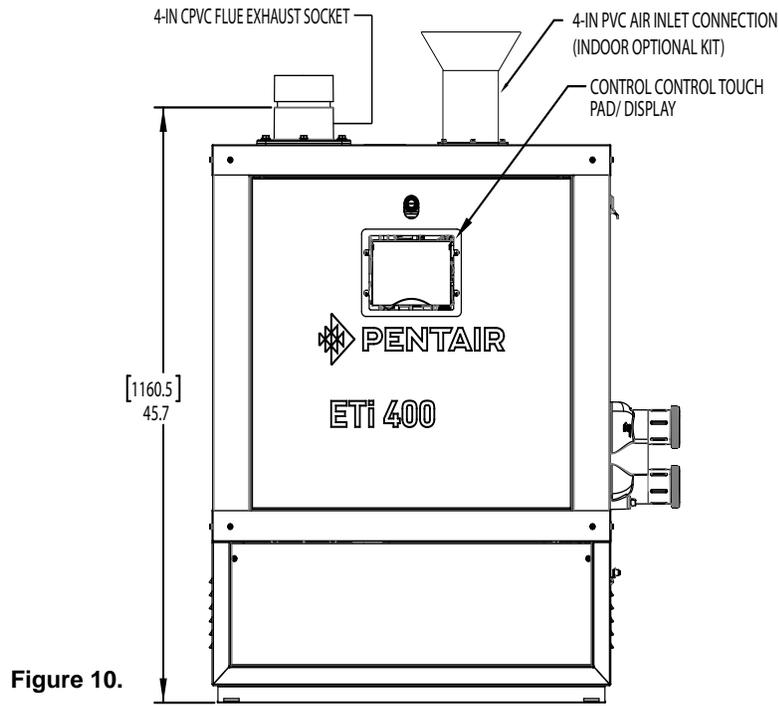


Figure 10.

Heater Front View

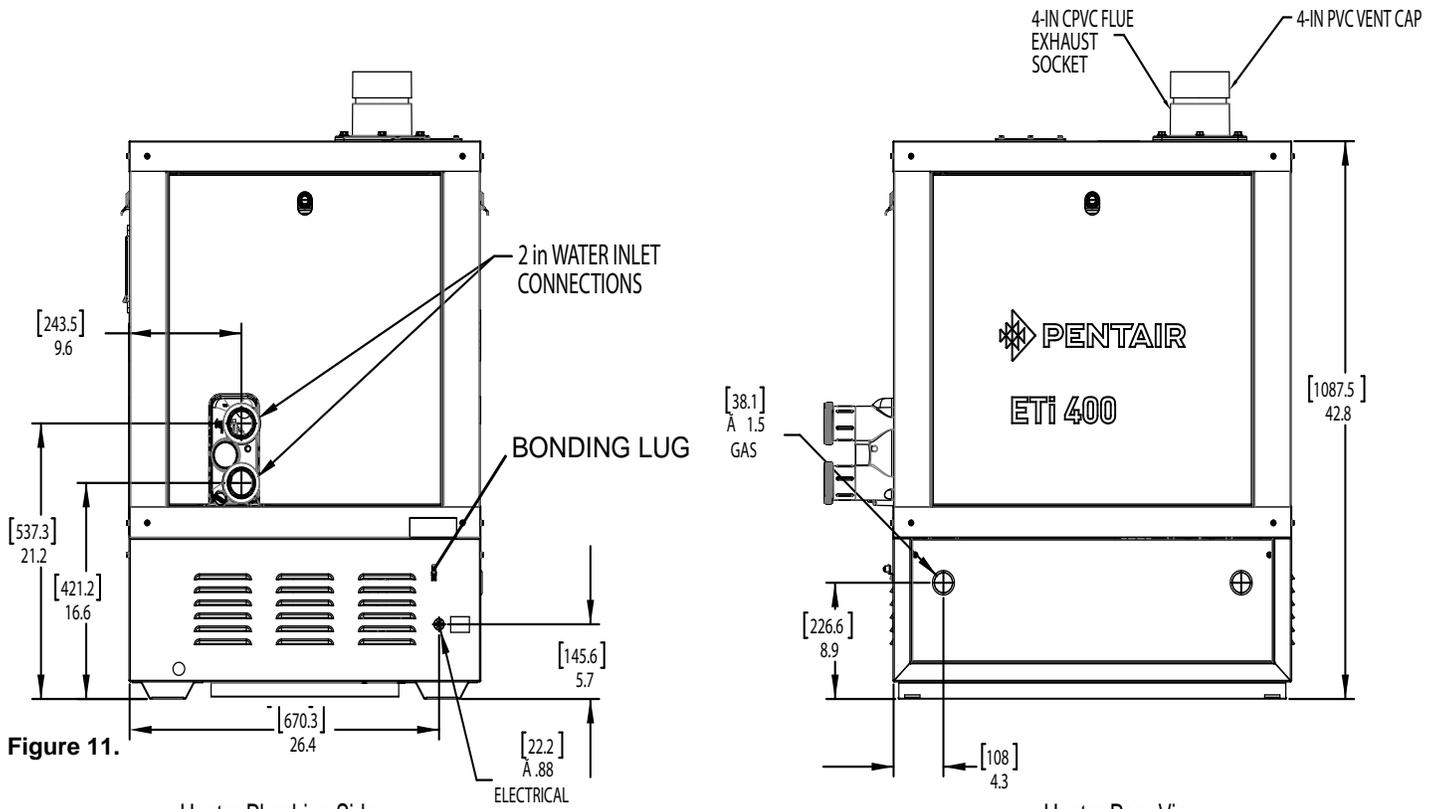


Figure 11.

Heater Plumbing Side

Heater Rear View

## PLUMBING CONNECTIONS

The heater has the unique capability of direct schedule 40 PVC plumbing connections. A set of bulkhead fittings is included with the heater to ensure conformity with Pentair's recommended PVC plumbing procedure. Other plumbing connections can be used. See Figure 12 for plumbing connections.

### CAUTION

Before operating the heater on a new installation, turn on the circulation pump and bleed all the air from the filter using the air relief valve on top of the filter. Water should flow freely through the heater. Do not operate the heater unless water in the pool/spa is at the proper level. If a manual by-pass is installed, temporarily close it to ensure that all air is purged from the heater.

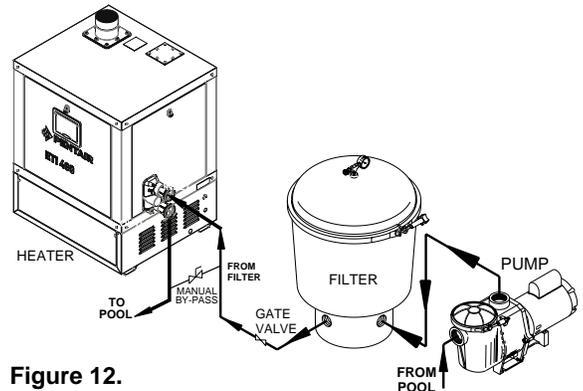


Figure 12.

## WATER CONNECTIONS

The heater requires proper water flow and pressure for its operation. See Figure 13 for the recommended installation. The filter pump discharges to the filter, the filter discharges to the heater, and the heater discharges directly to the pool or spa.

A manual bypass valve should be installed before the heater when the pump flow exceeds 120 GPM (454 LPM). See **WATER FLOW RATE Table 1 on page 21** for setting of the manual by-pass valve.

Make sure that the outlet plumbing from the heater contains no shut-off valves or other flow restrictions that could prevent flow through the heater (except for pool installations as noted below, or winterizing valves where needed). To switch flow between the pool and spa, use a diverter valve. Do not use any valve that can shut off the flow.

Install the chemical feeder downstream of the heater. Install a chemical resistant one-way check valve between the heater and the chemical feeder to prevent back-siphoning through the heater when the pump is off.

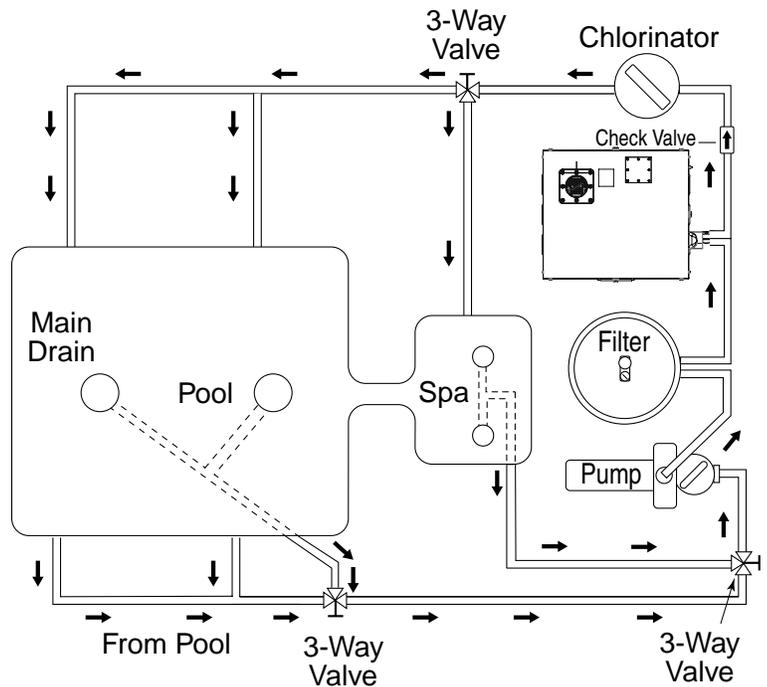


Figure 13.

Note: For Multiple Heater installation, see page 20.

**NOTICE:** If the heater is plumbed in backwards, it will cycle continuously. Make sure piping from filter is not reversed when installing heater.

Connect the heater directly to 2 in PVC pipe, using the provided unions. Heat sinks are not required. The low thermal mass of the heater will prevent overheating of the piping connected to the pump even if the heater shuts down unexpectedly.

Occasionally a two-speed pump will not develop enough pressure on the low speed to operate the heater. In this case, run the pump at high speed only to operate the heater. If this does not solve the problem, do not try to run the heater. Instead, correct the installation.

Do not operate the heater while an automatic pool cleaner is also operating. If the circulation pump suction is plugged (for example by leaves), there may not be adequate flow to the heater. Do not rely on the pressure switch in this case.

## MULTIPLE HEATER INSTALLATION

All plumbing on multiple heater installations must be done in parallel. See Figure 14 and Figure 15. To prevent heater overheating and to ensure heater longevity, water flow to each heater must be balanced for optimum operation. To meet recommended flow rates, be sure all installed pipes are installed in accordance with local and state codes or, in the absence of local codes, with all applicable codes and industry plumbing standards. To allow for proper operation and service clearance, maintain spacing to adjacent heaters. Heaters installed too close to one another may encounter operational issues associated with exhaust and/or condensation.

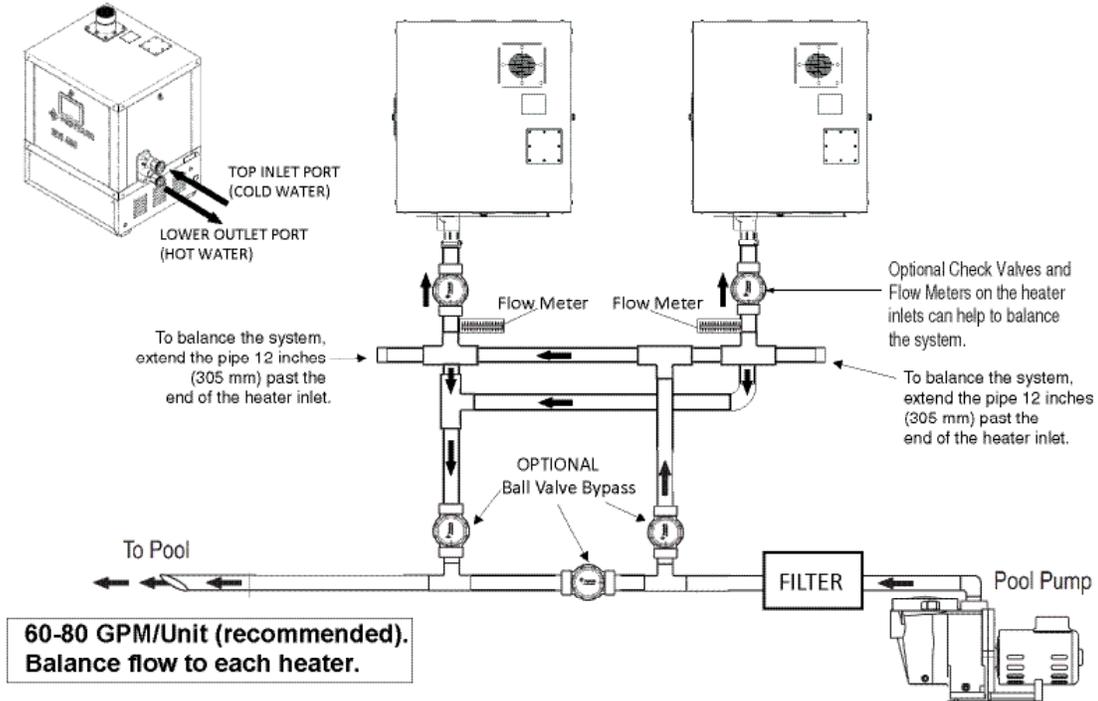


Figure 14. Two ETi 400 Heaters Plumbing Hydraulic Diagram

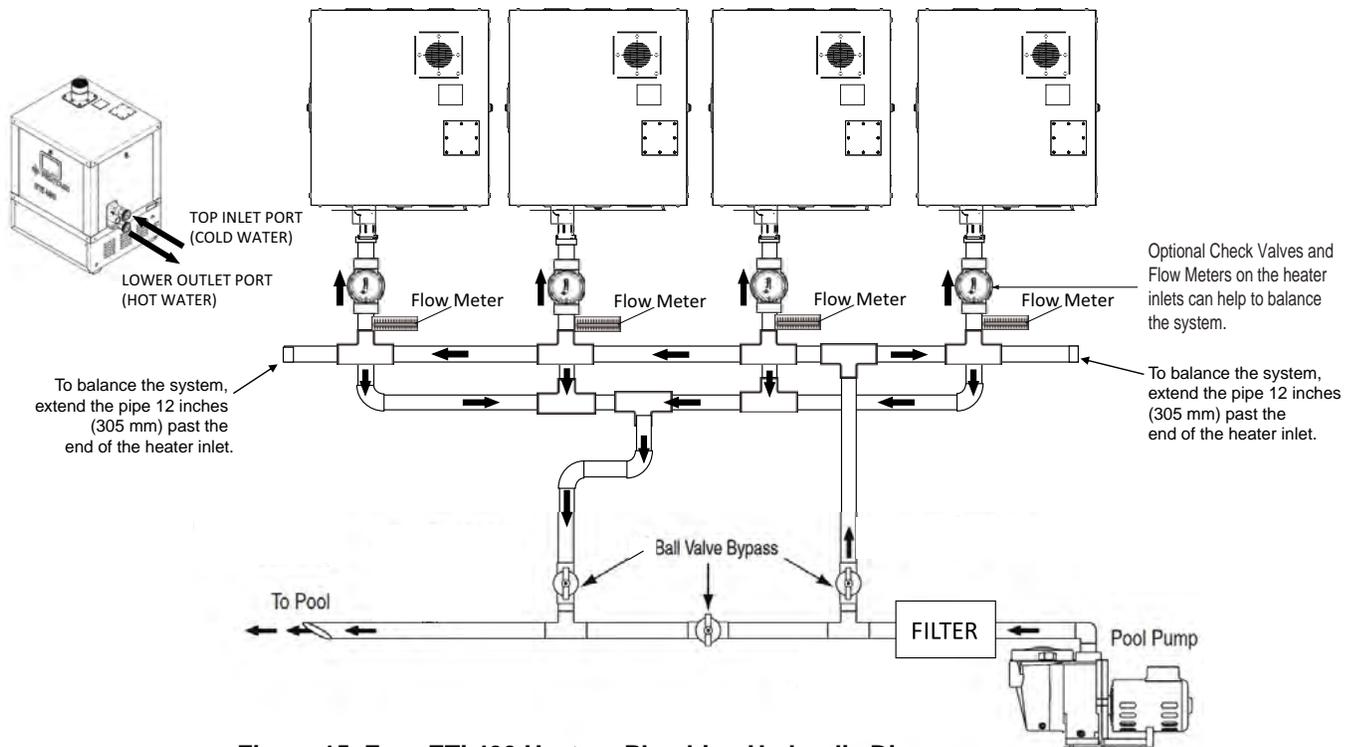


Figure 15. Four ETi 400 Heaters Plumbing Hydraulic Diagram

## VALVES

When any equipment is located below the surface of the pool or spa, valves should be placed in the circulation piping system to isolate the equipment from the pool or spa. Check valves are recommended to prevent back-siphoning. Back-siphoning is most likely to occur when the pump stops, creating a pressure-suction differential. Do **NOT** sanitize the pool by putting chlorine tablets or sticks into the skimmer(s). When the pump is off, this will cause a high concentration of chlorine to enter the heater, which could cause corrosion damage to the heat exchanger.

### CAUTION

Exercise care when installing chemical feeders so as to not allow back siphoning of chemical into the heater, filters or pump. When chemical feeders are installed in the circulation of the piping system, make sure the feeder outlet line is down stream of the heater, and is equipped with a positive seal noncorrosive Check Valve, (P/N R172288), between the feeder and heater.

## MANUAL BY-PASS

Where the water flow rate exceeds the maximum 120 GPM, a manual bypass should be installed. After installing the valve, adjust the valve to bring the flow rate within the acceptable range. Then remove the valve handle or lock it in place to avoid tampering. See Figure 16.

Table 1: Heater Water Pressure.

ETi®	GPM (min. / max)	Max. $\Delta T$ (°F) / Min $\Delta T$ (°F)
400	40 / 120	35 / 25*

(\*) Compare  $\Delta T$  by observing the Temperature Pressure gauges located inside the heater (see page 16), and the water inlet temperature displayed on the Control Board LCD.

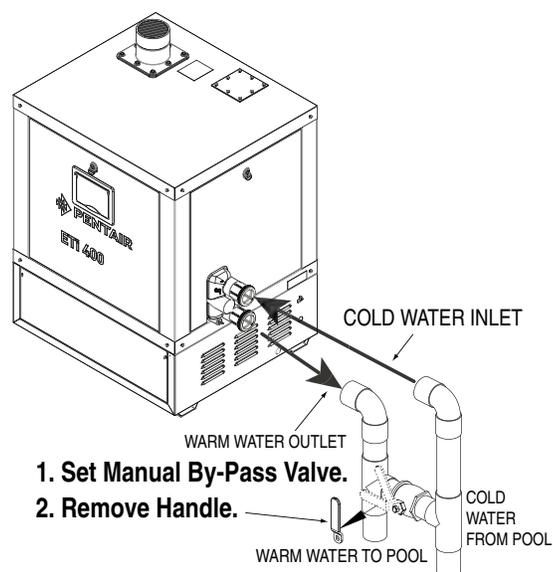


Figure 16.

## BELOW POOL INSTALLATION

If the heater is below water level, the pressure switch must be adjusted. This adjustment must be done by a qualified service technician. See following **CAUTION** before installation.

### CAUTION

#### BELOW OR ABOVE POOL INSTALLATION

The water pressure switch is set in the factory at 3.00 PSI ( $\pm 0.75$  PSI). This setting is for a heater installed at pool level. If the water pressure switch is more than 1 ft (30 cm) below or above the pool level, the water pressure switch must be adjusted by a qualified service technician. Figure 4 on page 14.

#### FLOW SWITCH

If the water pressure switch is installed more than 3 ft (0.9 m) above the pool or more than 3 ft (0.9 m) below the pool level, you will be beyond the limits of the pressure switch and a flow switch must be installed. Locate and install the flow switch externally on the outlet piping from the heater, as close as possible to the heater. Connect the flow switch wires in place of the water pressure switch wires.



## **GAS CONNECTIONS**

### **GAS LINE INSTALLATIONS**

Before installing the gas line, be sure to check which gas the heater has been designed to burn. This is important because different types of gas require different gas pipe sizes. The rating plate on the heater will indicate which gas the heater is designed to burn. The Table 2 below, show which size pipe is required for the distance from the gas meter to the heater. The table description is for natural gas at a specific gravity of 0.60, and propane gas at a specific gravity of 1.50.

When sizing gas lines, calculate three (3) additional feet of straight pipe for every elbow used. When installing the gas line, avoid getting dirt, grease or other foreign material in the pipe as this may cause damage to the gas valve, which may result in heater failure.

*The gas meter should be checked to make sure that it will supply enough gas to the heater and any other appliances that may be used on the same meter. The gas line from the meter will usually be of a larger size than the gas valve supplied with the heater. Therefore a reduction of the connecting gas pipe will be necessary. Make this reduction as close to the heater as possible.*

The heater requires a gas supply of not less than 4 in (10.2 cm) wc, and not more than 10.5 in (27 cm) wc for natural gas, and not more than 14 in (36 cm) wc for propane gas. Gas supply pressures outside of this range may result in improper burner operation. A minimum flowing or dynamic inlet pressure (while the heater is running) of 4 in (10.2 cm) wc is required to maintain input rating with no more than a 2 in pressure drop between static and dynamic. The gas supply must be installed in accordance with the *National Fuel Gas Code, ANSIZ223.1*, or standard *CSA B149.1, Natural Gas and Propane Installation Codes*, as applicable and all applicable local codes. Install a manual shut-off valve and a sediment trap and union located outside the heater panels, see Figure 16. Do not use a restrictive gas cock. The following minimum gas pipe sizes are recommended for natural gas supply piping, see Table 2 on below. For low pressure LP gas, pipe size may be reduced by 1/4-in, with a minimum pipe size of 1/2-in. Check for compliance with local codes.

The heater and any other gas appliances must be disconnected from the gas supply piping system during any pressure testing on that system, (greater than 1/2 PSI). The heater and its gas connection must be leak tested before placing the heater in operation. **Do not use flame to test the gas line** Use soapy water or another nonflammable method.

#### **NOTE**

**A manual main shut-off valve must be installed externally to the heater.**

### **WARNING**

**DO NOT INSTALL THE GAS LINE UNION INSIDE THE HEATER CABINET. THIS WILL VOID YOUR WARRANTY.**

## **GAS PIPE SIZING**

### **STAGE TWO LOW PRESSURE GAS PIPE SIZING**

Maximum Equivalent Pipe Length (ft)									
Natural Gas 1000 BTU/FT <sup>3</sup> 0.60 Specific Gravity at 0.5 in. WC Pressure Drop									
Propane Gas 2500 BTU/FT <sup>3</sup> 1.50 Specific Gravity at 0.5 in. WC Pressure Drop									
	Input	3/4"		1"		1-1/4"		1-1/2"	
Model	(KBTU)	N	P	N	P	N	P	N	P
ETi™ 400	399.0	*	20	20	60	90	150	200	450

Table 2: Note (\*) A 3/4" gas line can be used for up to 2 ft (61 cm) maximum length from the gas valve in addition to the sediment trap.

## **GAS PRESSURE TESTING** (See page 24 for Checking Gas Pressure Through Control Valve)

Before operating the heater, the heater and its gas connections must be leak tested. **Do NOT use an open flame to test for leaks.** Test all gas connections for leaks with soapy water or another non-flammable method.

The heater and its individual shut-off valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of 1/2 psig (3.5 kPa). The heater must be isolated from the gas supply system by closing its individual manual shut-off valve during any pressure testing of the gas supply at test pressures equal to or less than 1/2 psig (3.5 kPa).

**⚠ Caution:** Dissipate test pressure in the gas supply line before reconnecting the heater and its manual shut off valve to gas supply line. Failure to follow this procedure may damage the gas valve. Over pressurized gas valves are not covered by warranty. The heater and its gas connections shall be leak tested before placing the appliance in operation. Use soapy water for leak test. Do not use open flame.

**Note: do not use threaded seal tape on gas line pipe thread.** A pipe compound rated for use with natural and propane gases is recommended. Apply sparingly only on male pipe ends, leaving the two end threads bare.

**Special safety and precautions for LP gas:** If proper ventilation is not provided gas can collect or *pool* in enclosed areas, because LP gas is heavier than air. Pentair does not recommend installing the heater in an enclosed areas, such as a ground pit. If the heater is required to be installed in an enclosed area, be sure proper ventilation for LP gas are met and locate the heater a safe distance from LP gas cylinders and filling equipment. **Before installation, consult the national fuel gas code (NFPA 54 / ANSI Z223.1, Latest edition), the natural gas and propane installation code in Canada (CAN/CSA B149.1, Latest edition), and any other local codes and fire protection authorities about specific installation restrictions in your location.**

### **CHECKING GAS PRESSURE THROUGH GAS CONTROL VALVE**

#### **⚠ WARNING**

**Risk of explosion if a unit burning propane gas is installed in a pit or other low spot.** Propane is heavier than air. Do not install the heater using propane in pits or other locations where gas might collect. Consult your local building code officials to determine installation requirements and specific installation restrictions of the heater relative to propane storage tanks and filling equipment. Installation must meet the requirements for the Standard for the Storage and Handling of Liquefied Petroleum Gases, CAN/CSA B149.2 (latest edition) or ANSI/NFPA 58 (latest edition). Consult local codes and fire protection authorities about specific installation restrictions.

**CHECKING THE GAS PRESSURE THROUGH THE COMBINATION GAS CONTROL VALVE (See Figure 15):** Before operating the heater, the heater and its gas connections must be leak tested. **Do NOT use an open flame to test for leaks.** Test all gas connections for leaks with soapy water or another non-flammable method.

The heater and its individual shut-off valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of 1/2 psig (3.5 kPa). The heater must be isolated from the gas supply system by closing its individual manual shut-off valve during any pressure testing of the gas supply at test pressures equal to or less than 1/2 psig (3.5 kPa).

## CHECKING GAS PRESSURE THROUGH GAS CONTROL VALVE (CONTINUED)

This appliance is equipped with an unconventional gas control valve that is factory set with a manifold pressure of  $-.2''$  ( $-0.5\text{cm}$ ) wc. Installation or service must be performed by a qualified installer, service agency, or the gas supplier. If this control valve is replaced, it must be replaced with an identical control.

The combination gas valve incorporates dual shut-off valves and a negative-pressure regulator. For proper operation, the regulated pressure at the outlet manifold of the valve must be  $-0.2''$  ( $-0.5\text{cm}$ ) wc below the reference pressure at the blower mixer inlet, and the gas valve 'VENT' tap must be connected to the end cap air orifice as shown in Figure 17.

Do not attempt to adjust the gas input by adjusting the regulator setting. The correct gas regulator setting is required to maintain proper combustion and must NOT be altered.

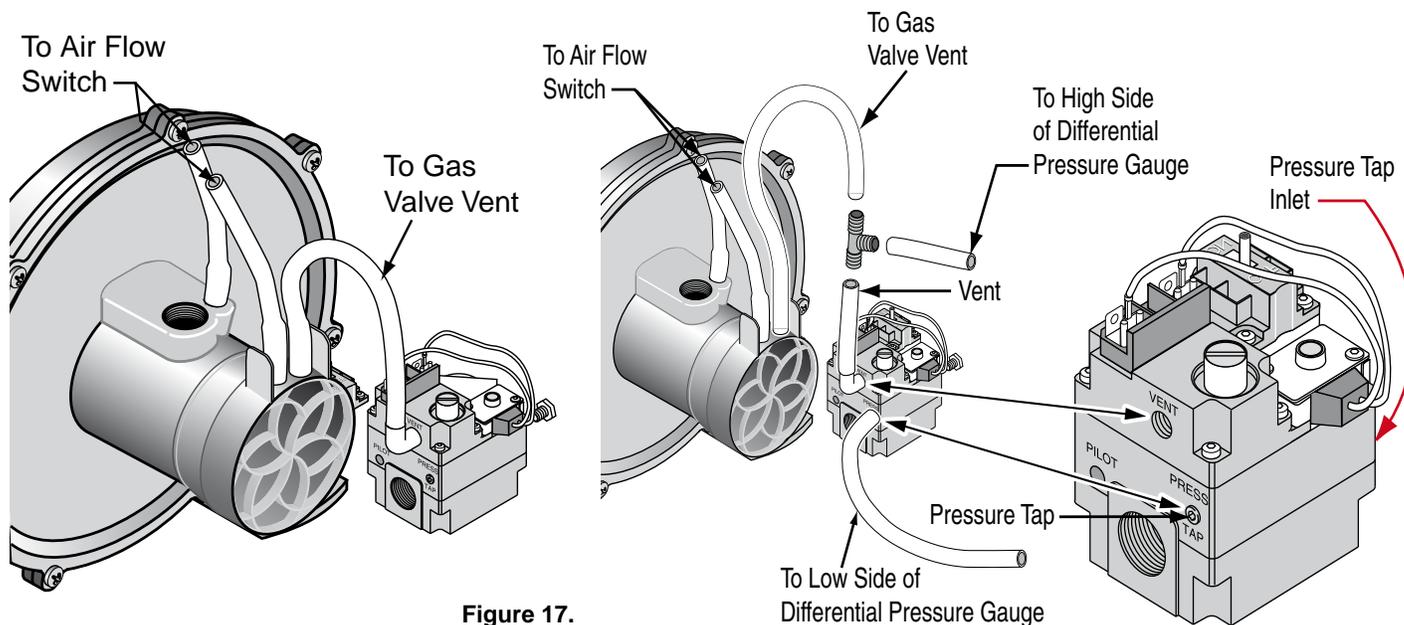


Figure 17.

**IMPORTANT: IF THERE ARE ANY IGNITION ISSUES AFTER THE NATURAL GAS TO PROPANE (LPG) CONVERSION, CALL PENTAIR TECHNICAL SUPPORT AT 800.831.7133.**

## SEDIMENT TRAPS

Install a sediment trap and union located outside the heater panels in accordance with National code requirements. Do not use a restrictive gas cock. The sediment trap shall be either a tee fitting with a capped nipple in the bottom outlet which can be removed for cleaning, as shown in Figure 18, or an other device recognized as an effective sediment trap. All gas piping should be tested after installation in accordance with local codes.

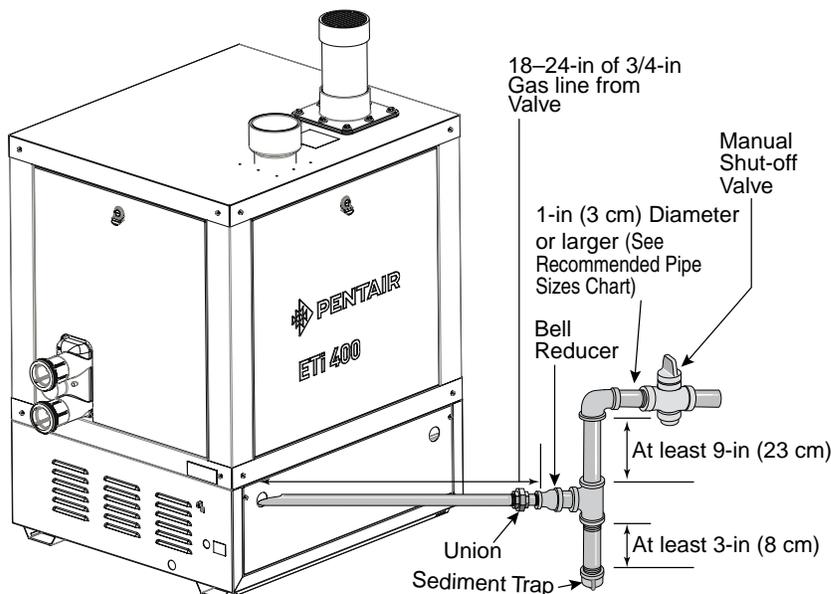


Figure 18.

## OUTDOOR HEATER INSTALLATION (U.S. and Canada)

The heater is designed and certified for outdoor installation using the 2 ft (61 cm) long vent pipe stack.

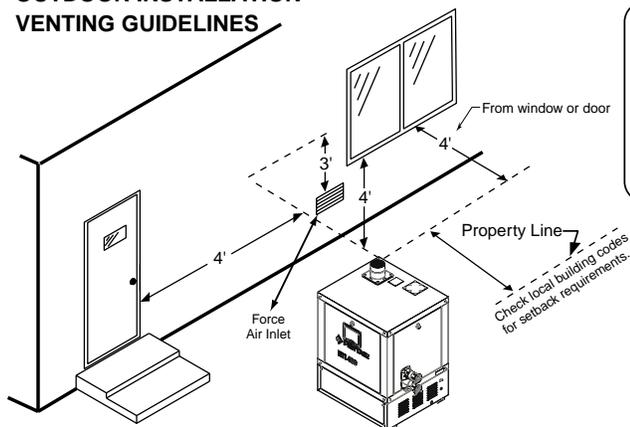
### ⚠ WARNING

**Risk of explosion if a unit burning propane gas is installed in a pit or other low spot.** Propane is heavier than air. Do not install the heater using propane in pits or other locations where gas might collect. Consult your local building code officials to determine installation requirements and specific installation restrictions of the heater relative to propane storage tanks and filling equipment. Installation must meet the requirements for the Standard for the Storage and Handling of Liquid Petroleum Gases, ANSI/NFPA 58 (latest edition) in the U.S., or CAN/CSA B149.2 (latest edition) in Canada. Consult local codes and fire protection authorities about specific installation restrictions.

The heater is designed for outdoor operation in **non-freezing conditions only**. During freezing conditions the condensate drain line and trap may freeze, causing the heater to shut down due to a blocked condensate drain. Also, the heater condensate system components may be damaged by the ice forming on the condensate drain line and trap. If the heater is installed in freezing climates for seasonal use, winterize the heater to avoid freeze damage. See Winterizing Instructions on page 56. Locate the heater on a level surface in an open area that is protected from drainage or run-off. Install the heater in an area where leaves or other debris will not collect on or around the heater. To avoid damage to the electronic components in the heater, take care to prevent prolonged exposure to driving sources of water (such as lawn sprinklers, heavy roof runoff, hoses, etc.). Avoid operation in persistent, extreme, moist or salty environments.

**⚠ CAUTION!** In an outdoor installation it is important to ensure water is diverted from overhanging eaves with a proper gutter/drainage system. **CAUTION!** If the heater is installed directly under a roof overhang, install a 90° street elbow onto the vent terminal. Install a 2 ft (61 cm) pipe section onto the elbow. Install the vent cap onto the end of the pipe. Direct the vent cap away from the house or building, See Figure 19 below.

### OUTDOOR INSTALLATION VENTING GUIDELINES



#### Vent Termination:

- Must be at least 3 ft. above any forced air inlet located within a 10 ft. radius.
- Must be located 6 in. away from the building wall and the following distances away from any building wall openings, included but not limited to vented eaves, doors, windows, gravity air inlet:
  - 4 ft. below,
  - 4 ft. horizontally

### ⚠ WARNING

**Risk of explosion if a unit burning propane gas is installed in a pit or other low spot.** Propane is heavier than air. Do not install the heater using propane in pits or other locations where gas might collect. Consult your local building code officials to determine installation requirements and specific installation restrictions of the heater relative to propane storage tanks and filling equipment. Installation must meet the requirements for the Standard for the Storage and Handling of Liquefied Petroleum Gases, CAN/CSA B149.2 (latest edition) or ANSI/NFPA 58 (latest edition). Consult local codes and fire protection authorities about specific installation restrictions.

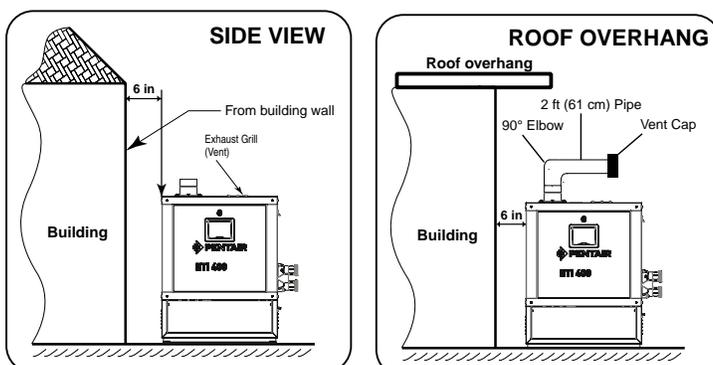


Figure 19.

## OUTDOOR HEATER INSTALLATION (CONTINUED)

The following information is for heaters located outdoors, using a 2 ft (61 cm) long vent pipe stack.

### ⚠ WARNING

**CARBON MONOXIDE GAS IS DEADLY** – Exhaust from this pool heater contains carbon monoxide, a dangerous, poisonous gas you cannot see or smell. Symptoms of carbon monoxide exposure or poisoning include dizziness, headache, nausea, weakness, sleepiness, muscular twitching, vomiting and inability to think clearly. IF YOU EXPERIENCE ANY OF THE ABOVE SYMPTOMS, IMMEDIATELY TURN OFF THE POOL HEATER, LEAVE THE VICINITY OF THE POOL OR SPA AND GET INTO FRESH AIR IMMEDIATELY. THE POOL HEATER MUST BE THOROUGHLY TESTED BY A GAS PROFESSIONAL BEFORE RESUMING OPERATION.

**EXCESSIVE CARBON MONOXIDE EXPOSURE CAN CAUSE BRAIN DAMAGE OR DEATH.**

### ⚠ WARNING

**Risk of explosion if a unit burning propane gas is installed in a pit or other low spot.** Propane is heavier than air. Do not install the heater using propane in pits or other locations where gas might collect. Consult your local building code officials to determine installation requirements and specific installation restrictions of the heater relative to propane storage tanks and filling equipment. Installation must meet the requirements for the Standard for the Storage and Handling of Liquefied Petroleum Gases, CAN/CSA B149.2 (latest edition) or ANSI/NFPA 58 (latest edition). Consult local codes and fire protection authorities about specific installation restrictions.

Locate the heater in an open, unroofed area and on a level surface that is protected from drainage or run-off. Install the heater in an area where leaves or other debris will not collect on or around the heater. See Figure 20.

It is recommended that a non-combustible base be a platform under the heater, not less than 100 millimeters (mm) thick. **However, the heater is approved to be installed on a combustible surface.** To avoid damage to the electronic components in the heater, take care to prevent prolonged exposure to driving sources of water (such as lawn sprinklers, heavy roof runoff, hoses, etc.). Avoid operation in persistent, extreme, moist or salty environments. In extreme weather, shut down the heater and disconnect the power to it until the weather has moderated. In areas subject to hurricanes or very high winds, purchase the Bolt Down Bracket Kit, P/N 476004, see Figure 21.

**Note 1: DO NOT locate the heater where it is exposed to a prevailing wind. Note 2: Be sure the heater is level.**

HEATER BASE FOR USE ON NON-COMBUSTIBLE  
OR COMBUSTIBLE SURFACE

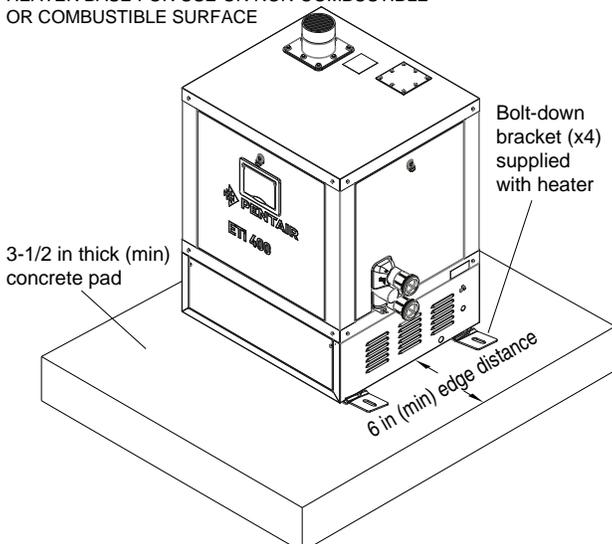


Figure 20.

For hurricane mounting bolts  
and clamps, purchase  
Bolt Down Kit P/N 476004

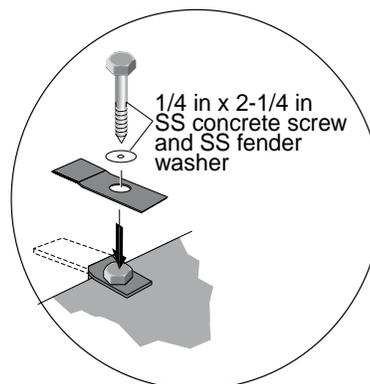


Figure 21.

## OUTDOOR HEATER INSTALLATION (CONTINUED)

### HEATER CLEARANCES – OUTDOOR

#### IMPORTANT!

- In an outdoor installation it is important to ensure water is diverted from overhanging eaves with a proper gutter/drainage system. **CAUTION!** If the heater is installed directly under a roof overhang, install a 90° street elbow onto the vent terminal. Install a 2 ft (61 cm) pipe section onto the elbow. Install the vent cap onto the end of the pipe. Direct the vent cap away from the house or building, (see page 25).
- The heater must be set on a level foundation for proper drainage.
- This unit shall not be operated outdoors at temperatures below 32° F (0° C).

If the heater is located under a roof or deck overhang, there must be at least three (3) feet (1 m) of clearance between the bottom of the overhang and the top of the heater exhaust vent, see Figure 22. If the heater is under a roof or deck overhang, the space around the heater must be open on three sides. **DO NOT** install the heater under any deck.

For minimum exhaust vent clearances for building openings, see Figure 27 on page 34.

In Canada, the heater must be installed with the top of the vent at least 10 ft (3 m) below, or to either side of, any opening into a building.

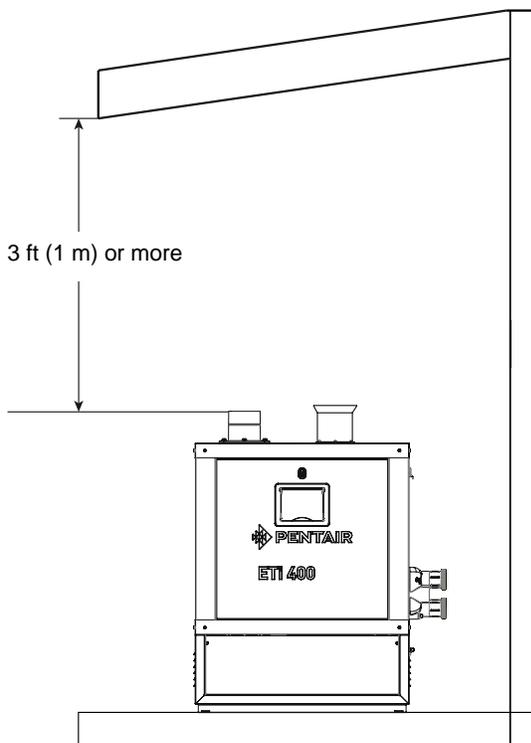
Orient the heater for convenient access to the water connections and the gas and electrical connections.

*Note: Check local building codes for installing the heater from any property line set back requirements (see Figure 19 on page 25 for installation illustration).*

### CAUTION

If installing the heater next to or near an air conditioning unit, heat pump or another gas pool heater, allow a minimum of 36 in. (91.4 cm) between the unit and the heater.

Note: (\*) See Table 4 (page 30) Category IV Requirements



**CAUTION!** A Propane (LPG) fired heater must not be installed in a garage in Massachusetts, by order of the Massachusetts State Fire Marshal. For more information, call the Massachusetts State Fire Marshal's office.

Figure 22.

## INDOOR VENTING — General Requirements

**The heater must be installed as a Category IV appliance.**

### ***Vented Appliance (Category IV) – Vertical or Horizontal***

An appliance that operates with a *positive* vent static pressure and with a vent gas temperature that allows excessive condensate production in the vent, see Figure 24 (page 30) and Figure 27, page 34.

If you are considering connecting this heater to a pre-existing vent system, make sure that the vent system meets the appropriate venting requirements as given in this manual on page 34. If not, replace the vent system. **DO NOT** use a draft hood with this heater.

The heater operates with a positive vent static pressure and with a vent gas temperature less than 170° F (77° C). The total length of the horizontal run must not exceed the length that is listed in Table 3 on page 29.

## HEATER CLEARANCES — General Requirements

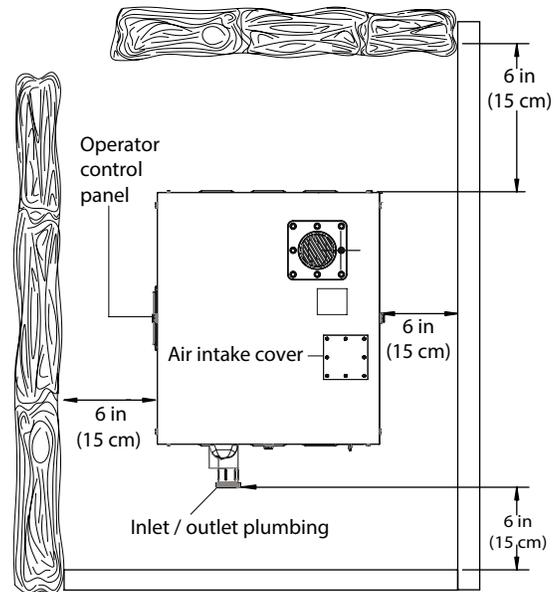
### ***INDOOR INSTALLATION OR OUTDOOR SHELTER (US AND CANADA)***

The following clearances must be maintained from combustible surfaces:

- TOP..... 6 in (15 cm)**
- EXHAUST SIDE ..... 6 in (15 cm)**
- HEADER SIDE ..... 6 in (15 cm)**
- DOOR PANELS (\*) ..... 6 in (15 cm)**

**NOTE:** (\*) For service access it is advisable to allow for sufficient clearance on at least one door panel. The heater is design certified by CSA International for installation on combustible flooring. For installation on carpeting, the heater must be mounted on a metal or wood panel that extends at least 3 in (10 cm) beyond the base of the heater. If the heater is installed in a closet or alcove, the entire floor shall be covered by the panel. For an outdoor shelter installation, the exhaust must discharge into a vent pipe. Orient the heater so that the vent pipe does not interfere with adjustment of the operator control panel.

**180° Control Panel and Plumbing Orientation:** The control panel board can be installed 180 degrees on either side of the heater, allowing for left or right side plumbing orientation for easy access.



**Figure 23.**

## DIRECT AIR INTAKE COVER

The heater is supplied from the factory with a cover on the top panel for outdoor installation (see Figure 23). Remove the outside air intake cover for outdoor shelter installation or Indoor Installation.

## COMBUSTION AIR SUPPLY

For indoor installation, the heater location must provide sufficient air supply for proper combustion and ventilation of the surrounding area, see Table 3 below.

The minimum requirements for the air supply specify that the room in which a heater is installed should be provided with two permanent air supply openings; one within 12 inches (30 cm) of the ceiling, the other within 12 in (30 cm) of the floor for combustion air, in accordance with the latest edition of ANSI Z223.1, or the National Fuel Gas code, the CSA B149.1, Natural Gas and Propane Installation Codes, as applicable, and any local codes that may apply. These openings shall directly, or through duct, connect to outdoor air.

### Air Supply Requirements Guide for the ETi® 400 Heater

Minimum Net Free Open Area for Each Opening* (Square Inches / Square Centimeters)				
Model	All Air From Inside Building		All Air From Outside Building	
	Combustion	Vent	Combustion	Vent
ETi 400	400 in <sup>2</sup> 2580 cm <sup>2</sup>	400 in <sup>2</sup> 2580 cm <sup>2</sup>	100 in <sup>2</sup> 645 cm <sup>2</sup>	100 in <sup>2</sup> 645 cm <sup>2</sup>

**NOTE** \*: Vent must be at least 2.4 m (8 ft) away from nearest vertical surface. Vents extending 1.5 m (5 ft) or more above the roof must be braced or guyed. Consult your local code officials for detailed information.

**Table 3.** Note (\*) Area indicated is for one of two openings; one at floor level and one at the ceiling.

### CAUTION

Chemicals should not be stored near the heater installation. Combustion air can be contaminated by corrosive chemical fumes which can void the warranty.

**Note:** For indoor installations where combustion air might be insufficient, see **Direct Air Intake Duct with 4 in PVC Pipe (Indoor Installation)** on page 30 and 31.



### Direct Air Intake Duct with 4-inch or 6-inch PVC Pipe (Indoor Installation)

For indoor heater installations, the heater is tested for a direct air intake duct using 4 in or 6 in PVC pipe. If outside air is drawn through 4 in or 6 in PVC duct directly into the heater, vent pipe can be installed in accordance with the following requirements, see Table 4 below.

The air intake opening MUST be installed at least 1 ft. above the roof line or normal snow levels for free air flow. The Category IV exhaust vent termination cap must have at least 3 ft. (1 m) minimum vertical clearance from air intake duct, see Figure 24.

#### Combustion Air Intake (Vertical or Horizontal) Duct Requirements\*

* Combustion Air Intake (Vertical or Horizontal) Maximum length in Feet (m)		
No. of 90° Elbows	4-in (10 cm) pipe	6-in (15 cm) pipe
0	120 ft. (36.6 m)	300 ft. (91.4 m)
1	108 ft. (33 m)	288 ft. (87.7 m)
2	96 ft. (29.3 m)	276 ft. (84.1 m)
3	84 ft. (26 m)	264 ft. (80.4 m)
4	72 ft. (22 m)	252 ft. (76.8 m)

**CAUTION**

Do **NOT** combine exhaust vent pipes to a common exhaust vent in multiple unit installations. Run separate vent pipes.

Table 4.

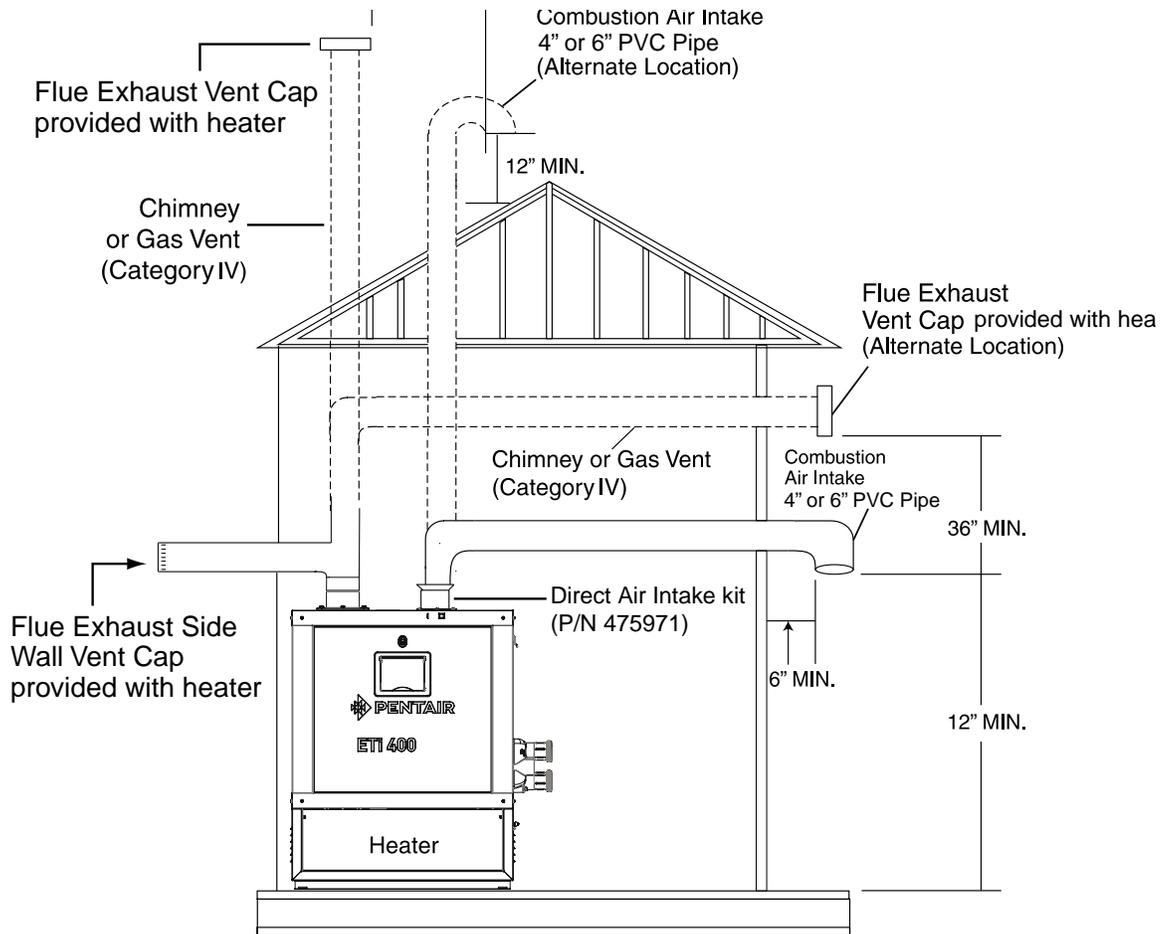


Figure 24.

## DIRECT AIR INTAKE KIT (P/N 475971) INSTALLATION

**IMPORTANT:** For indoor heater installations with Direct Air Intake duct using 4 in PVC duct it is required to order and install the Direct Air Intake Kit (P/N 475971).

To install the Direct Air Intake Kit (see Figure 25), the steps are as follows:

1. Remove the side panel from the heater to access the Vent Terminal (see illustration below). Using a flat-blade screwdriver, insert press and turn the screwdriver to unlock the panel.
2. Remove the Air Intake Vent cover from the top of the heater.
3. Insert the spigot part of the street wye up through the air intake hole in the top panel.
4. Insert the 45° elbow into the 3 in pipe section of the assembly that has the street wye.
5. Adjust the 45° elbow to align each 3 in pipe section with the air orifice.
6. Push the air intake assembly into the air orifices. Note: Be sure the top part of the elbow is concentric to the air intake hole in the top panel (see Figure 26).
7. Place the 3 x 4 in reducer to the street wye plate of the elbow and secure it with the 3 sheet metal retaining screws.

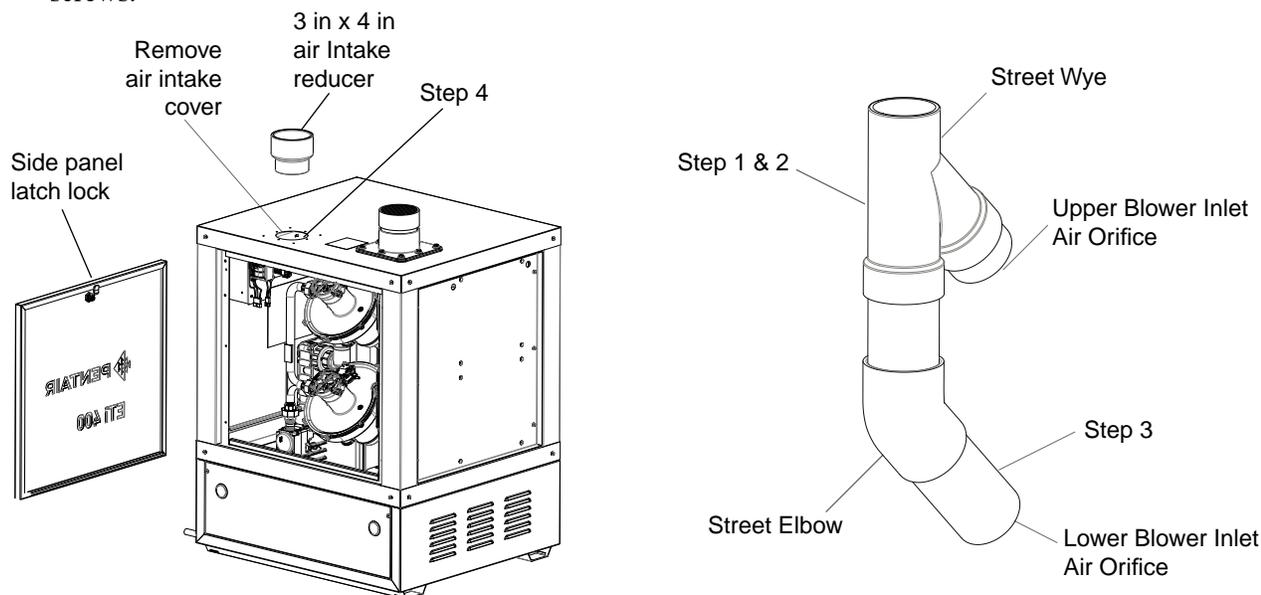


Figure 25.

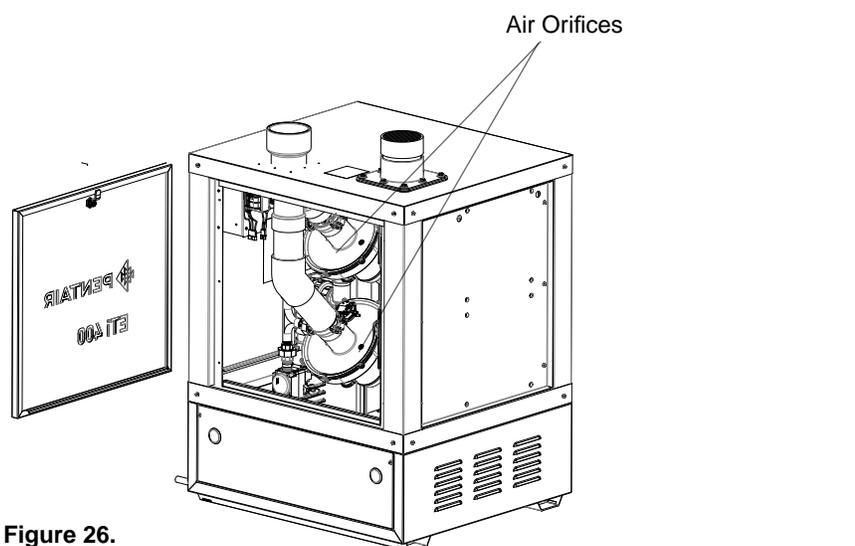


Figure 26.

## **COMBUSTION AIR SUPPLY (CONTINUED)**

### **NOTE**

Each 90-degree elbow reduces the maximum horizontal PVC air intake duct run by 12 feet and each 45-degree elbow in the PVC air intake duct run reduces the maximum run by 6 feet. See the Table 6 on page 33 for the maximum lengths using 90-degree elbows.

### **⚠ CAUTION**

Chemicals should not be stored near the heater installation. Combustion air can be contaminated by corrosive chemical fumes which can void the warranty.

### **Corrosive Vapors and Possible Causes**

<b>Area</b>	<b>Likely Contaminants</b>
Chlorinated swimming pools and spas	Pool or spa cleaning chemicals. Acids, such as hydrochloric or muriatic acid.
New construction and remodeling areas	Glues and cements, construction adhesives, paints, varnishes, and paint and varnish strippers. Waxes and cleaners containing calcium or sodium chloride.
Beauty parlors	Permanent wave solutions, bleaches, aerosol cans containing chlorocarbons or fluorocarbons.
Refrigeration plants or various industrial finishing and processing plants	Refrigerants, acids, glues and cements, construction adhesives.
Dry cleaning and laundry areas	Bleaches, detergents, or laundry soaps containing chlorine. Waxes and cleaners containing chlorine, calcium or sodium chloride.

Table 5.

## **HORIZONTAL OR VERTICAL VENTING (CATEGORY IV) - POSITIVE PRESSURE** (See Figure 28, page 35 and Figure 29, page 36)

Vent the heater either horizontally or vertically using the 4 in Vent Adapter that is provided with the heater. Install the vent pipe in accordance with local codes and the provisions of the National Fuel Gas Code, ANSI Z223.1 (U.S.), or the standards CSA B149.1, Natural Gas and Propane Installation Codes (Canada), and the vent manufacturer's instructions. Do not use a draft hood with this heater. Install the vent according to the vent manufacturer's detailed instructions. **Note:** Maintain clearance between the vent pipe and combustible surfaces according to the vent manufacturer's instructions and code requirements. Do not place any insulating materials around the vent or inside the required clear air space surrounding the vent. See Table 6 for maximum permissible vent lengths.

### **NOTE**

**Each 90° elbow reduces the maximum horizontal vent run by 12 ft and each 45-degree elbow in the vent run reduces the maximum vent run by 6 ft. See the Table 6 below for the maximum vent lengths using 90° elbows.**

### **The ETi® 400 heater is a Category IV appliance**

The ETi 400 heater requires a 4 in special gas approved *Category IV* vent pipe and is a forced-draft pool and spa heater which uses positive pressure to push flue gases through the vent pipe to the outside. **Flue gases under positive pressure may escape into the dwelling with any cracks or loose joints in the vent pipe, or improper vent installation.** The vent pipe must be of a sealed-seam construction, such as those listed for use with *Category IV Appliances*. Vent pipe construction will be of UL 1738 approved non-corrosive material, such as non-metallic PVC schedule 40 per ASTM D2665, CPVC schedule F441 or stainless steel such as AL 29-4C per UL 1738 in USA. In Canada must comply with ULC-5636 code requirements. The 4-in exhaust socket is CPVC. A condensate trap is required.

**Note: To solvent weld the PVC vent pipe to the CPVC exhaust socket use an approved industry standard primer and cement solvent specifically intended and marketed for PVC/CPVC joints, consult the adhesive manufacturer for details.**

The use of *Approved* thimbles, roof jacks and/or side vent terminals are required; and the proper clearances to combustible materials must be maintained in accordance with type of vent pipe employed—in the absence of a clearance recommendation by the vent pipe manufacturer, the requirements of the Uniform Mechanical Code should be met. **The ventilation air requirements for the heater are shown on page 34 and 36.** It is recommended that use of a condensate trap in the vent run close to the heater may be necessary in certain installations such as cold climates. Horizontal vents 4 in (25.4 mm) or less in length do not require a condensate tee. The heater is suitable for through-the-wall venting.

<b>(*) Special Gas Vent (Vertical or Horizontal)</b> <b>Maximum length in Feet (m)</b>		
No. of 90° Elbows	4-in (10 cm) pipe	6-in (15 cm) pipe
0	120 ft. (36.6 m)	300 ft. (91.4 m)
1	108 ft. (33 m)	288 ft. (87.7 m)
2	96 ft. (29.3 m)	276 ft. (84.1 m)
3	84 ft. (26 m)	264 ft. (80.4 m)
4	72 ft. (22 m)	252 ft. (76.8 m)

Table 6.

**(\*) Minimum vent length is 1 ft (.34M), or in accordance with vent manufacturer's instruction, and local and national codes. Horizontal vents 3 ft (1M) or less in length do not require a condensate tee, but must slope down toward the heater at 1/4 in to the foot (2 cm / m) to allow condensate to drain through the neutralizer cartridge.**

## DIRECT VENT REQUIREMENTS

1. Install vent pipe so that it can expand and contract freely as the temperature changes. Support the vent pipe according to applicable codes and vent manufacturer's instructions. Pipe support must allow the vent pipe free movement out and back, from side to side, or up and down as necessary, without putting a strain on the heater or vent body. It is recommended to slope the horizontal pipe runs up from the heater at least 1/4" per foot (2 cm/M). Install **Approved** condensate drains at low points where condensate might collect. Plumb condensate drains to a drain through hard piping or high-temperature tubing such as silicone rubber or EPDM rubber – do not use vinyl or other low temperature tubing. Follow drain manufacturer's installation instructions.
2. Use an *Approved* firestop for floor and ceiling penetrations. Use an *Approved* thimble for wall penetrations. Use an *Approved* roof flashing, roof jack, or roof thimble for all roof penetrations. Do not fill the space around the vent (that is, the clear air space in the thimble or firestop) with insulation. The roof opening must be located so that the vent is vertical.
3. **Vent Termination:** Vertical (See Figure 27 below and Figure 29 on page 36), for height of vent termination above the roof. Use an *Approved* vent terminal specified by local and national codes and your manufacturer's instructions. A roof termination must be vertical. In Canada, the Vent Cap location shall have a minimum clearance of 4 feet (1.2M) horizontally from electric meters, gas meters, regulators, and relief openings.
4. Make sure entire installation is sealed according to approved standards.

### ⚠ WARNING

**Risk of carbon monoxide poisoning if adapter is improperly attached.** Mechanical connections (such as screws) can cause cracking and leaks in the adapter. Do **NOT** drill holes or use screws to connect the appliance adapter to the heater vent body. Attach with manufacturer's specified adhesive.

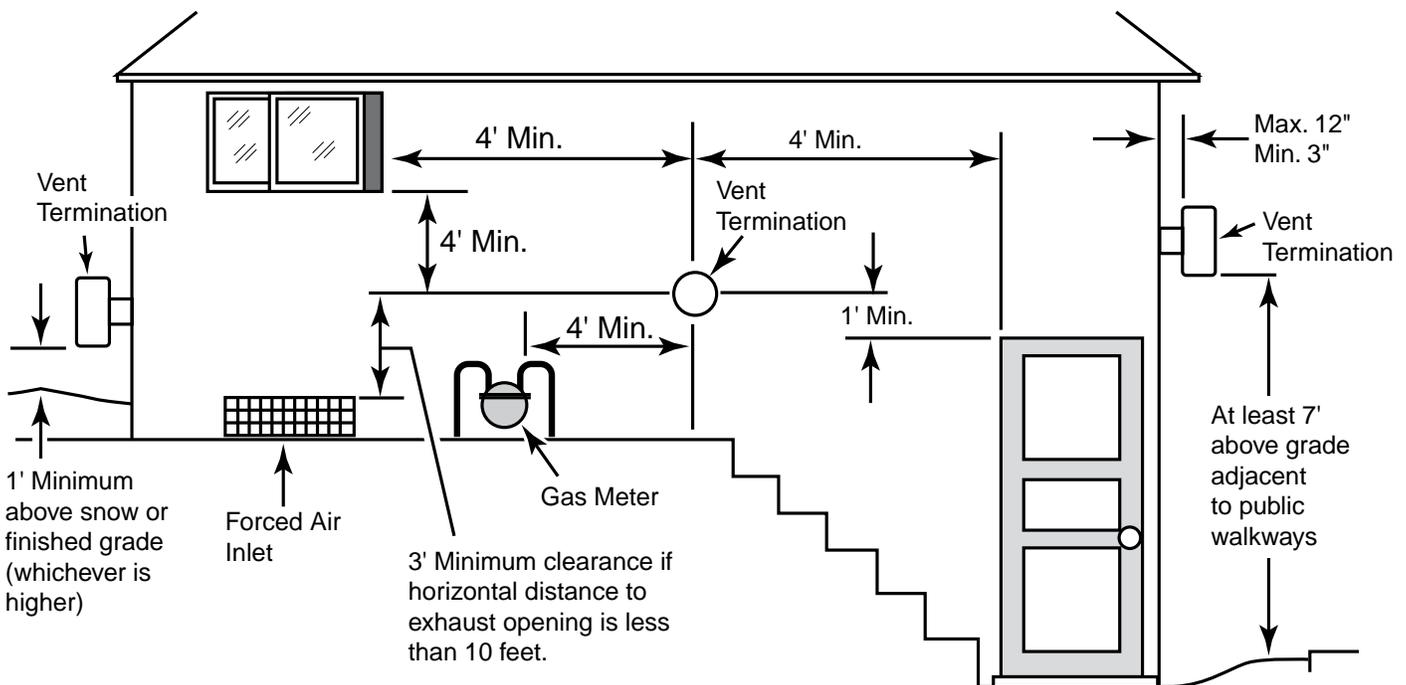


Figure 27.

## 5. Vent Termination - Horizontal

The terminal must be located (U.S. – See Figure 27 on page 34):

- at least 3" and at most 12" out from the wall (see Figure 29 on page 36), following the vent manufacturer's instructions
- at least 12" above finished grade or the normally expected snow accumulation level, whichever is higher
- at least 4 feet below or horizontally from, or 1 foot above, any doors or windows or gravity air inlet to a building
- at least 3 feet above any forced air inlet located within 10 ft.
- at least 4 feet horizontally from electric meters, gas meters, regulators and relief equipment
- at least 7 feet above grade adjacent to walkways or similar traffic areas

The terminal must be located (Canada – See Figure 27 on page 34):

- at least 10 feet (3.3M) from any opening into a building
- at least 12" (.3M) above finished grade or the normally expected snow accumulation level, whichever is higher
- at least 4 feet (1.2M) horizontally from electric meters, gas meters, regulators and relief equipment
- at least 7 feet (2.1M) above grade adjacent to walkways or similar traffic areas

Allow at least three feet (1M) vertical clearance over vent termination when terminating under an overhang.

Avoid corners or alcoves where snow or wind could have an effect. Exhaust may affect shrubbery and some building materials. Keep shrubbery away from termination. To prevent staining or deterioration, sealing or shielding exposed surfaces may be required.

### ⚠ WARNING

**Fire Hazard.** Do not run the heater vent into a common vent with any other appliance. Do not run the Special Gas Vent into, through, or within any active vent such as a factory built or masonry chimney.

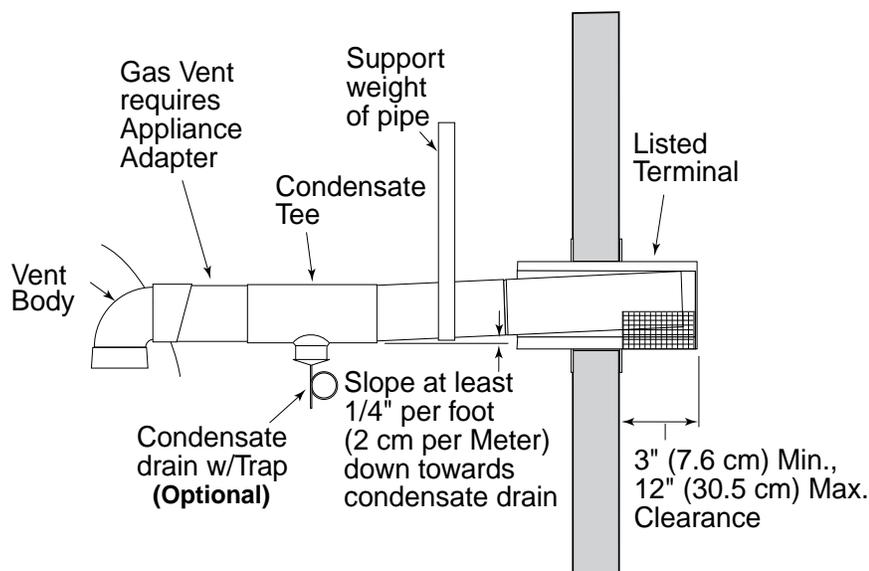


Figure 28.

## Direct Vent Indoor Installation (US and Canada) Horizontal Through-the-Wall

### Termination

The flue direct vent cap **MUST** be mounted on the exterior of the building. The direct vent cap cannot be installed in a well or below grade. The direct vent cap must be installed at least 1' (0.3 m) above ground level and above normal snow levels, see Figure 27, page 34. The direct vent cap **MUST NOT** be installed with any combustion air inlet directly above a direct vent cap. This vertical spacing would allow the flue products from the direct vent cap to be pulled into the combustion air intake installed above.

This type of installation can cause non-warrantable problems with components and poor operation of the heater due to the recirculation of flue products. Multiple direct vent caps should be installed in the same horizontal plane with a 4' (1.22 m) clearance from the side of one vent cap to the side of the adjacent vent cap(s).

Care must be taken during assembly that all joints are sealed properly and are airtight. The vent must be drained to prevent the potential accumulation of condensate in the vent pipes.

It is recommended that the intake vent (see Figure 29 below) be insulated in colder climates.

Combustion air supplied from outdoors must be free of particulate and chemical contaminants. To avoid a blocked flue condition, keep the vent cap clear of snow, ice, leaves, debris, etc.

### **WARNING**

**No substitutions of flue pipe or vent cap material are allowed. Such substitutions would jeopardize the safety and health of inhabitants. Use CPVC schedule 40 per ASTM D2665, CPVC schedule F441 or stainless steel, such as AL 29-4C per UL 1738 in USA. Canada must comply with ULC-S636 code requirements.**

**Venting:** Vent systems for Category IV appliances that terminate through an outside wall of a building and discharge flue gases perpendicular to the adjacent wall, must be located not less than 10 ft horizontally from an operable opening in the adjacent building. **Exception:** This does not apply to vent terminals that are 2 ft or more above 25 ft or more below the operable openings. Through the wall vents for Category IV must not terminate over public walkways or over an area where condensate or vapour could create nuisance or hazard or could be detrimental to the operation of regulators, relief valves, or other equipment.

Note: (\*) See Table 4  
(page 30) Category IV  
Requirements

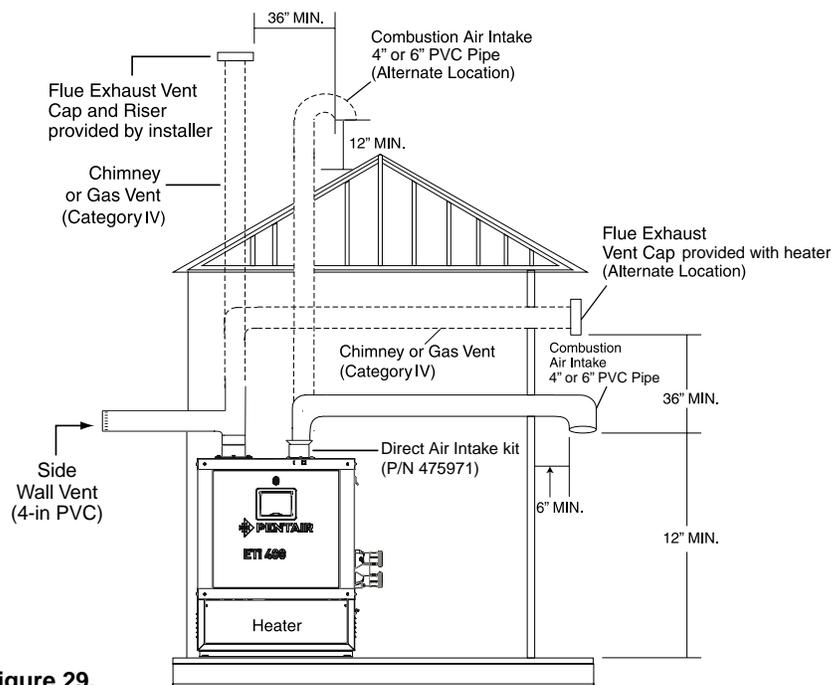


Figure 29.

## GARAGE OR UTILITY ROOM INSTALLATION

### **⚠ WARNING**

**Risk of fire and explosion if installed at floor level in an automotive garage or near gasoline or flammable liquid storage.** Gasoline fumes are heavier than air and will settle to floor level in closed spaces. Gasoline fumes and spilled gasoline or other volatile liquids (such as some paints and varnishes) will travel across the floor and can be ignited by a gas appliance.

In any utility room or residential garage installation, install the heater with the base at least 18 inches (.5M) above the floor, see Figure 30. In a garage, install a rail or wall to protect the heater from physical damage by a moving vehicle.

**NOTICE: A Propane (LPG) fired heater must not be installed in a garage in Massachusetts, by order of the Massachusetts State Fire Marshal. For more information, call the Massachusetts State Fire Marshal's office.**

### **VENT INSTALLATION – INDOOR INSTALLATION (U.S. AND CANADA)**

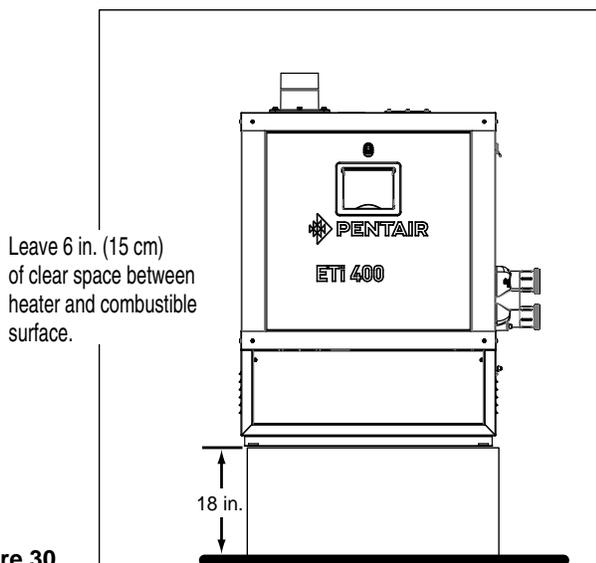


Figure 30.

### **FINAL INSTALLATION CHECK**

After heater installation, check and verify the following:

- Check that horizontal vent pipe runs slope uniformly at least 1/4" per foot (2 cm per meter) upward from the heater to the vent terminal. No sags, no dips, no high or low spots.
- Check that vent is supported at elbows, tees, and horizontal and vertical runs according to manufacturer's instructions and code requirements.
- Check that vent supports and wall and ceiling penetrations allow free movements up, down, and sideways without causing any strains on the heater or vent body.
- Check for at least six inch (15 cm) free air clearance between the heater vent pipe and combustible materials.
- There should be at least 30 in of clearance in front of the heater to provide adequate service space and access to the operator control panel, electrical controls and other operating components.
- Check that all joints are completely together and sealed.
- In Florida, building codes require that the heater be anchored to the equipment pad or platform to withstand high wind pressures created during hurricanes. A hold down bracket kit is designed to hold the unit to the equipment pad in high wind conditions. Installation of the anchor clamps are recommended in all installations and are required in Florida, (See Florida Building Code 301.13). For hurricane mounting bolts and clamps, purchase Bolt Down Kit P/N 476004.



## CONDENSATION MANAGEMENT

The ETi® 400 Heater is a condensing appliance. The flue gases will produce condensate while in operation and must be drained correctly. **Note: The condensate pH level is between 3.1 and 4.2, Pentair recommends to neutralize the condensate to avoid potential damage over time to the drainage system, and to comply with local water authorities where applicable.** To neutralize the condensate, use an optional Condensate Neutralizer Kit P/N 475612 or similar. The condensate drain must be installed so as to prevent accumulation of condensate. When a condensate pump is not used, the tubing must continuously slope downward toward the drain with no spiraling.

**⚠ CAUTION!** pH levels of 5.0 and below may harm some floor drains and/or pipes, particularly those that are metal. Ensure that the drain, drainpipe, and anything that will come in contact with the condensate can withstand the acidity. Damage caused by failure to install a neutralizer kit or to adequately treat condensate will not be the manufacturer's responsibility.

**⚠ WARNING!** DO NOT allow the exhaust flue gases to vent through the neutralizer. All condensate drains MUST have a trap to prevent flue gas leakage. Flue gas leakage can cause personal injury or death from carbon monoxide. Check with local authorities for regulations regarding discharge of condensate to the drain sewer system.

### Condensate Maintenance

**Annual condensate assembly inspection:** Inspect the inside tubing top for any dirt or particles that could collect and clog the condensate neutralizer cartridge. **DO NOT route the condensate outside tubing through any area that is exposed to freezing temperatures.**

### Condensate Neutralizer Cartridge Drain/Tubing Installation (FOR INDOOR OR OUTDOOR HEATER INSTALLATION)

To install the external condensate neutralizer cartridge drain/tubing:

1. Connect the PVC socket adaptors to the neutralizer. **DO NOT OVERTIGHTEN.**
2. Connect the inside tubing to the inlet of the neutralizer cartridge.
3. **Indoor Heater Installation (Figure 31):** Mount the neutralizer cartridge on the floor near the side of the heater. **Outdoor Heater Installation (Figure 32):** Using the provided brackets, secure the neutralizer cartridge onto the heater base.
4. Connect the outside tubing to the outlet of the neutralizer cartridge. Be sure the tubing is at its highest point at the cartridge outlet.
5. Route the outside tubing to a drain or to a pump. Maintain a pitch of  $\frac{1}{4}$  in per foot downward from the cartridge outlet.
6. Fill the condensate trap with water until flow is established through the neutralizer. **Note: Observe the neutralizer during the heater operation to ensure unrestricted flow .**

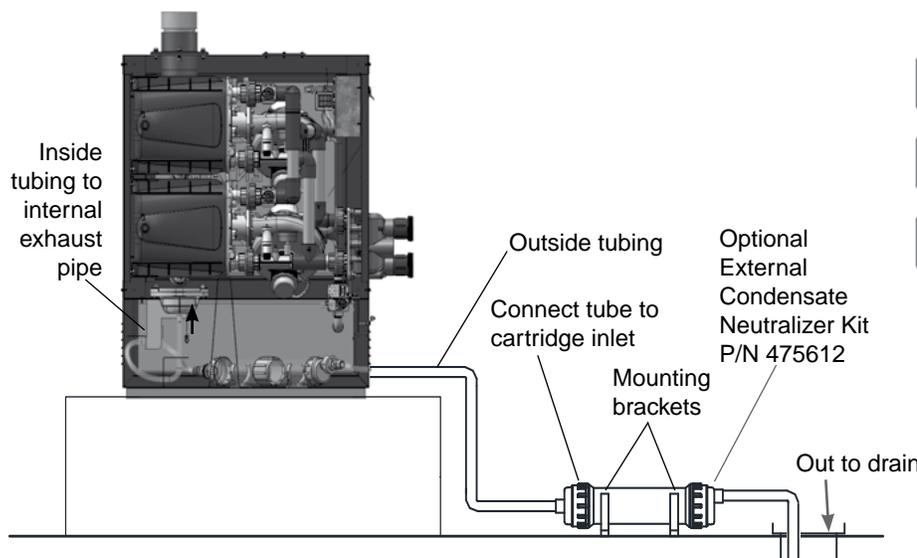


Figure 31. External Neutralizer Cartridge for indoor heater Installation

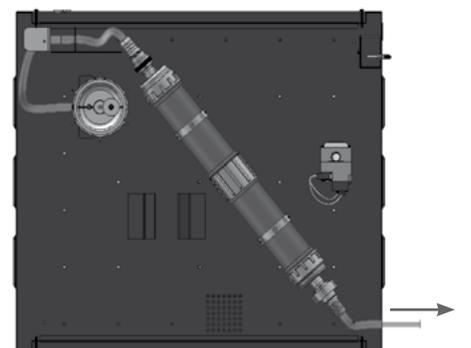


Figure 32. Internal Neutralizer Cartridge installed on base of heater for outdoor heater Installation

## ELECTRICAL CONNECTIONS

**Electrical Rating: 60 Hz 120 / 240 Volts AC, single phase.**

Enclose the incoming AC power line to the heater, in an approved flexible conduit connected directly to the junction box on the inside of the lower right side of the heater (see Figure 11 on page 18). The Line Voltage field wiring is 14 gauge, with a circuit capacity of 15 Amps.

The heater is factory wired for 240 VAC. See page 40 for 240 VAC and 120 VAC wiring. Operating amp draw is about 5 Amps at 120VAC and 2.5 Amps at 240VAC. A 15 Amp circuit capacity is required for the inrush current at startup.

### CAUTION

This heater is designed to operate at 120 or 240 VAC. It is not recommended to be connected to OR operate on a 208 VAC.

### CAUTION

The heater ships from the Factory with the 240V plug installed. Installing the 120V plug and then connecting the heater to 240V line current will immediately damage the transformer, control board, and will void the warranty. If you install the 240V plug and connect the heater to 120 volts line current, the heater will not operate.

### CAUTION

If, while there is line voltage connected to the heater, you touch either line voltage terminal with any 24VAC wire that is connected to the control board (including the Fireman's Switch jumper), you will immediately destroy the control board and void the warranty.

**Please read the information under IMPORTANT! (page 44) and READ ME FIRST! (page 48) before proceeding.**

- All wiring must be in accordance with all applicable codes.
- The heater, when installed, must be electrically grounded and bonded in accordance with local codes or, in the absence of local codes, with the National Electrical Code or the Canadian Electrical Code (as applicable).
- Electrical power circuits to the pool heater must follow local codes and National Electrical Code or Canadian Electrical Code (as applicable).
- All wiring between the heater and devices not attached to it, or between separate devices which are installed in the field, must be **Type T** wire rated for 35°C rise.
- All line voltage wiring shall be enclosed in approved flexible conduit, and shall be securely attached to the field wiring box located in the lower right side of the water manifold panel (**see Figure 11 on page 18**). The conduit or cable connector at the field wiring box should contain an insulating bushing or its equivalent to prevent abrasion of the wires as they enter the box.

## HEATER BONDING

### WARNING

- A bonding lug is provided on the heater located on the upper side of the base by the "Plumbing" side (see page 18). The heater along with the pool system equipment must be bonded together. Using solid copper conductor not smaller than 8 AWG to reduce voltage gradients in the pool area.
- Not properly bonding and grounding the heater increases the risk of electrical shock. Damage to the heat exchanger can occur from electrolysis when the heater is not bonded properly.

## **ELECTRICAL CONNECTIONS (CONTINUED)**

### **120 VAC Wiring**

- Connect the BLUE PLUG (120 VAC) into the 12-pin plug located on the electrical panel, see Figure 33).
- Connect the L1 to the BLACK WIRE in the heater.
- Connect the NEUTRAL WIRE to the RED WIRE in the heater.
- Connect the GROUND WIRE to the GREEN WIRE in the heater.

### **240 VAC Wiring**

- Connect the RED PLUG (240 VAC) into the 12-pin plug located on the electrical panel, see Figure 34).
- Connect the L1 to the BLACK WIRE in the heater and the other L2 to the RED WIRE at the heater.
- Connect the GROUND WIRE to the GREEN WIRE in the heater.

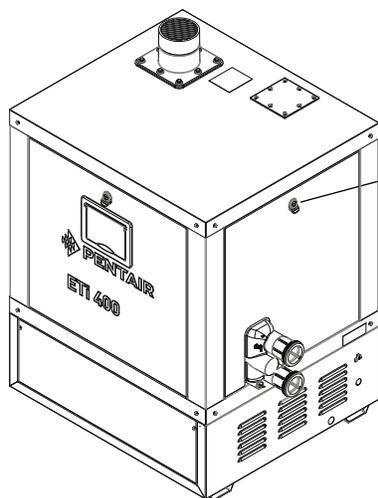


Figure 33.

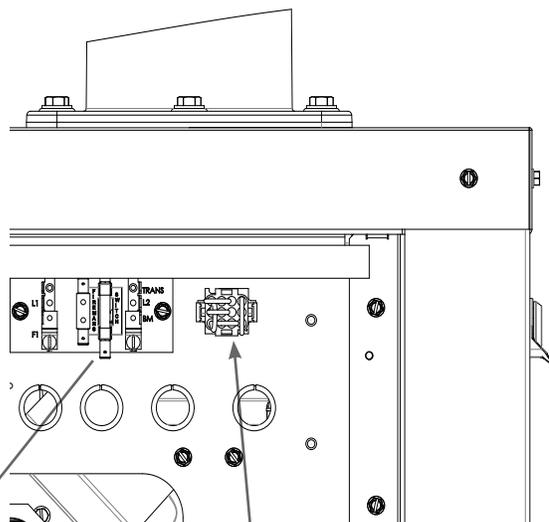


Figure 34.

Fireman Switch Board

**⚠ CAUTION!** The 120 VAC (Blue plug) voltage selector is NOT interchangeable with the MasterTemp® or StaRite® Heater voltage selector (Black plug)



120 VAC  
(BLUE)



220 VAC  
(RED)

## **ELECTRICAL CONNECTIONS (CONTINUED)**

### **REMOTE CONTROL CONNECTIONS**

1. **NOTE: Switch off power to heater at main circuit breaker panel.**
2. Remove the front side door panel, see Figure 33 on page 40.
3. Locate the **Fireman Switch jumper wire**; remove the wire. See Figure 35 below.
4. Connect the **Remote Control Dry Contact wires**. See Figure 35 below.

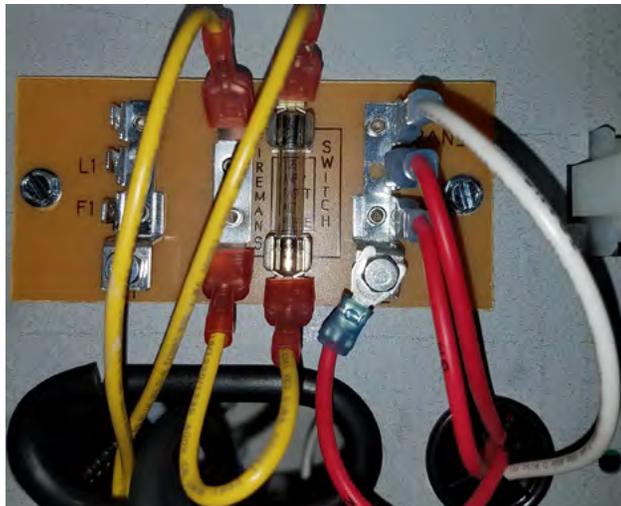


Figure 35.

#### **CONNECTION OF FIREMAN'S SWITCH OR REMOTE CONTACT YELLOW JUMPER WIRE**

4. **To connect a 2-Wire Control (for IntelliCenter<sup>®</sup>, IntelliTouch<sup>®</sup> or EasyTouch<sup>®</sup> Control System) or a timer:**
  - Remove the factory installed jumper from the Fireman's Switch terminals.
  - Connect wires between the Fireman's Switch terminals on the heater and the relay. Connect wires from the controller or timer to the Fireman's Switch. Controller, timer or relay should be sized to handle 24 VAC at 0.5 Amp (because it will be completing the 24 VAC control board circuit on the heater as shown in Figure 34 on page 40). **DO NOT** apply line voltage to the Fireman's Switch terminals. Use 18 gauge wire with a minimum 3/64-in (1.2 mm) thick insulation rated for a temperature rise of at least 105°C.
  - Knock-outs are provided to route the wires through the bottom of the control box and past the junction box.
5. Close front side door panel.

To control heaters that are operated in parallel, connect wiring at same locations on heater as 2-Wire. It is imperative that each control circuit is isolated from the other control circuits, to avoid that current will flow from one heater to another through the control circuits.

**NOTICE: The fuse for the Fireman's Switch is a 1.25 Amp 1¼ x ¼" fast blow fuse, which is commonly available.**

### ***FIREMAN'S SWITCH***

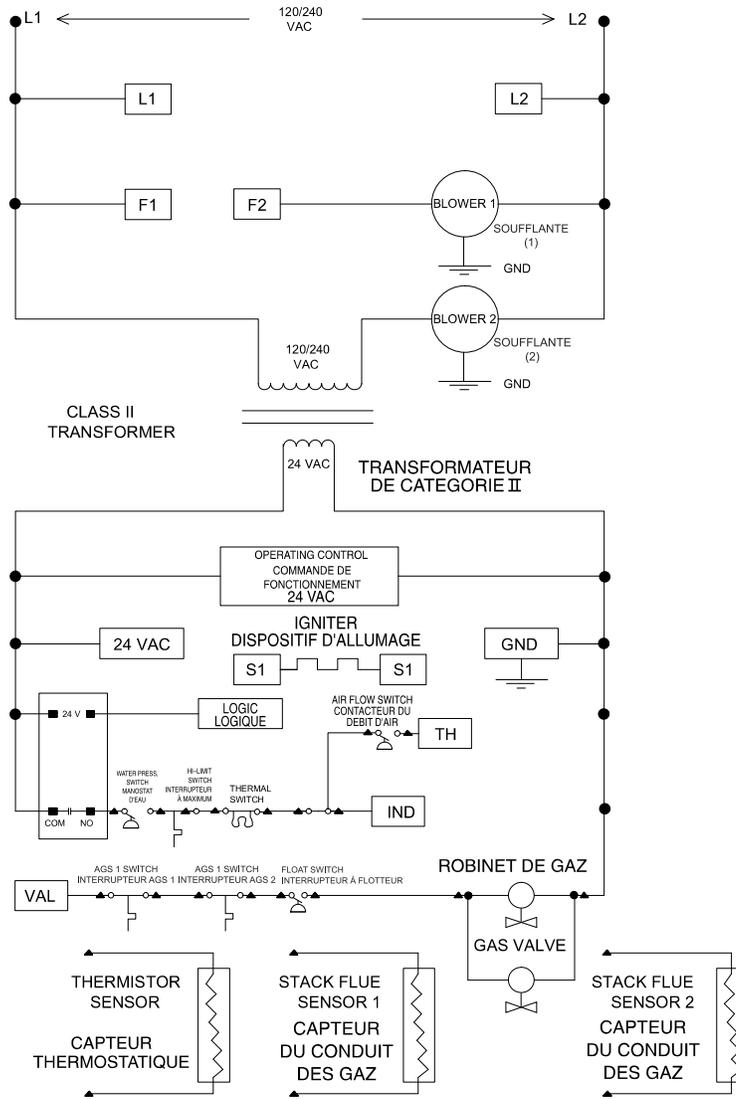
#### **TIME CLOCK/FIREMAN'S SWITCH (See Figure 31 above):**

A time clock controlling the filter pump should be a dual switch low-voltage Fireman's Switch should be set to shut off the call for heat to the pool heater 15 to 20 minutes before shutting down the pool pump. Always use crimp type connectors when connecting two wires. To operate the heater with a time clock, connect the timer to the fireman's switch wiring connection, as shown in the illustration on right. **The fireman's switch connection is located at the Yellow jumper wire below the fuse.** The fireman's switch connection must be a dry contact and must not supply power to the heater. Powering the fireman's switch connection externally may damage the heater, and is not covered by the heater warranty.



# HEATER LADDER WIRING DIAGRAM

## LADDER DIAGRAM DIAGRAMME EN ESCALIER



NOTES:-

- 1) L1 L2 F1 F2 S1 24 VAC  
S2 GND IND VAL TH

ARE CONNECTED ON THE IGNITION MODULE.

- 2) ▲ PIN AND SOCKET CONNECTOR.  
3) IF ANY OF THE ORIGINAL WIRES ARE SUPPLIED WITH THE APPLIANCE MUST BE REPLACED, THEY MUST BE REPLACED WITH TYPE 105°C WIRE OR ITS EQUIVALENT.

Figure 37.

## Section 3: Troubleshooting

### Initial Troubleshooting

Only qualified, trained service technicians with appropriate test equipment should service the heater. Remember that all parts of the system affect heater operation. Before starting this troubleshooting procedure, make sure that the pump is running correctly, that there are no blockages in the system, that the valves are correctly set and that the time clock is correctly set and is running.

**CAUTION: Installing the BLUE 120 volt plug in the control box and then connecting the heater to a 240 volt line will destroy the transformer, control board, and ignition control module, and will void the warranty. If you install the RED 240 volt plug and then connect the heater to a 120 volt line, the heater**

### READ THE FOLLOWING INFORMATION CAREFULLY

1. Check the line voltage to your heater. This heater will operate on either 120 Volts AC or 240 Volts AC.
2. Remove the covers and check the 12-pin plug in the back of the control box. The plug must match the voltage in the heater circuit.
3. If the 12-pin plug is not plugged into the back of the control box, select the correct plug from the bag in the control box and plug it in. The BLUE plug is for 120 volts, the RED plug is for 240 volts. See Figure 34 on page 40)

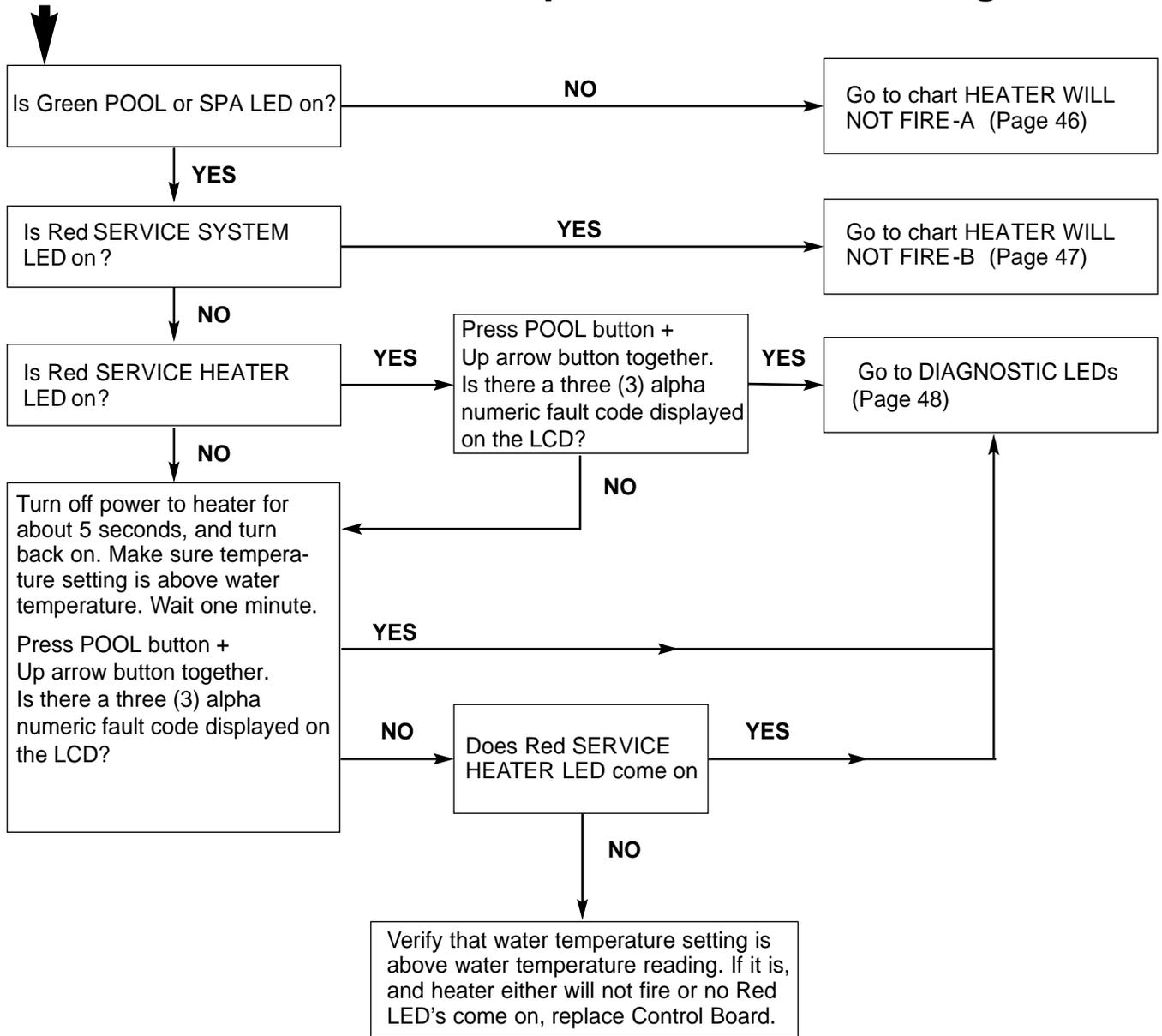
### Error and Fault Codes

The following table lists the ETi® 400 Heater Error and Fault Codes.

Fault Condition	Initial Error Code Display	* Error Symbol/Text (Press and disengage POOL ON and UP arrow at the same time) Error display will appear for 30 seconds and then previous state will display.	Note	Troubleshooting
SHORTED Stack Flue Sensors (SFS1 or SFS2) means flue temperature is greater than 170 F (77.7 C)	<b>E06</b>	SFS symbol  will be displayed	All keypad disabled (To Reset: Cycle Power)	Follow diagram on page 50
OPEN Stack Flue Sensor (SFS)	<b>E05</b> (error should display after 30 sec of firing)	SFS symbol  will be displayed	All keypad disabled except OFF (To Reset: OFF key)	Follow diagram on page 50
OPEN Automatic Gas Shut-off Switch (AGS1 and AGS2)--opens when outlet temperature goes above 150 F (65.5 C)		AGS1 or AGS2  symbol will be displayed along with text "AG1" or "AG2".	All keypad disabled (To Reset: Cycle Power)	Follow diagram on page 49
Air Flow Switch (AFS1 and AFS2)		AFS symbol  will be displayed along with text "AFS".		Follow diagram on page 49
High Limit Switch (HLS)--Opens when outlet temperature goes above 135 F (57.2 C)		HLS Symbol  will be displayed along with text "HLS".		Follow diagram on page 49
OPEN Water Pressure Switch (PS)		PS symbol  will be displayed along with text "PS".		Follow diagram on page 49
OPEN Water Temperature Sensor	<b>E01</b>	<b>E01</b>	LED 7 will light up on back of board	Follow diagram on page 49
SHORTED Water Temperature Sensor or water temperature greater than 125 F (51.6 C)	<b>126</b>	<b>126</b>		Follow diagram on page 49
OPEN Condensate Float Switch		"FS" text will be displayed		Follow diagram on page 51
Flame Sensor		IGN symbol  will be displayed along with text "IGN"	All keypad disabled (To Reset: Cycle Power)	Follow diagram on page 47
OPEN Thermal Sensor		tf Symbol  will be displayed along with text "tf".		Follow diagram on page 51

# Section 3: Troubleshooting

Start here for directions to specific Troubleshooting Chart



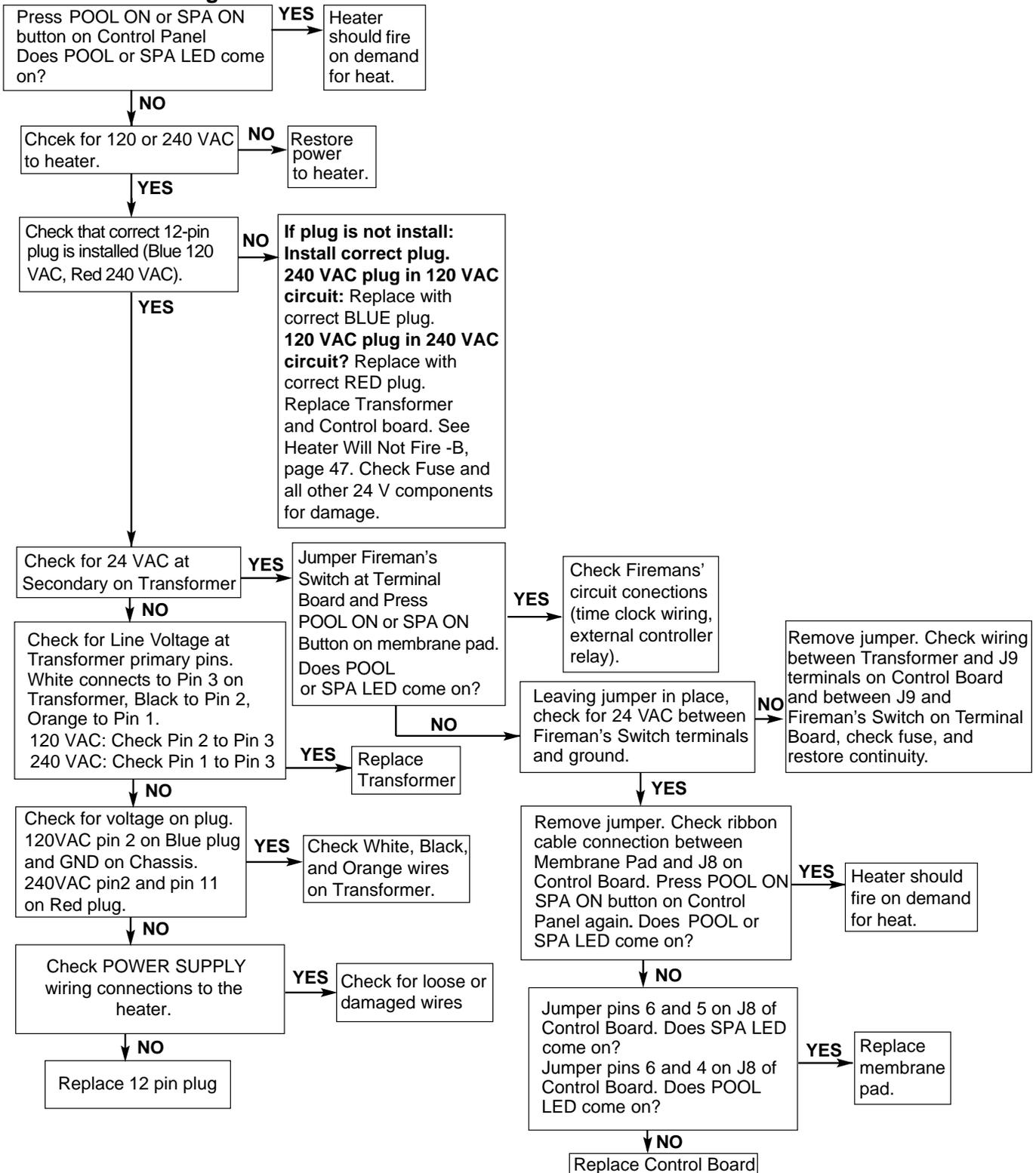
**⚠ WARNING** Hazardous voltage. Can shock, burn or kill. Disconnect power before servicing any components.

**⚠ WARNING** Fire and Explosion hazard. Do not jumper switch terminals to remedy a failed safety switch.



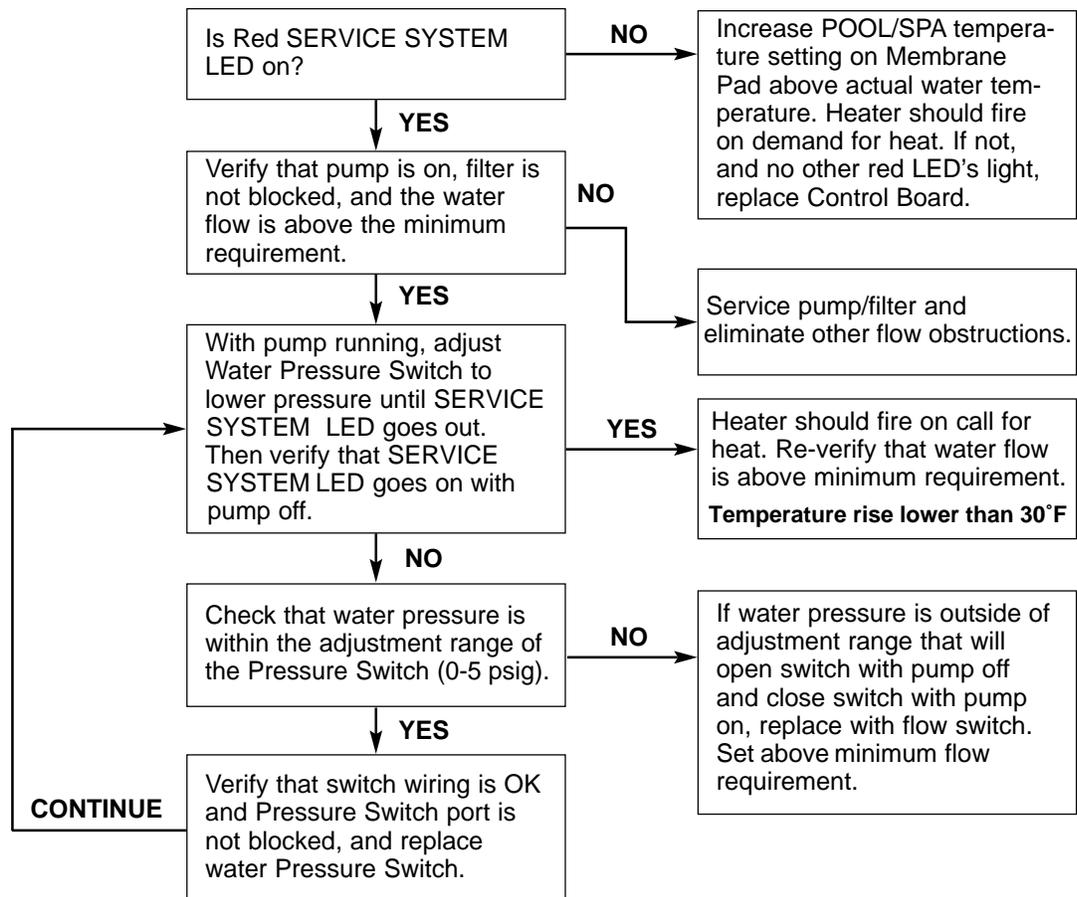
## Heater Will Not Fire - A

Start Here: from Page 45.



## Heater Will Not Fire - B

From page 45: Start



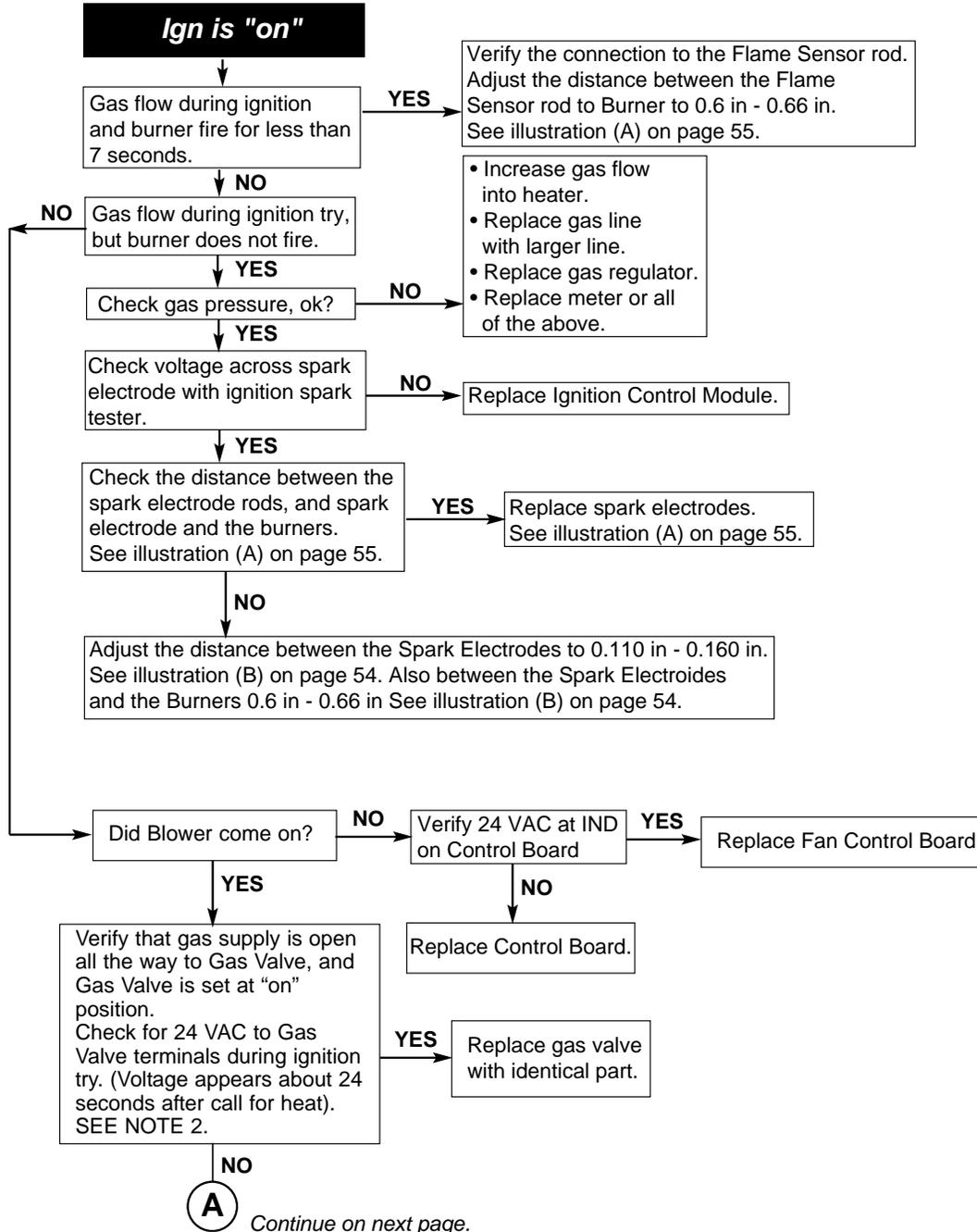
# Diagnostic LEDs: PS, HLS, TF, IGN, AFS, AG1, AG2, FS

## IMPORTANT! READ ME FIRST!

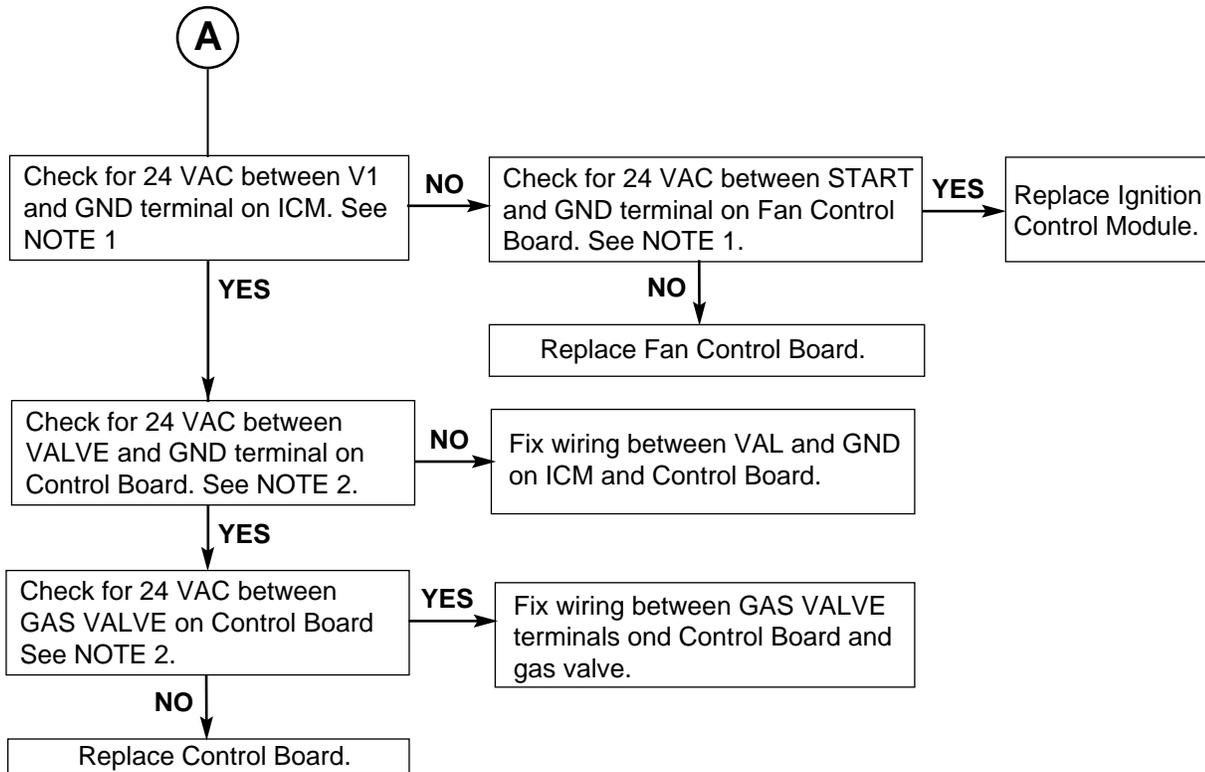
### IMPORTANT! READ ME FIRST!!

If your heater is correctly connected to **240 Volts AC**, the Ignition Control Module (ICM) will convert the 240VAC to an intermittent pulse to the ignitor. Digital meters don't read this type of signal well. (An analog meter will give a better reading than a digital meter). If the ICM is bad, your volt-

meter will read either 0 VAC or 240 VAC. If your ICM is good, your meter will read some voltage between 0 and 240 VAC. Exactly what reading you get will depend on the meter, but with a good ICM, the reading won't be 0 VAC or 240 VAC, but somewhere in between.



## Diagnostic LEDs: PS, HLS, TF, IGN, AFS, AG1, AG2, FS (Continued)



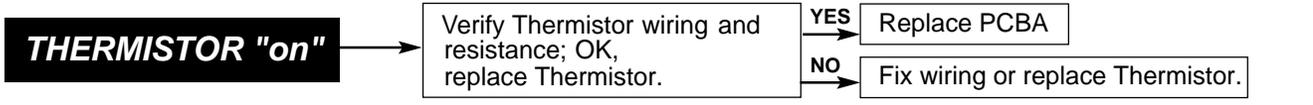
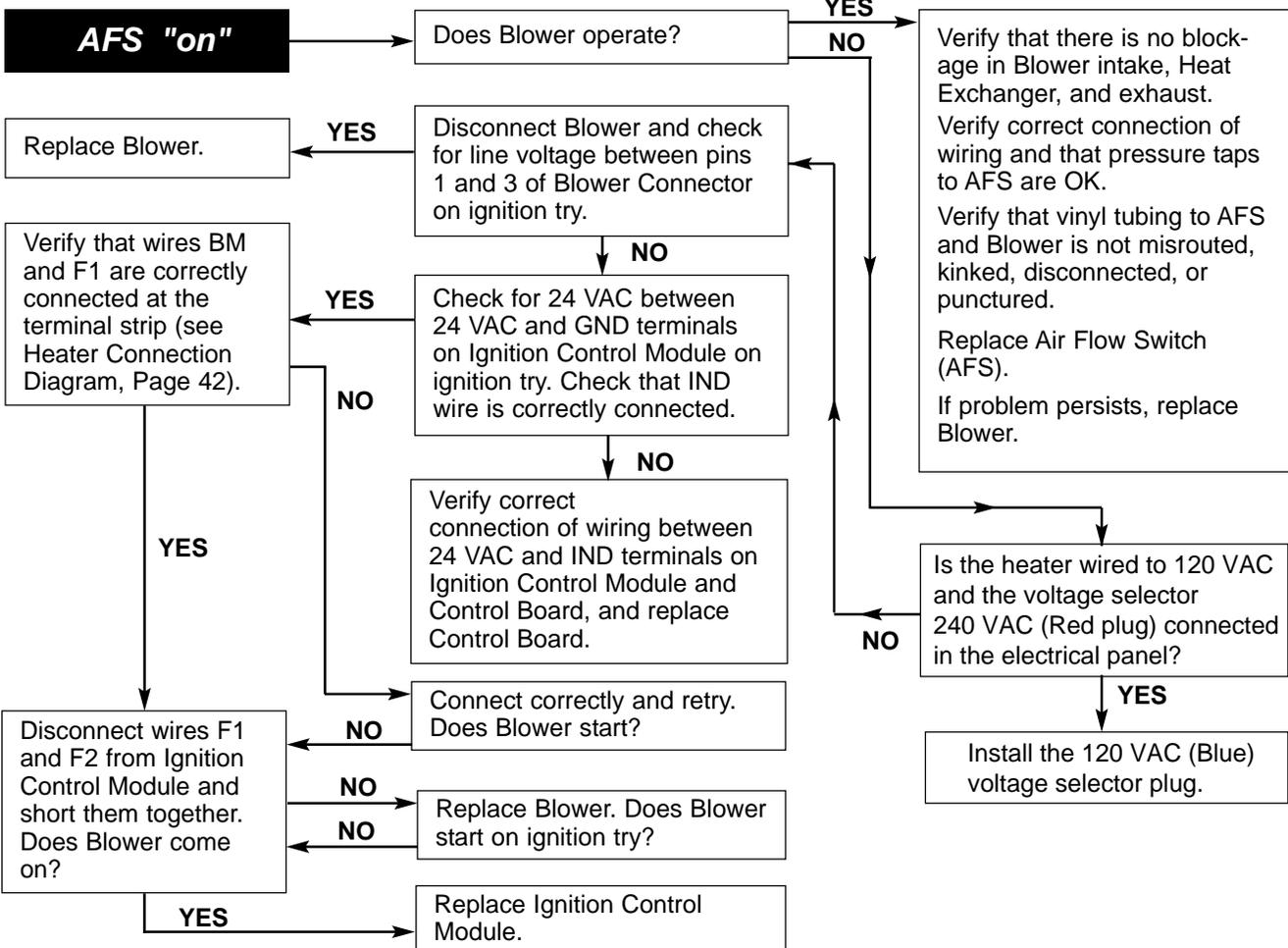
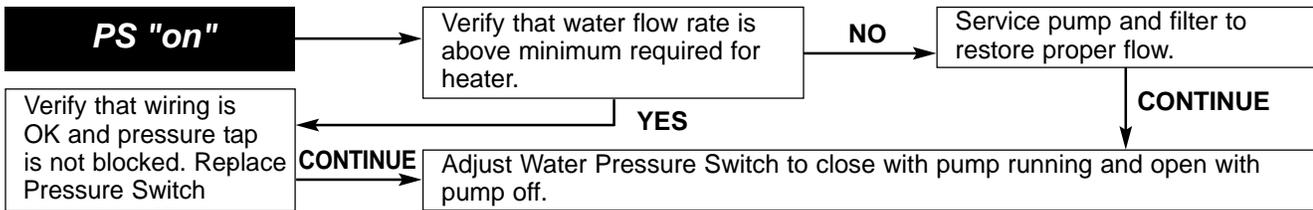
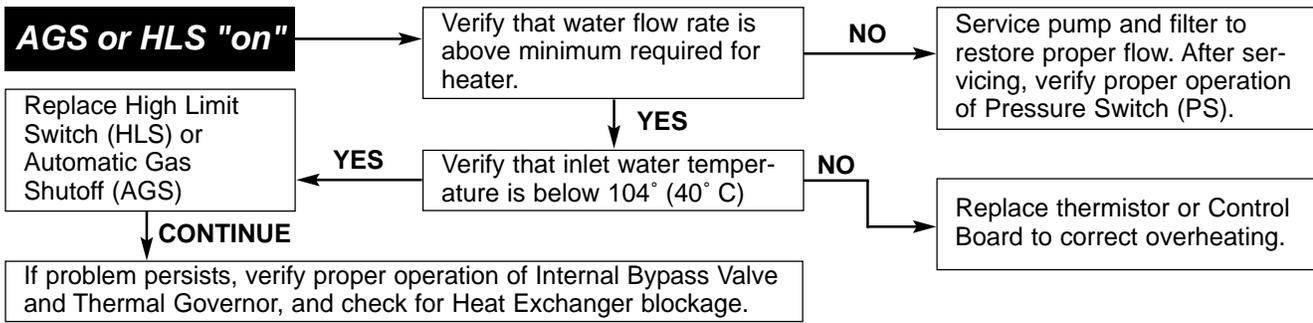
**NOTE 1:** Voltage appears immediately after call for heat, and may be on for only about 30 seconds.

**NOTE 2:** Voltage appears about 24 seconds after call for heat, and may be on for only about 7 seconds.

**CAUTION** Do not jumper a safety switch to remedy a failed switch.

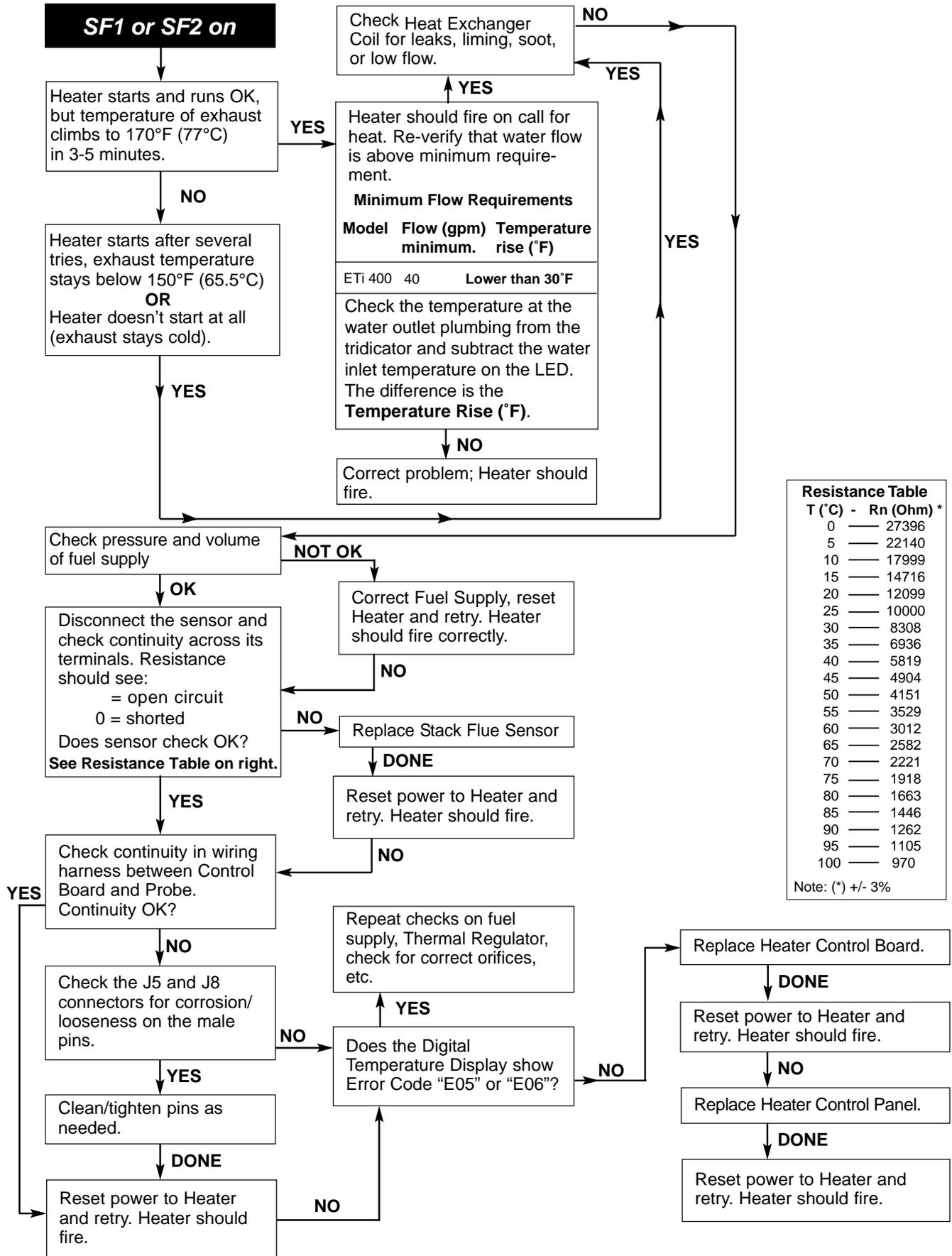
**NOTE:** ES1 is a spare and should be jumpered.

## Diagnostic LEDs: PS, HLS, TF, IGN, AFS, AG1, AG2, FS



**CAUTION** Do not jumper a safety switch to remedy a failed switch. **NOTE:** ES1 is a spare and should be jumpered.

# Diagnostic LEDs: PS, HLS, TF, IGN, AFS, AG1, AG2, FS



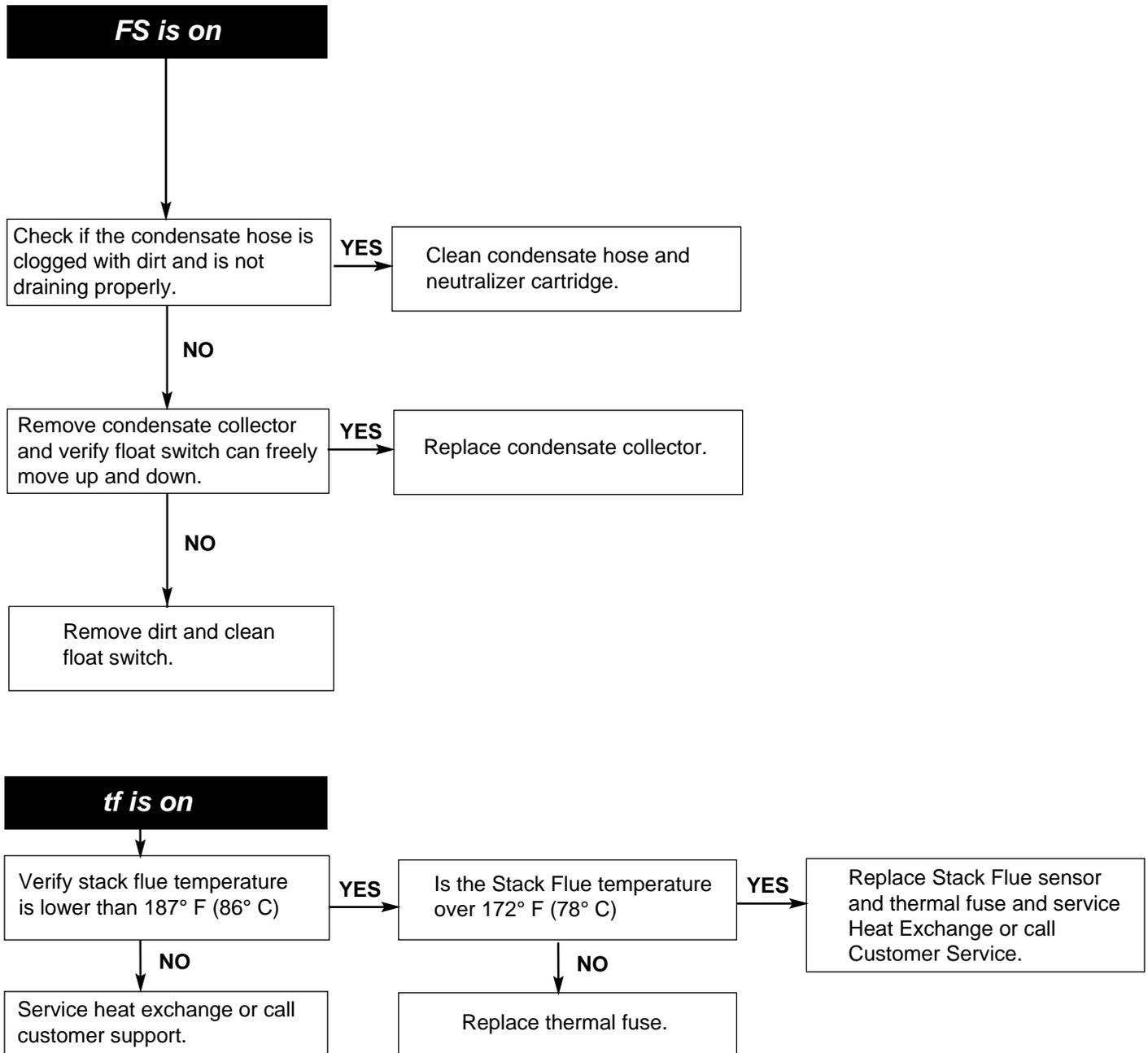
**Resistance Table**

T (°C) - Rn (Ohm) \*

0	27396
5	22140
10	17999
15	14716
20	12099
25	10000
30	8308
35	6936
40	5819
45	4904
50	4151
55	3529
60	3012
65	2582
70	2221
75	1918
80	1663
85	1446
90	1262
95	1105
100	970

Note: (\*) +/- 3%

## Diagnostic LEDs: PS, HLS, TF, IGN, AFS, AG1, AG2, FS



## Burner Troubleshooting

<b>SYMPTOM</b>	<b>CAUSE</b>	<b>REMEDY</b>
Loud, high-pitched whine	Flame is too rich.	Verify pressure tap between gas valve and blower inlet.  See page 16 and verify that the gas regulator setting is $-0.2''$ ( $-0.5\text{cm}$ ) wc.  Contact a qualified technician or service agency to replace the gas orifice.
Flame is “fluttery.” Exhaust may have acrid smell or burner may fail to stay lit.	Flame is too lean.	See page 16 and verify that the gas regulator setting is $-0.2''$ ( $-0.5\text{cm}$ ) wc.  Contact a qualified technician or service agency to replace the gas orifice.
Burner pulsates or surges, especially on ignition.	Exhaust vent is too long.	Reduce length of exhaust vent and/or number of elbows.
Combustion appears normal, but flame does not stay lit.	Flame current is not being sensed.	Check for wet or damaged igniter with low resistance to ground. Replace with new igniter.  Verify burner flameholder is properly grounded.  Replace Ignition Control Module.

## Heat Exchanger Troubleshooting

<b>SYMPTOM</b>	<b>CAUSE</b>	<b>REMEDY</b>
Boiling in heat exchanger. May be accompanied by “bumping” sounds.	Low water flow to heater  Heat exchanger plugged.  Bypass valve stuck open.	Service pump and or filter.  Service heat exchanger. Correct water chemistry.  Service bypass valve.

## Operator Control Panel Displays RNC Code

<b>SYMPTOM</b>	<b>CAUSE</b>	<b>REMEDY</b>
Operator control panel LCD displays the RNC code.	Neutralizer maintenance reminder.  The RNC code is displayed on the LCD to remind you to do the maintenance on the neutralizer cartridge.	To clear this code, press the OFF button to put the heater in off mode, then press and hold the OFF button for 5 seconds.  Contact a qualified technician or service agency to service the condensate neutralizer cartridge.



## Section 4: Maintenance and Care Instructions

### MAINTENANCE AND CARE INSTRUCTIONS

#### ⚠ WARNING

**Risk of fire or explosion from flammable vapors.** Do not store gasoline, cleaning fluids, varnishes, paints, or other volatile flammable liquids near heater or in the same room with heater.

The following maintenance is recommended every six months and at the start of every swimming season:

1. Inspect the heater panels and venting system to make sure that there are no obstructions to the flow of ventilating air or burner exhaust. Check that room air intakes are open and clear of obstructions.
2. Keep the area in and around the heater clear and free from combustible materials, gasoline and other flammable vapors and corrosive liquids.
3. Test the operation of the pressure relief valve by lifting the valve lever (if installed).
4. Test for proper operation of the water pressure switch. See **WATER PRESSURE SWITCH** on page 14 for testing instructions.
5. For enclosed installations, repeat the **Final Installation Check**, page 37. Check for evidence of joint leakage. Make sure that joints have not slipped partially or completely apart. Check pipe and fittings for cracks or breaks. The combustion air blower is permanently lubricated, and does not require periodic lubrication.

### TITANTOUGH™ HEAT EXCHANGER ASSEMBLIES ANNUAL INSPECTION

The following maintenance is recommended every 12 months and at the start of every swimming season:

1. The upper and lower TitanTough Heat Exchanger assembly must be inspected every 12 months and cleaned. It is recommended to call a qualified service technician to inspect the heat exchangers. See Figure 38.

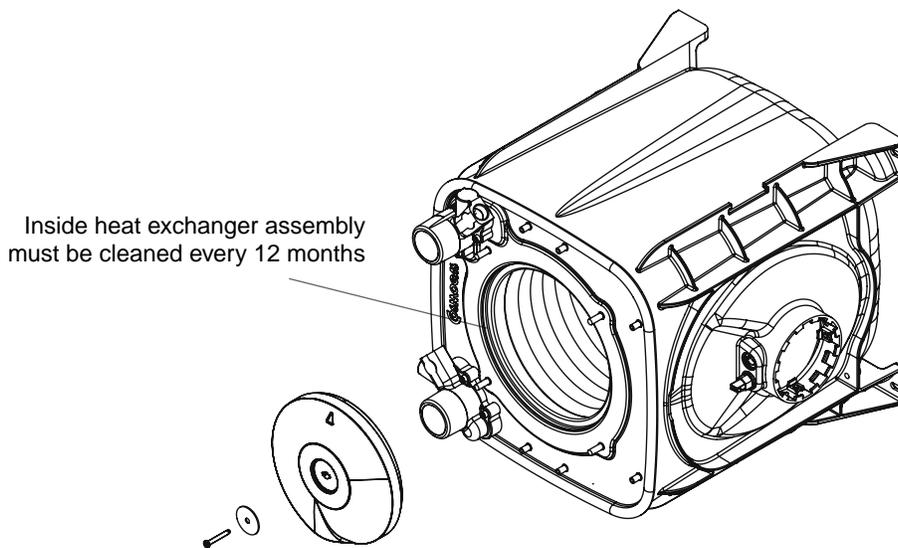


Figure 38.

Heat Exchanger Assembly

**⚠ CAUTION:** The gasket ensures that the combustion chamber is sealed. If the gasket appears to be damaged, DO NOT reuse it. The combustion chamber must be replaced with the burner unit. To replace it, call **Pentair Customer Support at 800. 831.7133.**

## BURNER SPARK ELECTRODE AND FLAME SENSOR ROD ANNUAL INSPECTION

The following maintenance is recommended every 12 months and at the start of every swimming season:

- The Thermal Insulation must be checked every 12 months, and if necessary be replaced. Inspect the Thermal Insulation for signs of exterior damage to the device. It is recommended to call a qualified service technician to inspect the Thermal Insulation. See Figure 39 and Figure 40.

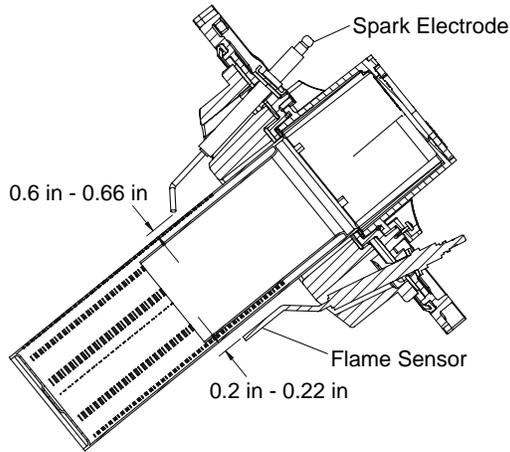


Figure 39. (A) Burner Spark Electrode

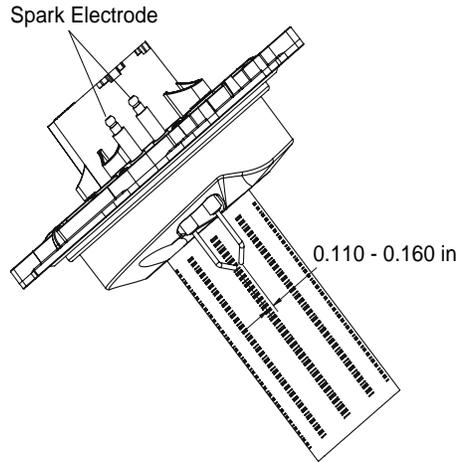


Figure 40. (B) Flame Sensor Rod

## PRESSURE RELIEF VALVE (50 PSI) (FACTORY INSTALLED)

To avoid water damage or scalding from operation of the pressure relief valve (see Figure 41), install a drain pipe in the outlet of the pressure relief valve that will direct water discharging from the valve to a safe place for disposal. Do not install any reducing couplings or valves in the drain pipe. The drain pipe must be installed so as to allow complete drainage from the valve and drain line. The relief valve should be tested at least once a year by lifting the valve lever.

### **⚠WARNING**

**Explosion hazard.** Any heater installed with restrictive devices in the piping system downstream from the heater, (including check valves, isolation valves, flow nozzles, or therapeutic pool valving), must have a relief valve installed as described above.

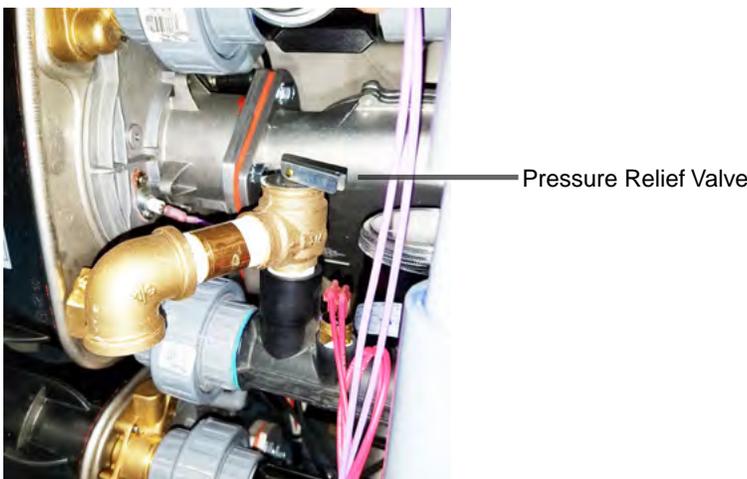


Figure 41.

## **AFTER START-UP**

### **CHECKING WATER FLOW**

#### **⚠WARNING**

**Fire or flooding hazard.** If the heater overheats and the burners fails to shut off, follow the instructions under **To Turn Off Gas to the Appliance, on page 13**, and call a qualified service technician to repair the heater.

After start-up, the outlet water pipe should feel slightly warmer than the inlet pipe. If it feels hot, or if you hear the water in the heater boiling, there may not be enough water flow to the appliance. Make sure that the filter is not plugged. If water temperature remains high but the unit continues to operate, turn off the appliance and call your service technician.

### **SPRING AND AUTUMN OPERATION**

If the pool is only used occasionally, lower the pool thermostat to 68° F (20° C) and leave the heater on. This will keep the pool and the surrounding ground warm enough so that the heater should restore the pool to a comfortable temperature within about one day.

### **WINTER OPERATION AND WINTERIZATION**

**Notice:** Pentair recommends to use a blower to remove all of the water out of the heater in areas subject to freezing temperatures while the heater is not being used.

#### **⚠WARNING**

**Explosion hazard.** Purging the system with compressed air can cause components to explode, with risk of severe injury or death to anyone nearby. Use only a low pressure (below 5 PSI or 35 kPa), high volume blower when air purging the heater,

#### **⚠CAUTION**

- If the heater has been drained for freezing condition, **DO NOT TURN ON** the heater until the system is circulating water.
- Water trapped in the heat exchanger can result in freeze damage to the exchanger or headers. Freeze damage is specifically not covered by the warranty.
- When starting the heater for the swimming season with a water temperature below 50° F (10° C), the heater may be used to heat the water; however, make sure that the heater operates continuously until the water temperature reaches the heater's minimum setting of 68° F (20° C). During cold weather, if there is no danger of freezing, operate the filter pump continuously even if the heater is not operating. If air temperatures are expected to drop below freezing (32° F/0° C), shut down the heater and winterize it.

For outdoor heaters in freezing climates, shut the heater down and drain it for winter as follows:

1. Turn off the electrical supply to the heater and pump ay the main circuit breakers.
2. Close main gas control valve and manual gas valve (located outside the heater). **See Figure 16 on page 21.**
3. Open the main DRAIN COCK located on the bottom of the manifold adapter and drain the heater exchanges, internal CPVC plumbing, and manifold adapter completely.
4. If the heater is **below pool water level**, be sure to close the isolation valves to prevent from draining the pool. Isolation valves are not required and should not be used on heaters installed above pool water level, except when needed for winterization valves.
5. Remove the two WATER PRESSURE SWITCHES located in the plumbing inlet assembly. **See Figure 3, page 14.** Plug the water pressure switches ports to prevent insects and dirt from getting into the plumbing inlet assembly  
*Continue with Step 6 on next page.*

6. Drain the plastic inlet/outlet manifold through the outlet pipe. If the pipe does not drain naturally to the pool, install a drain cock in the outlet pipe to drain the manifold.
7. Use a blower to remove all remaining water in the heater.
8. Cover air inlet grate with a plastic bag to prevent bugs, leaves, etc., from getting into the heater.

***NOTICE: Water trapped in the heater can cause freeze damage. Allowing the heater to freeze voids the warranty.***

## Removal of Condensate Cartridge and Neutralizer Hose-Loop in Freezing Temperatures

If the ETi 400 heater is installed outdoors and **must operate** in below freezing temperatures (32° F/0° C or below), to prevent freezing of the condensate line, the condensate neutralizer cartridge and the condensate neutralizer hose-loop located inside the heater must be removed.

First remove the condensate cartridge and store it, then unwrap the hose-loop below the exhaust to prevent any condensation water from being trapped inside the hose and freezing. Run the condensate hose to the outside of the heater sloping downward at all times.

**Note:** *The condensate neutralizer cartridge should be reinstalled on the heater in the Springtime when outdoor temperatures are above freezing point.*

## RETURN THE HEATER TO SERVICE

### To return the heater to service after winterizing:

1. Connect the INLET and OUTLET unions to the system plumbing, see page 16. Check that they are connected correctly and there are no water leaks.
2. Reinstall the two WATER PRESSURE SWITCHES in the CPVC plumbing inlet assembly. **See Figure 16 on page 21.**
3. Place the DRAIN PLUG back into the port at the manifold assembly.
4. Before starting the heater, circulate water through the heater for several minutes until all air noises stop. See also **BEFORE START-UP** (page 12) and **CARE AND MAINTENANCE** (page 54). **See additional notes on page 12.**

## MAINTAINING POOL TEMPERATURE

To maintain pool temperature, make sure that the heater switch and valving are reset to pool settings after using the spa.

### ENERGY SAVING TIPS

1. Keep the pool or spa covered when not in use. This will reduce heating costs, reduce water evaporation, conserve chemicals and reduce load on the filtering system.
2. Reduce pool thermostat to 78° F (25° C) or lower; reduce spa temperature to 100° F (38° C). This is accepted as being the most healthy temperature for swimming by the American Red Cross.
3. Use a time clock to start the filter pump at 6 a.m. or later. The swimming pool loses less heat after daybreak.
4. For pools used only on weekends, lower the thermostat setting by 10° F to 15° F (5° C to 8° C) during the week to reduce heat loss. A properly sized heater will restore normal temperature within one day.
5. Turn the heater off when the pool will not be used for an extended period.
6. Follow a regular program of preventive maintenance for the heater each new swimming season. Check operation of the heater and its controls.

## **CHEMICAL BALANCE**

### ***POOL AND SPA WATER***

Your pool heater was designed specifically for your spa or pool and will give you many years of trouble-free service, provided you keep your water chemistry in proper condition.

Water chemistry should follow good swimming pool water chemistry practices. When using a chlorinator, install it down stream from the heater and at a lower level than the heater outlet. Install a corrosion resistant positive seal “Check Valve”, (P/N R172288), between the heater and the chlorinator to prevent concentrated chemicals from back-siphoning into the heater. Back-siphoning is most likely to occur when the pump stops, creating a pressure-suction differential. Do NOT sanitize the pool by putting chlorine tablets or sticks into the skimmer(s). When the pump is off, this will cause a high concentration of chlorine to enter the heater, which could cause corrosion damage to the heat exchanger.

Three major items that can cause problems with your pool heater are: improper pH, disinfectant residual, and total alkalinity. These items, if not kept properly balanced, can shorten the life of the heater and cause permanent damage.

<b> CAUTION</b>
--

<b>Heat exchanger damage resulting from chemical imbalance is not covered by the warranty.</b>
--

### **WHAT A DISINFECTANT DOES**

Two pool guests you do not want are algae and bacteria. To get rid of them and make pool water sanitary for swimming - as well as to improve the water’s taste, odor and clarity - some sort of disinfectant must be used.

Chlorine and bromine are universally approved by health authorities and are accepted disinfecting agents for bacteria control.

### **WHAT IS A DISINFECTANT RESIDUAL?**

When you add chlorine or bromine to the pool water, a portion of the disinfectant will be consumed in the process of destroying bacteria, algae and other oxidizable materials. The disinfectant remaining is called chlorine residual or bromine residual. You can determine the disinfectant residual of your pool water with a reliable test kit, available from your local pool supply store.

You must maintain a disinfectant residual level adequate enough to assure a continuous kill of bacteria or virus introduced into pool water by swimmers, through the air, from dust, rain or other sources.

## CHEMICAL BALANCE (continued)

It is wise to test pool water regularly. Never allow chlorine residual to drop below 0.6 ppm (parts per million). The minimum level for effective chlorine or bromine residual is 1.4 ppm.

**pH** - The term pH refers to the acid/alkaline balance of water expressed on a numerical scale from 0 to 14. A test kit for measuring pH balance of your pool water is available from your local pool supply store; see Table 7 below.

Muriatic Acid has a pH of about 0. Pure water is 7 (neutral). Weak Lye solution have a pH of 13-14.

**RULE:** 7.4 to 7.6 is a desirable pH range. It is essential to maintain correct pH, see Table 7 below.

### If pH becomes too high (over alkaline), it has these effects:

1. Greatly lowers the ability of chlorine to destroy bacteria and algae.
2. Water becomes cloudy.
3. There is more danger of scale formation on the plaster or in the heat exchanger tubing.
4. Filter elements may become blocked.

### If pH is too low (over acid) the following conditions may occur:

1. Excessive eye burn or skin irritation.
2. Etching of the plaster.
3. Corrosion of metal fixtures in the filtration and recirculation system, which may create brown, blue, green, or sometimes almost black stains on the plaster.
4. If you have a sand and gravel filter, the alum used as a filter aid may dissolve and pass through the filter.

**CAUTION:** Do not test for pH when the chlorine residual is 3.0 ppm or higher, or bromine residual is 6.0 ppm or higher. See your local pool supply store for help in properly balancing your water chemistry.

**RULE:** Chemicals that are acid lower pH. Chemicals that are alkaline raise pH.

### ALKALINITY High or Low:

Total alkalinity is a measurement of the total amount of alkaline chemicals in the water, and control pH to a great degree. It is not the same as pH which refers merely to the relative alkalinity/acidity balance. Your pool water's total alkalinity should be 100 - 140 ppm to permit easier pH control. A total alkalinity test is simple to perform with a reliable test kit. You will need to test about once a week and make proper adjustments until alkalinity is in the proper range. Then, test only once every month or so to be sure it is being maintained. See your local pool dealer for help in properly balancing the water chemistry.

## WATER CHEMISTRY PARAMETERS

Disinfectant levels	Minimum	Ideal	Maximum
Free Chlorine, ppm	1.0	2.0-3.0	4.0**
Salt, ppm	3000	3400	4500
Combined Chlorine, ppm	None	None	0.2
Bromine, ppm	2.0	4-6	10.0
Other Sanitizers	Levels not established. Consult local health department before use.		
<b>Chemical Values</b>			
pH	7.2	7.4-7.6	7.8**
Total Alkalinity (Buffering), ppm	60	80-100	180 as CaCO <sub>3</sub>
Salt ppm	2000	3200	5000**
Total Dissolved Solids (includes salt)	3000 ppm	5700 (6000 max)	1,500 ppm > TDS at startup*
Calcium Hardness, ppm, as CaCO <sub>3</sub>	150	200-400	500-1,000
Cyanuric Acid	Less than 30 ppm		
<b>Biological Values</b>			
Algae	None	None	None
Bacteria	None	None	Refer to Local Code

Table 7.

\*Start-up TDS includes source water TDS and any other inorganic salt added at start-up.

**NOTE (\*\*):** Failure to adhere to the listed water chemistry parameters may result in premature failure of the heat exchanger and will void the warranty.

**ETI® 400 HEATER REPLACEMENT PARTS LIST**

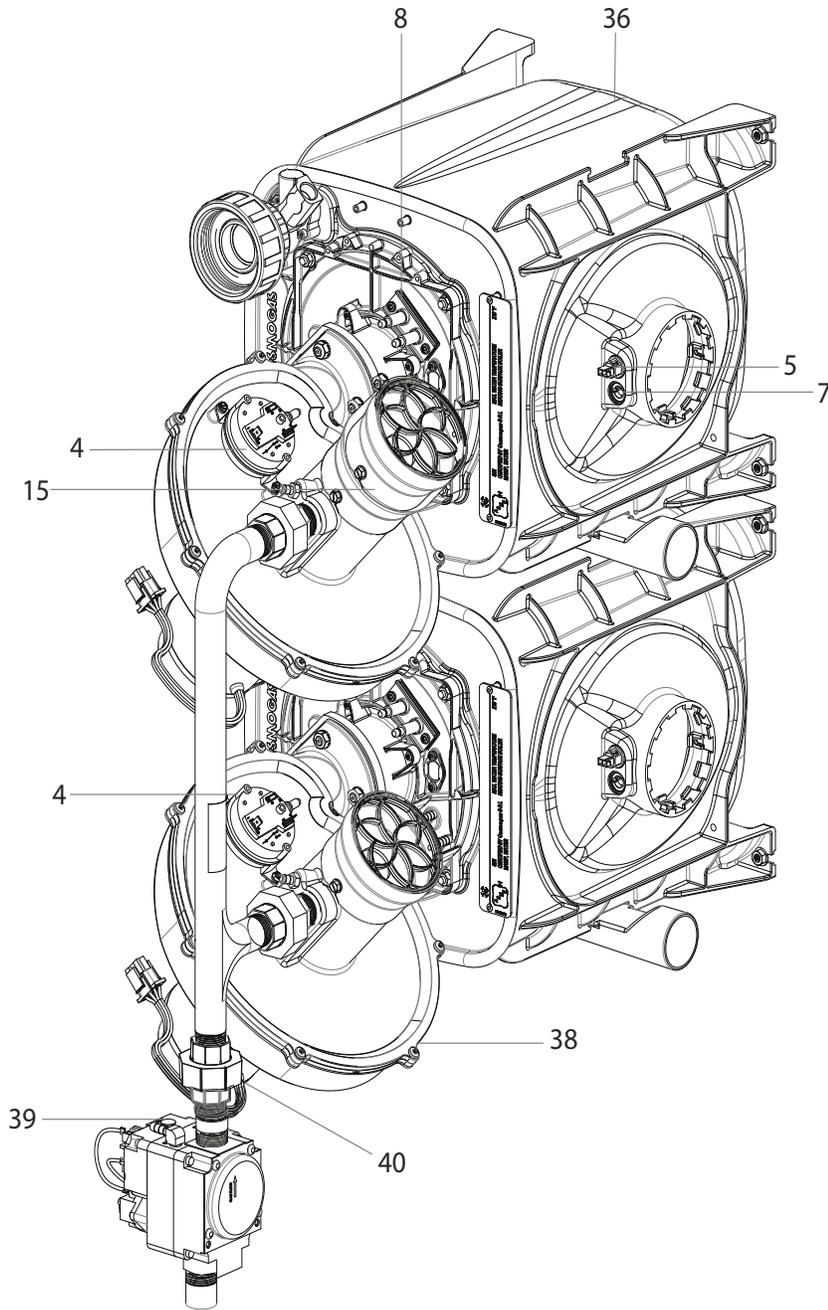
Item	Description	Quantity	Part Number
1	Fan Control Board	1	475978
2	Membrane pad	1	475984
3	Automatic Gas Shut-Off Switch (AGS) 150°F	1	475985
4	Air pressure switch	1	475987
5	Thermal fuse	1	475998
6	Wire harness (not shown)	1	475996
7	Stack flue sensor	2	475601
8	Spark electrodes	1	476081Z
9	Spark Electrodes cables (not shown)	1	475982
10	Condensate assembly/float switch	1	475980
11	HX and Chimney gaskets and Insulation	1	475615
12	Heat exchanger screws	1	475606
13	Plug 120/240 V	1	475979
14	Tridicator Gauge	1	475603
15	Air orifice	1	475604
16	Heater gasket kit	1	475973
17	Air intake Kit (not shown)	1	475971
18	Gas side panel	1	475608
19	Water manifold panel	1	475609
20	Control board panel	1	475610
21	Latch assy	1	475611
22	Condensate neutralizer cartridge kit	1	475612
23	Inlet plumbing assembly	1	475613
24	Outlet plumbing assembly	1	475614
25	Exhaust assembly	1	475617
26	Terminal board	1	42001-0056S
27	Fireman's Switch Fuse (1.25 amps)	1	32850-0099
28	Thermistor, water sensor (not shown)	1	42001-0053S
29	Water pressure switch	1	42001-0060S
30	Dual voltage transformer	1	42001-0107S
31	Pressure relief valve	1	475618
32	Control cover	1	475619
33	Vent cap exhaust	1	475620
34	Water bypass assy	1	475621
35	Vent socket	1	475622
36	TitanTough Heat Exchanger	1	475623
37	Burner	1	475624
38	Blower	1	476000
39	Gas valve	1	476001
40	3/4" Union	1	38404-4097S
41	High Limit Switch	1	42001-0063S
42	Drain plug	1	U178-920P
43	Manifold	1	476002
44	Manifold-Enclosure Fasteners	1	476003
45	Hold down bracket kit (not shown)	1	476004
47	Propane gas orifice kit (not shown)	1	476040
48	Heater control board	1	475975
49	Ignition control module	1	475976
50	Flame sensor	1	462023
51	Burner Assembly	1	476059
52	Natural gas to propane (LPG) conversion Kit	1	476072
53	Inlet Brass Fitting for Heat Exchanger	1	461103
54	Outlet Brass Fitting for Heat Exchanger	1	461104





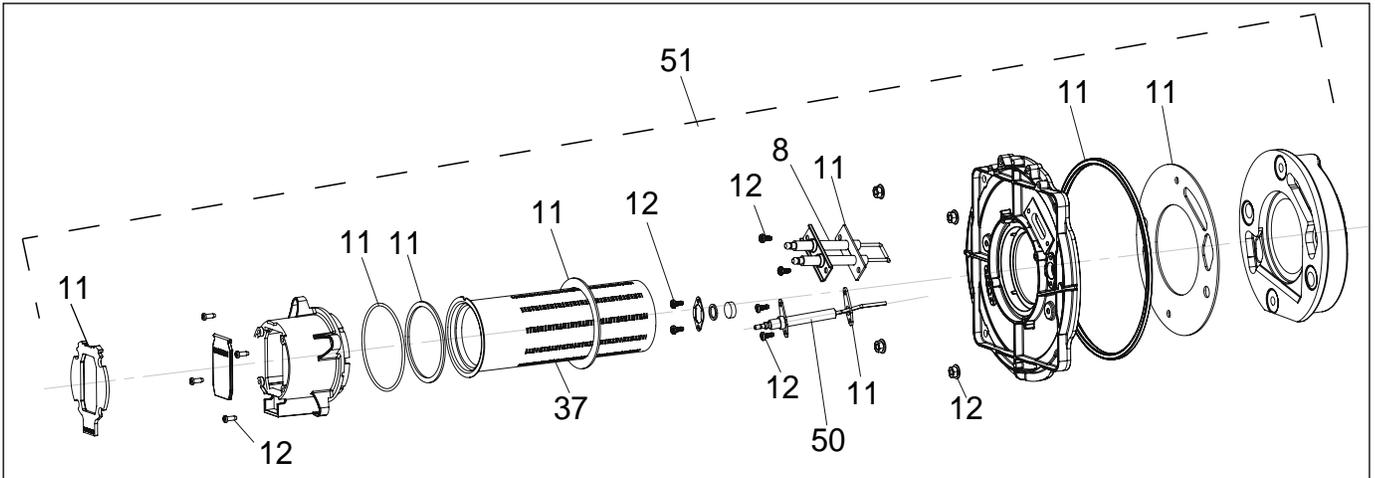
**ETi® 400 HEATER HEAT EXCHANGER AND BLOWER ASSEMBLIES REPLACEMENT PARTS**

Note: Item 11, 12, 17, 37 not shown.

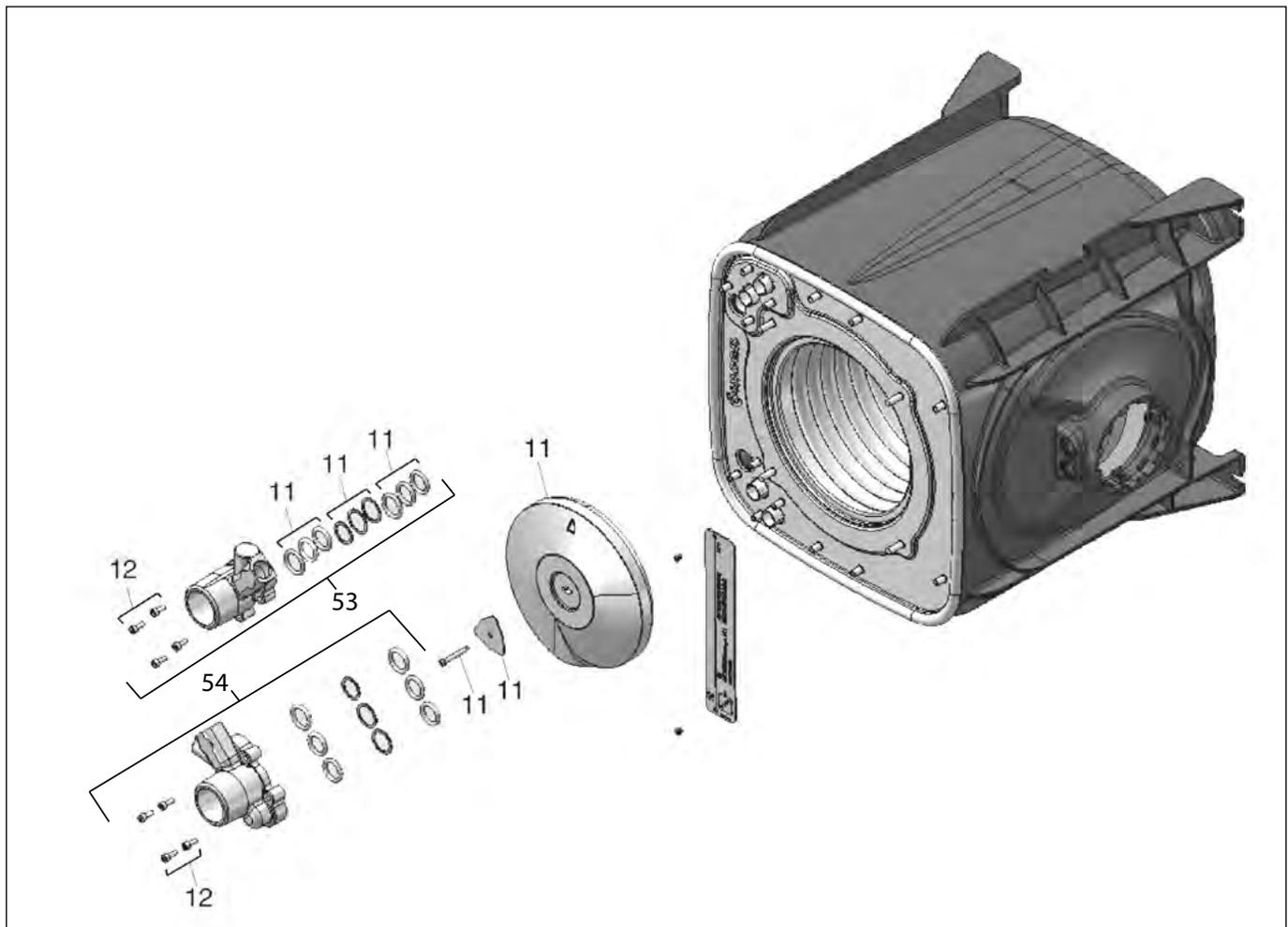


Heat Exchangers and Blower Assemblies

**ETi® 400 HEATER HEAT EXCHANGER ASSEMBLY REPLACEMENT PARTS (CONTINUED)**



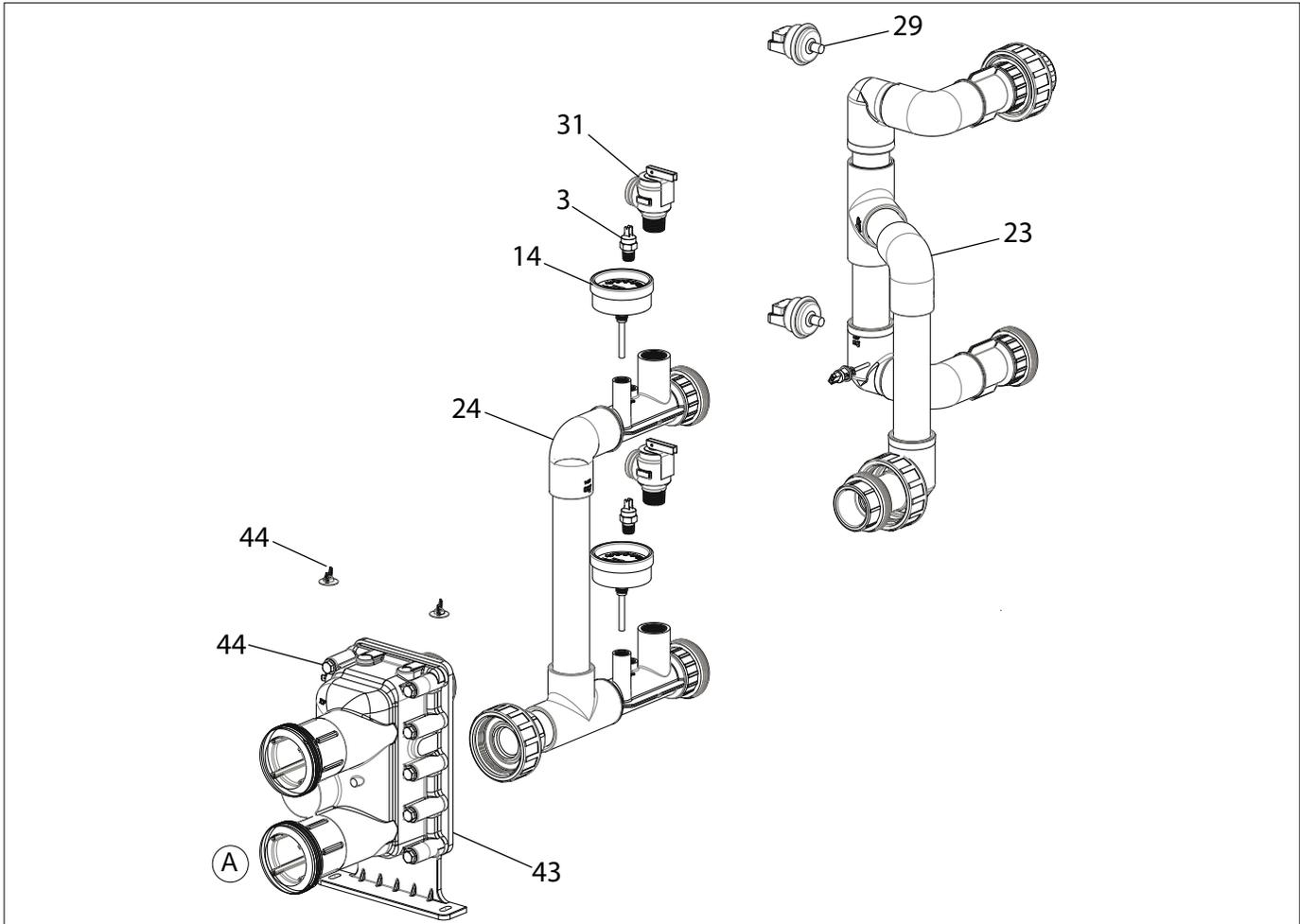
Heat Exchanger Assembly



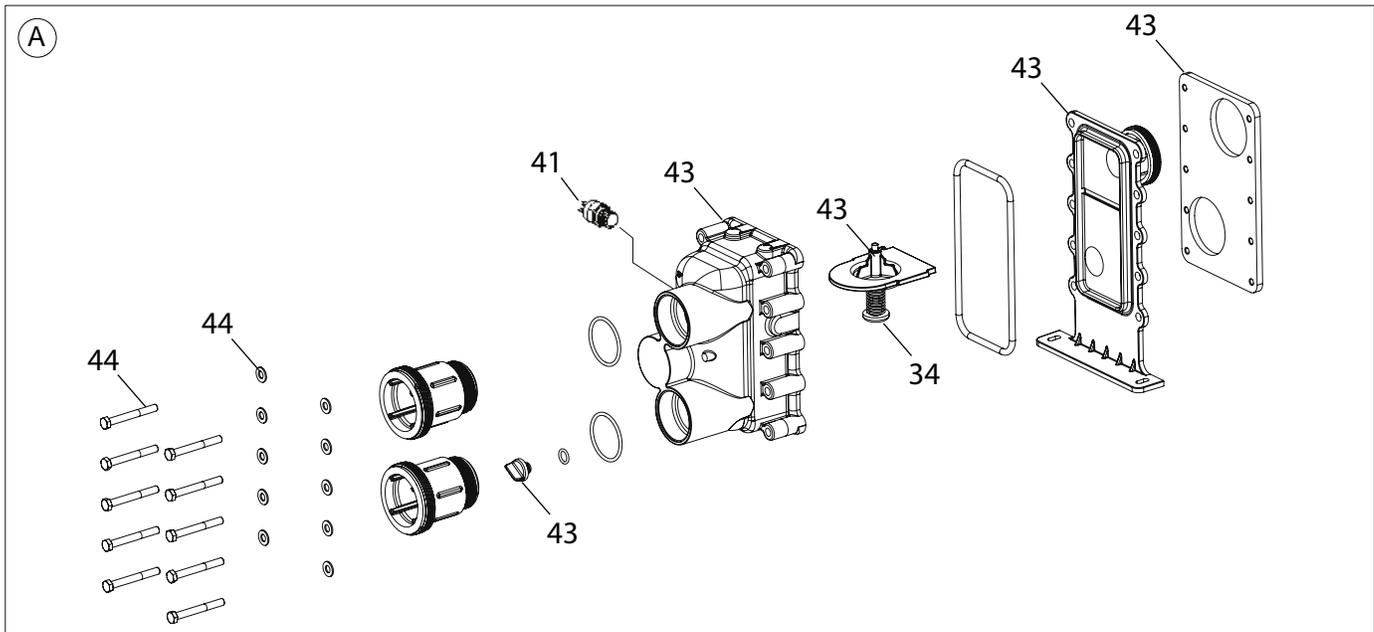
Heat Exchanger Assembly

**ETI® 400 HEATER MANIFOLD ASSEMBLY - INLET AND OUTLET PLUMBING ASSEMBLY**

**REPLACEMENT PARTS**

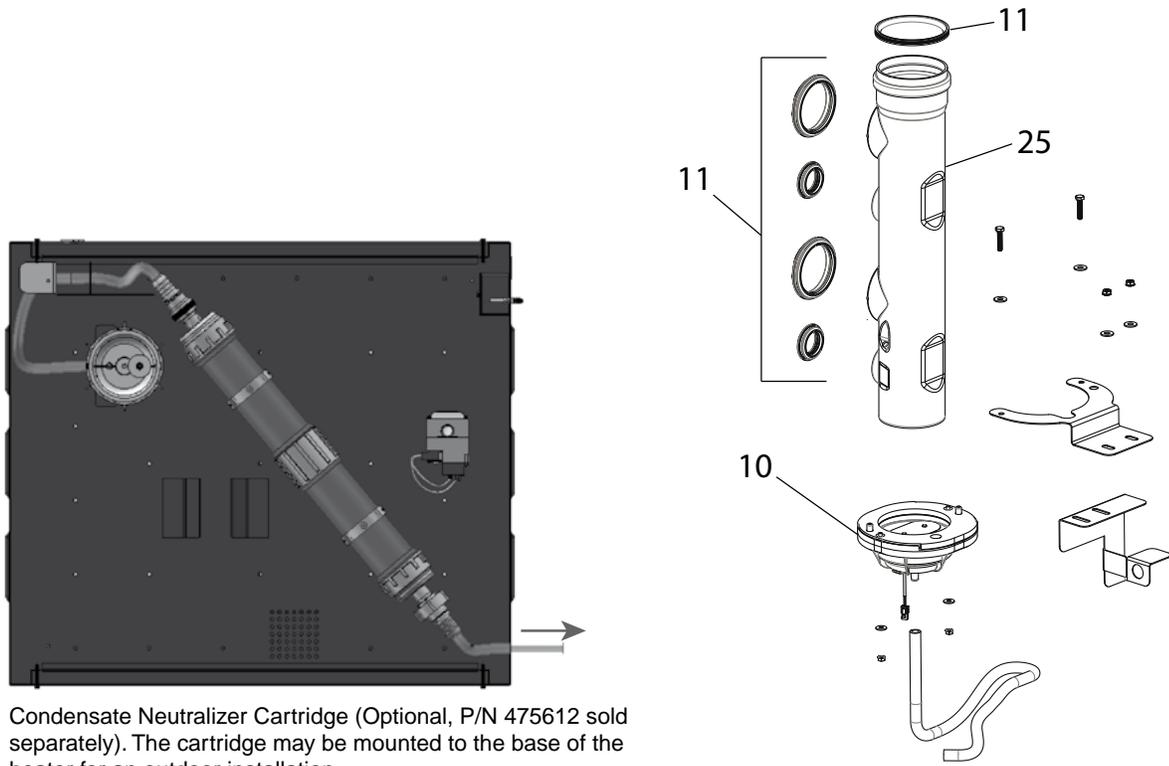


Manifold Assembly - Inlet and Outlet Plumbing Assembly

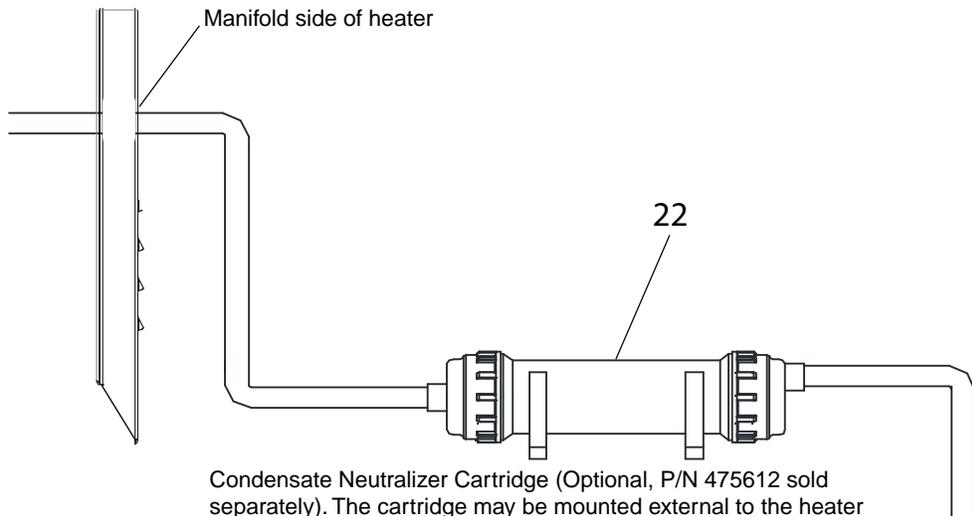


Manifold Assembly

**ETI® 400 HEATER CONDENSATE AND EXHAUST ASSEMBLY REPLACEMENT PARTS**



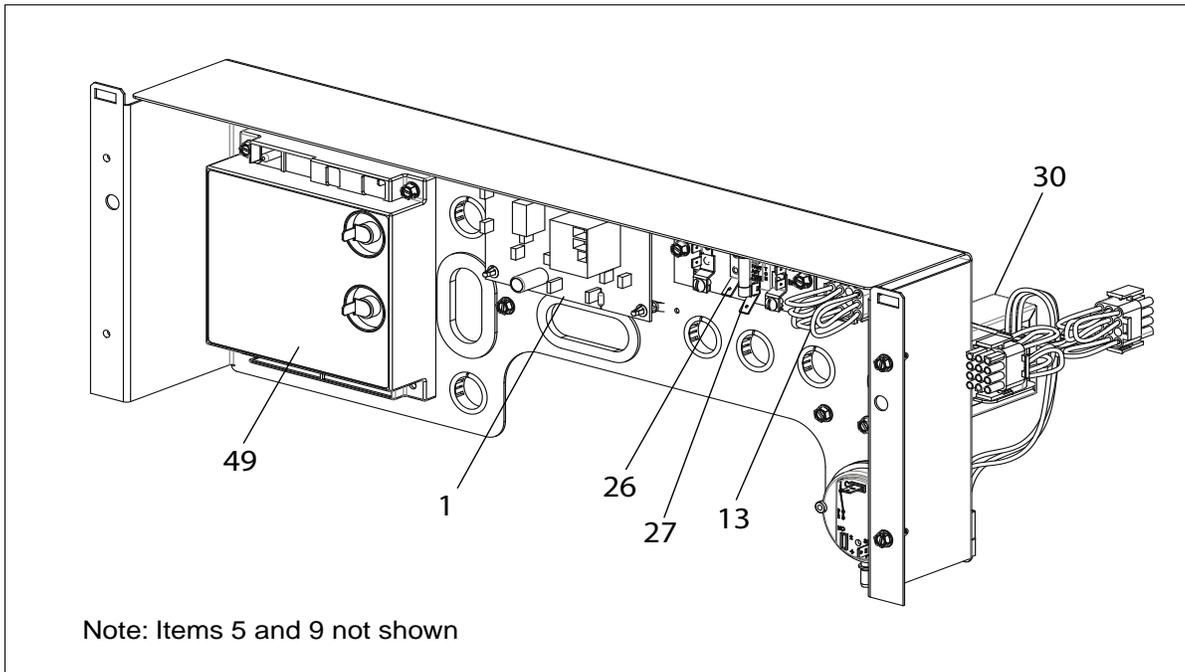
Condensate Neutralizer Cartridge (Optional, P/N 475612 sold separately). The cartridge may be mounted to the base of the heater for an outdoor installation.



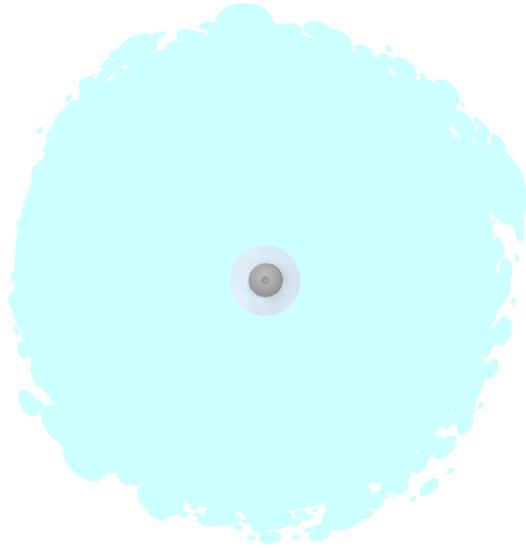
Condensate Neutralizer Cartridge (Optional, P/N 475612 sold separately). The cartridge may be mounted external to the heater for an indoor installation.

Condensate Neutralizer Cartridge Assembly and Exhaust Assembly.

**ETI® 400 HEATER OPERATOR CONTROL PANEL ASSEMBLY REPLACEMENT PARTS**



Fan Control Board and Terminal Board



# FUN-BRELLA

## PLAY ZONES

0 - 4

5 - 8

9 +

## HIGHLIGHTS

The Fun-Brella features a unique laminar water effect that fascinates curious minds. Waterplayers love to run fingers through, or huddle under the Fun-Brella's shield of water.

### WATER DISPLAY

laminar effect



gentle water effect



collaboration



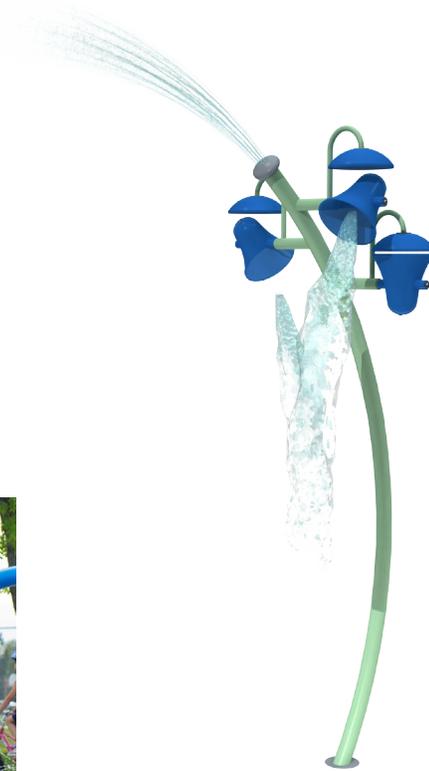
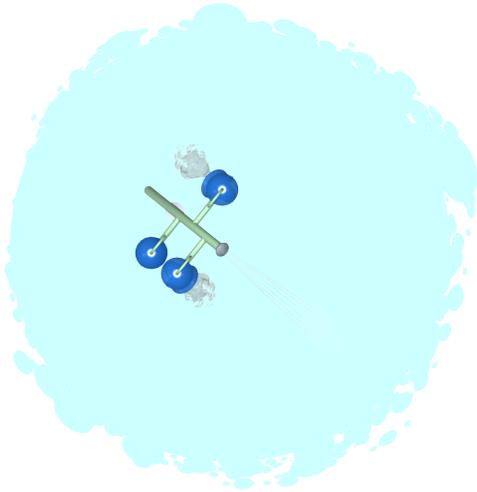
discovery play

### PRODUCT COLLECTION

Kaleidoscope, Play Pals

### COLOURS

See Waterplay Colour Collections



## SNEAKY SOAKER 3

### PLAY ZONES

0-4

5-8

9+

### HIGHLIGHTS

Keep waterplayers on their toes with the Sneaky Soaker 3. Its bell-shaped tipping buckets spill and dump water at random intervals to create bursts of excitement on the play pad.

#### WATER DISPLAY

spray and splash effect



high action



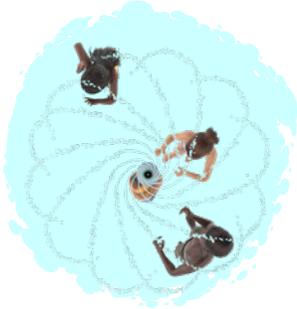
big splash

### PRODUCT COLLECTION

Play Pals

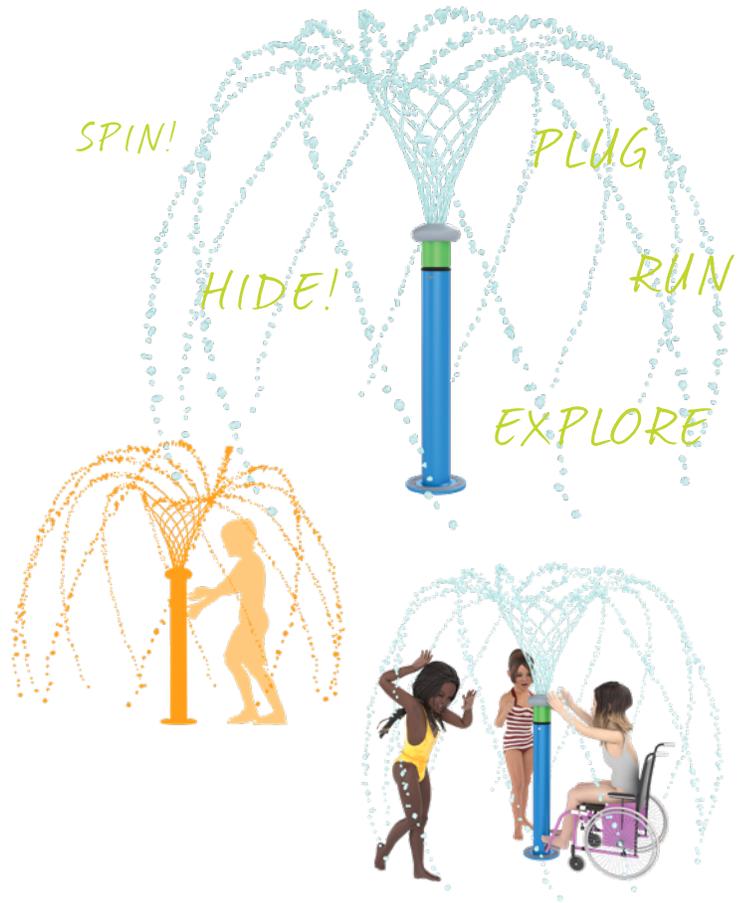
### COLOURS

See Waterplay Colour Collections



5% DISCOUNT

When Water Weavers are purchased in groups of 3 or more.



## WATER WEAVER 2

### PLAY ZONES

0-4

5-8

9+

### HIGHLIGHTS

Spin the hub to create a water fortress that comes alive through weaving water. Excited waterplayers crouch down to hide under the stunning water streams, spinning the hub faster or slower to experiment with the water and invent new games.

#### WATER DISPLAY

weaving spray effect



social play



interactive



360° rotation

#### PRODUCT COLLECTION

Play Pals

#### COLOURS

See Waterplay Colour Collections





**Haws**<sup>®</sup>  
AXION<sup>®</sup>

model 8300-8309  
MSR Emergency Shower and Eye/Face Wash

## FEATURES & BENEFITS

### CONSTRUCTION

1-1/4" IPS Schedule 40 hot-dipped galvanized steel pipe and fittings along with powder-coated cast-iron 9" (22.9 cm) diameter floor flange and 11" (27.9 cm) stainless steel receptor provide an additional corrosion resistance in a long lasting product.

### QUALITY CONTROL

Eye/face wash and valve assembly are pre-built and fully water/pressure tested to ensure no leaks and proper function which ultimately reduces installation time.

### VALVES

Eyewash and shower ball valves are designed to make the flushing of contaminants occur with the simple pull of a lever or push of a stainless steel flag. Both valves come equipped with stainless steel ball and stem to provide greater protection against corrosion and breakage.

### STRAINERS/FILTERS

Chrome-plated brass in-line 50 x 50 mesh water strainer prevents debris from reaching the eyewash so the unit stays functioning at its best. Strainer is easily serviceable.

### SHOWERHEAD

AXION<sup>®</sup> MSR ABS plastic drench showerhead uses a hydrodynamic design to give equal distribution of water throughout the entire footprint of flow.

### EYE/FACE WASH

AXION<sup>®</sup> MSR eye/face wash head uses an inverted directional laminar flow to sweep contaminants away from the vulnerable nasal cavity.

## OPTIONS

- ❑ Scald Protect Bleed Valve: Model SP157A, stainless steel scald protection bleed valve. Automatic thermal actuator bleed valve opens when internal water temperature reaches 98° F (36.7° C) and closes at 95° F (35° C).
- ❑ Thermostatic Mixing Valve: Model 9201E AXION<sup>®</sup> Emergency Tempering Valve thermostatically mixes hot and cold water to provide a safe fluid supply for emergency showers and eyewash equipment, with a flow rate of 31 gpm (117.3 L).
- ❑ Emergency Alarm System: Model 9001, 1-1/4" 120 VAC emergency alarm and light system. Buzzer and flashing light are activated by an 1-1/4" double pole, double throw flow switch.
- ❑ Dust Cover: Model 9102 is a stainless steel cover that protects the eyewash heads as well as the bowl. (Picture shows cover mounted to an eyewash.)

For more information, visit [www.hawsc.com](http://www.hawsc.com) or call (888) 640-4297.



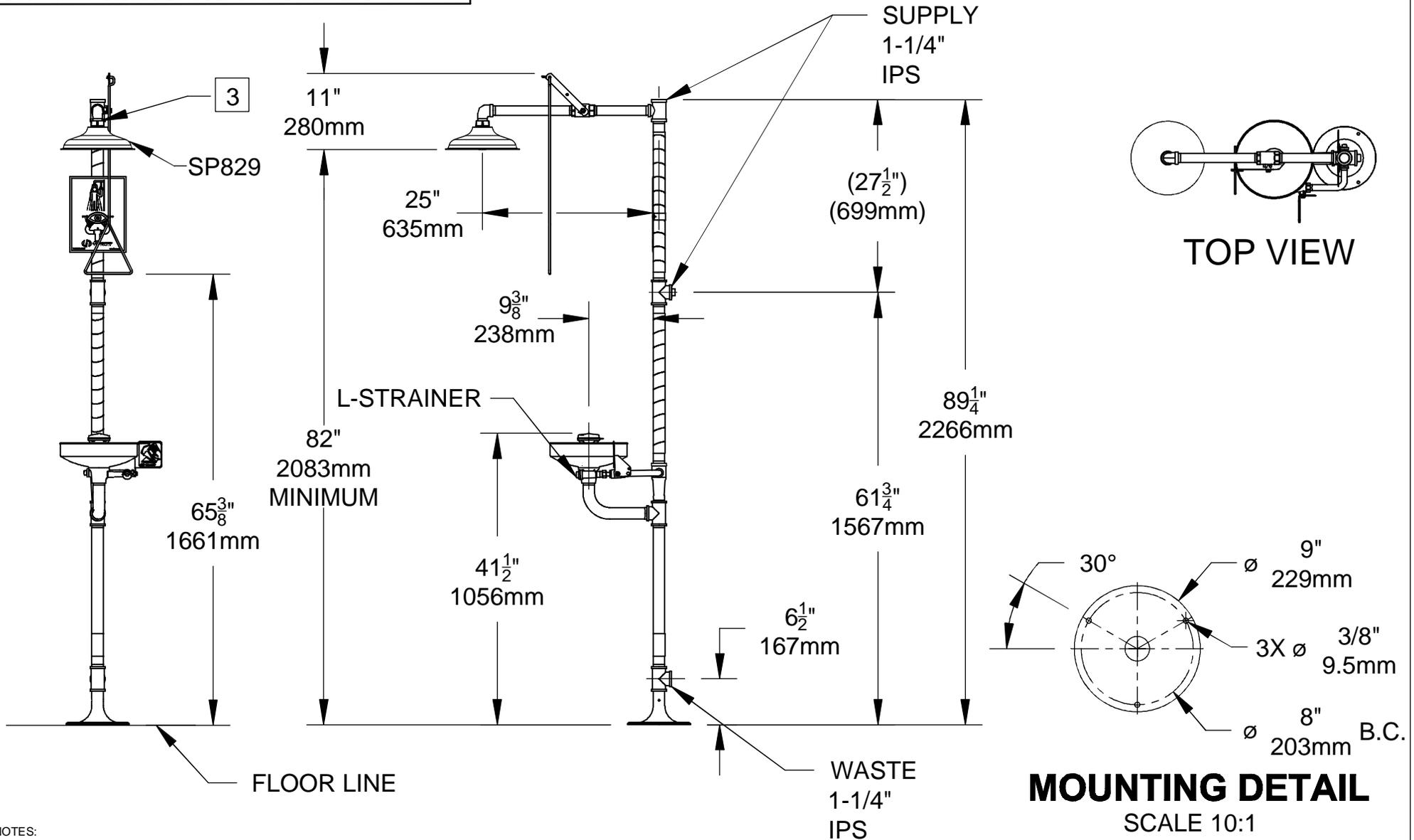
## SPECIFICATIONS

Model 8300-8309 combination shower and eye/face wash shall include a stainless steel 11" (27.9 cm) round bowl, an AXION<sup>®</sup> MSR eye/face wash head shall feature inverted directional laminar flow which achieves Zero Vertical Velocity<sup>™</sup> supplied by an integral 3.7 gpm flow control. Unit shall also include the AXION MSR hydrodynamic designed ABS plastic showerhead with 20 gpm flow control, chrome-plated brass stay-open ball valve equipped with stainless steel ball and stem, and chrome-plated brass in-line 50 x 50 mesh water strainer. Unit shall also include Schedule 40 hot-dipped galvanized steel pipe and fittings, powder-coated cast-iron 9" (22.9 cm) diameter floor flange, self-adhesive high visibility safety green and bright yellow stripes, universal sign, and 1-1/4" NPT supply.

## APPLICATIONS

Where the eyes or body of any person may be exposed to injurious or corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use. Emergency eyewash facilities and deluge showers shall be in unobstructed and accessible locations that require no more than 10 seconds for the injured person to reach. Model 8300-8309 is certified by CSA to meet the ANSI Z358.1 Standard for Emergency Eyewash and Shower Equipment.





NOTES:

1. DIMENSIONS MAY VARY BY ± 1/2 INCH [13mm].
2. TO COMPLY WITH ANSI Z358.1-2009 FOR EMERGENCY EYEWASH OR EYE/FACE WASH AND SHOWER EQUIPMENT:
  - UNIT SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND ACCEPTABLE PLUMBING PRACTICES.
  - EYEWASH OR EYE/FACE WASH SHALL BE POSITIONED WITH NOZZLES NOT LESS THEN 83.8 CM (33 IN.) AND NO GREATER THAN 114.3 CM (45 IN.) FROM SURFACE ON WHICH USER STANDS AND 15.3 CM (6 IN.) MINIMUM FROM WALL OR NEAREST OBSTRUCTION.
  - SHOWER SHALL BE POSITIONED SO THAT SHOWER HEAD IS NOT LESS THAN 208.3 CM (82 IN.) NOR MORE THAN 243.8 CM (96 IN.) FROM SURFACE ON WHICH USER STANDS.
  - SHOWER SPRAY PATTERN SHALL HAVE A MINIMUM DIAMETER OF 50.8 CM (20 IN.) AT 152.4 CM (60 IN.) ABOVE SURFACE ON WHICH USER STANDS, AND CENTER OF SPRAY PATTERN SHALL BE LOCATED AT LEAST 40.6 CM (16 IN.) FROM ANY OBSTRUCTION.

**3.** DO NOT USE REGULAR PIPE SEALANT. IF NECESSARY USE DOW CORNING 832 SEALANT PLACING 5 SMALL BEADS ON THE MALE THREADS, JUST ABOVE THE FIRST THREAD.

		1455 KLEPPE LANE SPARKS, NEVADA 89431 (775) 359-4712 FAX (775) 359-7424 E-MAIL: HAWS@HAWSCO.COM WEBSITE: WWW.HAWSCO.COM	
		ECN NO. REVISED PER BY: MODEL(S) ECN: 4938 VWC DRAWN: SLS DATE: 04/25/08 CHKD.: APPROVED: FV DATE: 01/08/15	8300-8309/8300CRP-8309CRP
SCALE: 1:1   DRAWING TYPE: INSTALLATION   SIZE: A   SHEET 1 OF 1			



# INTELLICHEM<sup>®</sup> COMMERCIAL WATER CHEMISTRY CONTROLLER



## ULTIMATE POOL CHEMICAL MANAGEMENT AND CONVENIENCE

Step up to the new Commercial IntelliChem pool chemical management system. The IntelliChem controller automatically monitors your pH and chemical levels and delivers just the right amount of chemicals to keep your pool clearer, safer and ready to enjoy...anytime.

With IntelliChem continuously checking and automatically dispensing the required chemicals, you avoid the harsh chemical swings that can lead to burning eyes, itchy skin and bleached out bathing suits...or worse, costly and time consuming maintenance to correct your water chemistry problems.

With the included ScreenLogic2<sup>®</sup> Interface, local or remote chemical control management is taken to a new level.

## STANDARD FEATURES

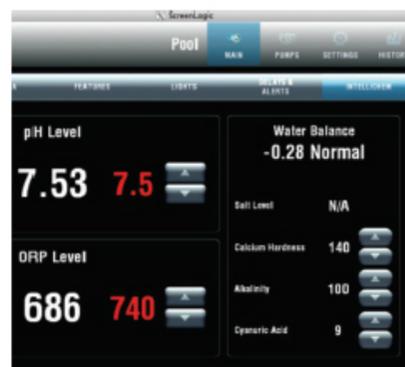
- Programmable chemical feed cycle and on and off times for precise water balance.
- Flow sensor ensures chemicals won't feed without system flow, guarding against false readings and equipment damage.
- Dual sanitizer support. When sudden heavy bather load occurs secondary chlorine source feeder kicks in to get pool up to chlorine set point quickly.
- Built-in Langelier Saturation Index calculator lets you know when your water chemistry is perfectly in balance...and when it's not.
- The use of ScreenLogic2 on PC offers the ability to keep track of pH and ORP levels and make adjustments locally or remotely.
- Compatible with IntelliChlor<sup>®</sup> Salt Chlorine Generators, liquid feed pumps and CO<sub>2</sub> systems.
- Password-protected access prevents tampering or accidental program change.
- Assures safer water conditions by preventing excess chemical addition within a 24-hour period.

## BENEFITS

- Dual sanitizer support, with sudden heavy bather load secondary chlorine source feeder kicks in to get pool up to chlorine set point quickly.
- The use of ScreenLogic2® Interface on PC offers the ability to keep track of pH and ORP levels and make set point adjustments. Connecting remotely to keep tabs on the pool.
- Eliminates the time and guesswork that lead to imbalances as bather loads change and airborne contaminants invade your pool.
- Eliminates eye and skin irritation and the odor caused by out-of-balance water conditions.
- Helps protect your pool equipment from corrosion caused when pH swings in and out of balance.
- Minimizes chemical costs by adding chemicals with precision, and only when needed, to eliminate waste. No more manual handling of chlorine and acid.
- Makes sanitizer more effective by eliminating fluctuations in pH level.
- Auto Setup/Configuration wizard makes start-up quick and easy.



Plug & Play installation.  
Powerful chemical automation.



Easy to install, powerful chemical automation with ScreenLogic integration.

## SPECIFICATIONS

Commercial IntelliChem® Commercial Water Chemistry Controller has the controller, flow cell, ScreenLogic wireless transceiver, and Stenner commercial pump mounted on a 2' x 2' backboard. Supports dual sanitization (SCG primary + liquid secondary) and can be monitored and controlled by ScreenLogic's PC interface.

Model Number	Feed Pumps	UPC Number
522577	1	788379506469
522578	2	788379506476



1620 HAWKINS AVE, SANFORD, NC 27330 800.831.7133 WWW.PENTAIRCOMMERCIAL.COM

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Catalog #: \_\_\_\_\_ Project: \_\_\_\_\_

Prepared By: \_\_\_\_\_ Date: \_\_\_\_\_ Type: \_\_\_\_\_

# Mirada Medium (MRM)

## Outdoor LED Area Light



### OVERVIEW

Lumen Package	7,000 - 48,000
Wattage Range	48 - 401
Efficacy Range (LPW)	117 - 160
Weight lbs(kg)	30 (13.6)

### QUICK LINKS

[Ordering Guide](#)[Performance](#)[Photometrics](#)[Dimensions](#)

## FEATURES & SPECIFICATIONS

### Construction

- Rugged die-cast aluminum housing contains factory prewired driver and optical unit. Cast aluminum wiring access door located underneath.
- Designed to mount to square or round poles.
- Fixtures are finished with LSI's DuraGrip® polyester powder coat finishing process. The DuraGrip finish withstands extreme weather changes without cracking or peeling. Other standard LSI finishes available. Consult factory.
- Shipping weight: 37 lbs in carton.

### Optical System

- State-of-the-Art one piece silicone optic sheet delivers industry leading optical control with an integrated gasket to provide IP66 rated sealed optical chamber in 1 component.
- Proprietary silicone refractor optics provide exceptional coverage and uniformity in IES Types 2, 3, 5W, FT, FTA and AM.
- Silicone optical material does not yellow or crack with age and provides a typical light transmittance of 93%.
- Zero uplight.
- Available in 5000K, 4000K, and 3000K color temperatures per ANSI C78.377. Also Available in Phosphor Converted Amber with Peak intensity at 610nm.
- Minimum CRI of 70.
- Integral louver (IL) and house-side shield (IH) options available for improved backlight control without sacrificing street side performance. See page 3 for more details.

### Electrical

- High-performance programmable driver features over-voltage, under-voltage, short-circuit and over temperature protection. Custom lumen and wattage packages available.
- 0-10V dimming (10% - 100%) standard.
- Standard Universal Voltage (120-277 Vac) Input 50/60 Hz or optional High Voltage (347-480 Vac).
- L80 Calculated Life: >100k Hours (See Lumen Maintenance on Page 5)
- Total harmonic distortion: <20%
- Operating temperature: -40°C to +50°C (-40°F to +122°F). 42L and 48L lumen packages rated to +40°C.
- Power factor: >.90
- Input power stays constant over life.
- Field replaceable 10kV surge protection device meets a minimum Category C Low operation (per ANSI/IEEE C62.41.2).
- High-efficacy LEDs mounted to metal-core circuit board to maximize heat dissipation
- Components are fully encased in potting material for moisture resistance. Driver complies with FCC standards. Driver and key electronic components can easily be accessed.

### Controls

- Optional integral passive infrared Bluetooth™ motion and photocell sensor (see page 9 for more details). Fixtures operate independently and can be commissioned via iOS or Android configuration app
- LSI's AirLink™ wireless control system options reduce energy and maintenance costs while optimizing light quality 24/7. (see page 9 for more details).

### Installation

- Designed to mount to square or round poles.
- A single fastener secures the hinged door, underneath the housing and provides quick & easy access to the electrical compartment.
- Included terminal block accepts up to 12 ga. wire.
- Utilizes LSI's traditional 3" drill pattern B3 for easy fastening of LSI products. (See drawing on page 9)

### Warranty

- LSI LED Fixtures carry a 5-year warranty.

### Listings

- Listed to UL 1598 and UL 8750.
- Meets Buy American Act requirements.
- IDA compliant; with 3000K color temperature selection.
- Title 24 Compliant; see local ordinance for qualification information.
- Suitable for wet Locations.
- IP66 rated Luminaire per IEC 60598.
- 3G rated for ANSI C136.31 high vibration applications are qualified.
- DesignLights Consortium® (DLC) qualified product. Not all versions of this product may be DLC qualified. Please check the DLC Qualified Products List at [www.designlights.org/QPL](http://www.designlights.org/QPL) to confirm which versions are qualified.
- Patented Silicone Optics (US Patent NO. 10,816,165 B2)

*Specifications and dimensions subject to change without notice.*





# Mirada Medium Outdoor LED Area Light

## ORDERING GUIDE

[Back to Quick Links](#)TYPICAL ORDER EXAMPLE: **MRM LED 36L SIL FTA UNV DIM 50 70CRI ALSCS04 BRZ IL**

Luminaire Prefix	Light Source	Lumen Package	Light Output	Distribution	Orientation <sup>2</sup>	Voltage	Driver
MRM - Mirada	LED	7L - 7,000 lms 9L - 9,000 lms 12L - 12,000 lms 18L - 18,000 lms 24L - 24,000 lms 30L - 30,000 lms 36L - 36,000 lms 42L - 42,000 lms 48L - 48,000 lms Custom Lumen Packages <sup>1</sup>	SIL - Silicone	2 - Type 2 3 - Type 3 5W - Type 5 Wide FT - Forward Throw FTA - Forward Throw Automotive AM - Automotive Merchandise	(blank) - standard L - Optics rotated left 90° R - Optics rotated right 90°	UNV - Universal Voltage (120-277V) HV - High Voltage (347-480V)	DIM - 0-10V Dimming (0-10%)
Color Temp		Color Rendering		Finish		Options	
50 - 5,000 CCT 40 - 4,000 CCT 30 - 3,000 CCT AMB - Phosphor Converted Amber <sup>12</sup>		70CRI - 70 CRI		BLK - Black BRZ - Dark Bronze GMG - Gun Metal Gray GPT - Graphite MSV - Metallic Silver PLP - Platinum Plus SVG - Satin Verde Green WHT - White		(Blank) - None IH - Integral Houseside Shield <sup>2</sup> IL - Integral Louver (Sharp Spill Light Cutoff) <sup>2</sup>	

### Controls (Choose One)

(Blank) - None	<b>Stand-Alone Controls</b> EXT - 0-10v Dimming leads extended to housing exterior CR7P - 7 Pin Control Receptacle ANSI C136.41 <sup>6</sup> IMSBT1 - Integral Bluetooth™ Motion and Photocell Sensor max 8-24' mounting height <sup>4,5</sup> IMSBT2 - Integral Bluetooth Motion and Photocell Sensor max 25-40' mounting height <sup>4,5</sup>	<b>Lutron Limelight Controls</b> LLC - LimeLight Integral Wireless Radio Control by Lutron <sup>4</sup> LLCS1 - Limelight Integral Wireless Radio Control and PIR Motion/Daylight Sensor by Lutron 8-15' mt height <sup>4</sup> LLCS2 - Limelight Integral Wireless Radio Control and PIR Motion/Daylight Sensor by Lutron 16-30' mt height <sup>4</sup> LLCS3 - Limelight Integral Wireless Radio Control and PIR Motion/Daylight Sensor by Lutron 31-40' mt height <sup>4</sup>
<b>Wireless Controls System</b> ALSC - AirLink Synapse Control System ALSCH - AirLink Synapse Control System Host / Satellite <sup>3</sup> ALSCHS02 - AirLink Synapse Control System with 12-20' Motion Sensor ALSCHS02 - AirLink Synapse Control System Host / Satellite with 12-20' Motion Sensor <sup>3</sup> ALSCHS04 - AirLink Synapse Control System with 20-40' Motion Sensor ALSCHS04 - AirLink Synapse Control System Host / Satellite with 20-40' Motion Sensor <sup>3</sup> ALBGS1 - AirLink Blue Wireless Motion & Photo Sensor Controller (8-24' mounting height) <sup>4</sup> ALBGS2 - AirLink Blue Wireless Motion & Photo Sensor Controller (25-40' mounting height) <sup>4</sup>	<b>Button Type Photocells</b> PCI120 - 120V PCI208-277 - 208 -277V PCI347 - 347V	

## Accessory Ordering Information<sup>7</sup>

Controls Accessories	
Description	Order Number <sup>10</sup>
PC120 Photocell for use with CR7P option (120V) <sup>8</sup>	122514
PC208-277 Photocell for use with CR7P option (208V, 240V, 277V) <sup>8</sup>	122515
Twist Lock Photocell (347V) for use with CR7P <sup>8</sup>	122516
Twist Lock Photocell (480V) for use with CR7P <sup>8</sup>	1225180
AirLink 5 Pin Twist Lock Controller <sup>8</sup>	661409
AirLink 7 Pin Twist Lock Controller <sup>8</sup>	661410
PMOS24-24V Pole-Mounted Occupancy Sensor (24V)	663284CLR
Shorting Cap for use with CR7P	149328

Fusing Accessories <sup>11</sup>	
Description	Order Number
Single Fusing (120V)	FK120
Single Fusing (120V)	FK277
Double Fusing (208V, 240V)	DFK240
Double Fusing (480V)	DFK480
Double Fusing (347V)	DFK347

Mounting Accessories <sup>9</sup>	
Description	Order Number <sup>10</sup>
Universal Mounting Bracket	684616CLR
Adjustable Slip Fitter (2" - 2 3/8" Tenon)	688138CLR
Horizontal Slip Fitter (2" - 2 3/8" Tenon)	652761CLR
Quick Mount Pole Bracket (Square Pole)	687073CLR
Quick Mount Pole Bracket (4-5" Round Pole)	689903CLR
15 Tilt Quick Mount Pole Bracket (Square Pole)	688003CLR
15 Tilt Quick Mount Pole Bracket (4-5" Round Pole)	689905CLR
Wall Mount Bracket	382132CLR
Wood Pole Bracket (6" Minimum Pole Diameter)	751219CLR

Miscellaneous Accessories	
Description	Order Number
Integral Louver/Shield	690981
Integral House Side Shield	743415
10' Linear Bird Spike Kit (3' Recommended per Luminaire)	736795

### FOOTNOTES:

- Custom lumen and wattage packages available, consult factory. Values are within industry standard tolerances but not DLC listed.
- Not available with 5W distribution
- Consult Factory for availability.
- Not available in HV.
- IMSBT is field configurable via the LSI app that can be downloaded from your smartphone's native app store
- Control device or shorting cap must be ordered separately. See Accessory Ordering Information.

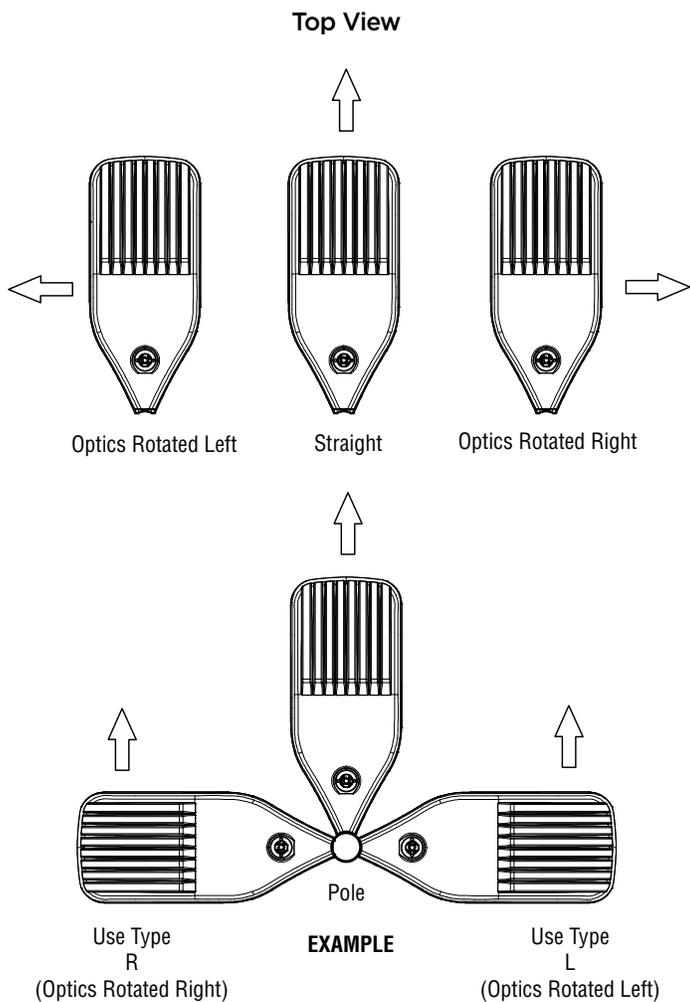
- Accessories are shipped separately and field installed.
- Factory installed CR7P option required. See Options.
- "CLR" denotes finish. See Finish options.
- Only available with ALSC/ALSCH control options.
- Fusing must be located in hand hole of pole.
- Only available in 9L and 12L Lumen Packages. Consult factory for lead time and availability.





# Mirada Medium Outdoor LED Area Light

## OPTICS ROTATION



## ACCESSORIES/OPTIONS

### Integral Louver (IL) and House-Side Shield (IH)

Accessory louver and shield available for improved backlight control without sacrificing street side performance. LSI's Integral Louver (L) and Integral House-Side Shield (IH) options deliver backlight control that significantly reduces spill light behind the poles for applications with pole locations close to adjacent properties. The design maximizes forward reflected light while reducing glare, maintaining the optical distribution selected, and most importantly eliminating light trespass.

### Luminaire Shown with IMSBT & IL/IH Options



### 7 Pin Photoelectric Control

7-pin ANSI C136.41-2013 control receptacle option available for twist lock photocontrols or wireless control modules. Control accessories sold separately. Dimming leads from the receptacle will be connected to the driver dimming leads (Consult factory for alternate wiring).

### Luminaire Shown with PCR 7P





# Mirada Medium Outdoor LED Area Light

[Back to Quick Links](#)

## PERFORMANCE

Delivered Lumens*												
Lumen Package	Distribution	CRI	3000K CCT			4000K CCT			5000K CCT			Wattage
			Delivered Lumens	Efficacy	BUG Rating	Delivered Lumens	Efficacy	BUG Rating	Delivered Lumens	Efficacy	BUG Rating	
7L	2	70	7560	157	B2-U0-G2	7560	157	B2-U0-G2	7560	157	B2-U0-G2	48
	3		7616	159	B1-U0-G2	7616	159	B1-U0-G2	7616	159	B1-U0-G2	
	5W		7292	152	B3-U0-G1	7292	152	B3-U0-G1	7292	152	B3-U0-G1	
	FT		7562	158	B2-U0-G2	7562	158	B2-U0-G2	7562	158	B2-U0-G2	
	FTA		7595	158	B2-U0-G2	7595	158	B2-U0-G2	7595	158	B2-U0-G2	
	AM		7687	160	B1-U0-G1	7687	160	B1-U0-G1	7687	160	B1-U0-G1	
9L	2	70	9853	159	B2-U0-G2	9853	159	B2-U0-G2	9853	159	B2-U0-G2	62
	3		9926	160	B2-U0-G2	9926	160	B2-U0-G2	9926	160	B2-U0-G2	
	5W		9504	153	B3-U0-G2	9504	153	B3-U0-G2	9504	153	B3-U0-G2	
	FT		9856	159	B2-U0-G3	9856	159	B2-U0-G3	9856	159	B2-U0-G3	
	FTA		9900	160	B2-U0-G2	9900	160	B2-U0-G2	9900	160	B2-U0-G2	
	AM		10019	162	B2-U0-G1	10019	162	B2-U0-G1	10019	162	B2-U0-G1	
12L	2	70	13135	155	B3-U0-G2	13135	155	B3-U0-G2	13135	155	B3-U0-G2	85
	3		13232	156	B2-U0-G2	13232	156	B2-U0-G2	13232	156	B2-U0-G2	
	5W		12669	149	B4-U0-G2	12669	149	B4-U0-G2	12669	149	B4-U0-G2	
	FT		13138	155	B2-U0-G3	13138	155	B2-U0-G3	13138	155	B2-U0-G3	
	FTA		13196	155	B2-U0-G2	13196	155	B2-U0-G2	13196	155	B2-U0-G2	
	AM		13355	157	B2-U0-G2	13355	157	B2-U0-G2	13355	157	B2-U0-G2	
18L	2	70	19318	143	B3-U0-G3	19318	143	B3-U0-G3	19318	143	B3-U0-G3	135
	3		19461	144	B3-U0-G3	19461	144	B3-U0-G3	19461	144	B3-U0-G3	
	5W		18633	138	B4-U0-G2	18633	138	B4-U0-G2	18633	138	B4-U0-G2	
	FT		19324	143	B3-U0-G3	19324	143	B3-U0-G3	19324	143	B3-U0-G3	
	FTA		19408	144	B3-U0-G3	19408	144	B3-U0-G3	19408	144	B3-U0-G3	
	AM		19641	145	B3-U0-G2	19641	145	B3-U0-G2	19641	145	B3-U0-G2	
24L	2	70	25957	147	B4-U0-G3	25957	147	B4-U0-G3	25957	147	B4-U0-G3	176
	3		26149	149	B3-U0-G4	26149	149	B3-U0-G4	26149	149	B3-U0-G4	
	5W		25037	142	B5-U0-G3	25037	142	B5-U0-G3	25037	142	B5-U0-G3	
	FT		25964	148	B3-U0-G4	25964	148	B3-U0-G4	25964	148	B3-U0-G4	
	FTA		26077	148	B3-U0-G3	26077	148	B3-U0-G3	26077	148	B3-U0-G3	
	AM		26393	150	B3-U0-G2	26393	150	B3-U0-G2	26393	150	B3-U0-G2	
30L	2	70	32417	140	B4-U0-G3	32417	140	B4-U0-G3	32417	140	B4-U0-G3	232
	3		32656	141	B3-U0-G4	32656	141	B3-U0-G4	32656	141	B3-U0-G4	
	5W		31267	135	B5-U0-G3	31267	135	B5-U0-G3	31267	135	B5-U0-G3	
	FT		32424	140	B3-U0-G4	32424	140	B3-U0-G4	32424	140	B3-U0-G4	
	FTA		32566	140	B4-U0-G3	32566	140	B4-U0-G3	32566	140	B4-U0-G3	
	AM		32960	142	B3-U0-G3	32960	142	B3-U0-G3	32960	142	B3-U0-G3	
36L	2	70	38275	133	B4-U0-G4	38275	133	B4-U0-G4	38275	133	B4-U0-G4	288
	3		38557	134	B4-U0-G5	38557	134	B4-U0-G5	38557	134	B4-U0-G5	
	5W		36917	128	B5-U0-G4	36917	128	B5-U0-G4	36917	128	B5-U0-G4	
	FT		38283	133	B4-U0-G5	38283	133	B4-U0-G5	38283	133	B4-U0-G5	
	FTA		38450	134	B4-U0-G4	38450	134	B4-U0-G4	38450	134	B4-U0-G4	
	AM		38916	135	B3-U0-G3	38916	135	B3-U0-G3	38916	135	B3-U0-G3	







# Mirada Medium Outdoor LED Area Light

## PERFORMANCE (CONT.)

Delivered Lumens*												
Lumen Package	Distribution	CRI	3000K CCT			4000K CCT			5000K CCT			Wattage
			Delivered Lumens	Efficacy	BUG Rating	Delivered Lumens	Efficacy	BUG Rating	Delivered Lumens	Efficacy	BUG Rating	
42L	2	70	44118	125	B5-U0-G4	44118	125	B5-U0-G4	44118	125	B5-U0-G4	354
	3		44444	126	B4-U0-G5	44444	126	B4-U0-G5	44444	126	B4-U0-G5	
	5W		42555	120	B5-U0-G4	42555	120	B5-U0-G4	42555	120	B5-U0-G4	
	FT		44130	125	B4-U0-G5	44130	125	B4-U0-G5	44130	125	B4-U0-G5	
	FTA		44322	125	B4-U0-G4	44322	125	B4-U0-G4	44322	125	B4-U0-G4	
	AM		44859	127	B4-U0-G3	44859	127	B4-U0-G3	44859	127	B4-U0-G3	
48L	2	70	48795	122	B5-U0-G4	48795	122	B5-U0-G4	48795	122	B5-U0-G4	401
	3		49156	123	B4-U0-G5	49156	123	B4-U0-G5	49156	123	B4-U0-G5	
	5W		47066	117	B5-U0-G4	47066	117	B5-U0-G4	47066	117	B5-U0-G4	
	FT		48809	122	B4-U0-G5	48809	122	B4-U0-G5	48809	122	B4-U0-G5	
	FTA		49021	122	B5-U0-G4	49021	122	B5-U0-G4	49021	122	B5-U0-G4	
	AM		49615	124	B4-U0-G3	49615	124	B4-U0-G3	49615	124	B4-U0-G3	

ELECTRICAL DATA (AMPS)*						
Lumens	120V	208V	240V	277V	347V	480V
7L	0.40	0.23	0.20	0.17	0.14	0.10
9L	0.52	0.30	0.26	0.22	0.18	0.13
12L	0.71	0.41	0.35	0.31	0.24	0.18
18L	1.13	0.65	0.56	0.49	0.39	0.28
24L	1.47	0.85	0.73	0.64	0.51	0.37
30L	1.93	1.12	0.97	0.84	0.67	0.48
36L	2.40	1.38	1.20	1.04	0.83	0.60
42L	2.95	1.70	1.48	1.28	1.02	0.74
48L	3.4A	1.9A	1.7A	1.5A	1.2A	0.8A

ELECTRICAL DATA - PHOSPHOR CONVERTED AMBER (AMPS)*							
Lumens	Watts	120V	208V	240V	277V	347V	480V
9L	74.3	0.6A	0.4A	0.3A	0.3A	0.2A	0.2A
12L	102.9	0.9A	0.5A	0.4A	0.4A	0.3A	0.2A

\*Electrical data at 25°C (77°F). Actual wattage may differ by +/-10%

RECOMMENDED LUMEN MAINTENANCE <sup>1</sup> (7-18L)					
Ambient	Initial <sup>2</sup>	25h <sup>2</sup>	50hr <sup>2</sup>	75hr <sup>2</sup>	100hr <sup>2</sup>
0-50 C	100%	96%	92%	88%	84%

RECOMMENDED LUMEN MAINTENANCE <sup>1</sup> (24-48L)					
Ambient	Initial <sup>2</sup>	25h <sup>2</sup>	50hr <sup>2</sup>	75hr <sup>2</sup>	100hr <sup>2</sup>
0-40 C	100%	100%	97%	94%	92%

- Lumen maintenance values at 25C are calculated per TM-21 based on LM-80 data and in-situ testing.
- In accordance with IESNA TM-21-11, Projected Values represent interpolated value based on time durations that are within six times the IESNA LM-80-08 total test duration for the device under testing.
- In accordance with IESNA TM-21-11, Calculated Values represent time durations that exceed six times the IESNA LM-80-08 total test duration for the device under testing.

DELIVERED LUMENS*							
Lumen Package	Distribution	Phosphor Converted Amber (Peak 610nm)			Wattage		
		Delivered Lumens	Efficacy	BUG Rating			
9L	2	5848	80	B2-U0-G2	74		
	2 - IL	3644	50	B0-U0-G1			
	3	6018	82	B1-U0-G2			
	3 - IL	4468	61	B0-U0-G2			
	5W	5471	74	B3-U0-G1			
	FT	5801	79	B1-U0-G2			
	FT - IL	3649	50	B0-U0-G1			
	FTA	5924	81	B1-U0-G1			
12L	FTA - IL	4243	58	B1-U0-G1	102		
	2	7530	74	B2-U0-G2			
	2 - IL	4692	46	B0-U0-G1			
	3	7749	76	B1-U0-G2			
	3 - IL	5753	57	B0-U0-G2			
	5W	7045	69	B3-U0-G2			
	FT	7470	73	B2-U0-G2			
	FT - IL	4699	46	B0-U0-G2			
FTA	7628	75	B2-U0-G2	FTA-IL	5464	54	B1-U0-G1

\*LEDs are frequently updated therefore values are nominal.



# Mirada Medium Outdoor LED Area Light

## PHOTOMETRICS

[Back to Quick Links](#)

Luminaire photometry has been conducted by a NVLAP accredited testing laboratory in accordance with IESNA LM-79-08. As specified by IESNA LM-79-08 the entire luminaire is tested as the source resulting in a luminaire efficiency of 100%.

See <https://www.lsicorp.com/product/mirada-medium/> for detailed photometric data.

### MRM-LED-30L-SIL-2-40-70CRI

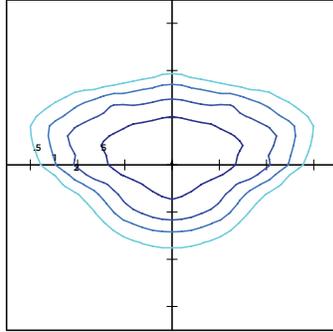
#### LUMINAIRE DATA

Type 2 Distribution	
Description	4000 Kelvin, 70 CRI
Delivered Lumens	32,416
Watts	232
Efficacy	140
IES Type	Type II - Short
BUG Rating	B4-U0-G3

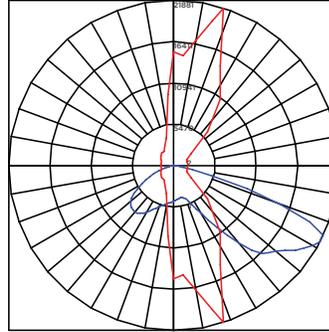
#### Zonal Lumen Summary

Zone	Lumens	%Luminaire
Low (0-30)°	4796	15%
Medium (30-60)°	19811	61%
High (60-80)°	7474	23%
Very High (80-90)°	335	1%
Uplight (90-180)°	0	0%
Total Flux	32416	100%

#### ISO FOOTCANDLE



#### POLAR CURVE



25' Mounting Height/ 25' Grid Spacing

■ 5 FC ■ 2 FC ■ 1 FC ■ 0.5 FC

### MRM-LED-30L-SIL-3-40-70CRI

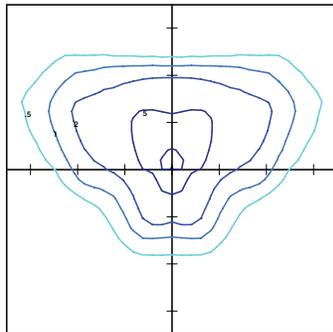
#### LUMINAIRE DATA

Type 3 Distribution	
Description	4000 Kelvin, 70 CRI
Delivered Lumens	32,656
Watts	232
Efficacy	141
IES Type	Type III - Short
BUG Rating	B3-U0-G4

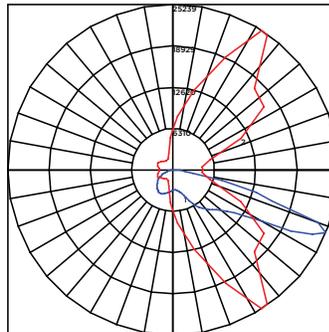
#### Zonal Lumen Summary

Zone	Lumens	%Luminaire
Low (0-30)°	3385	10%
Medium (30-60)°	16250	50%
High (60-80)°	12430	38%
Very High (80-90)°	591	2%
Uplight (90-180)°	0	0%
Total Flux	32656	100%

#### ISO FOOTCANDLE



#### POLAR CURVE



25' Mounting Height/ 25' Grid Spacing

■ 5 FC ■ 2 FC ■ 1 FC ■ 0.5 FC

### MRM-LED-30L-SIL-FT-40-70CRI

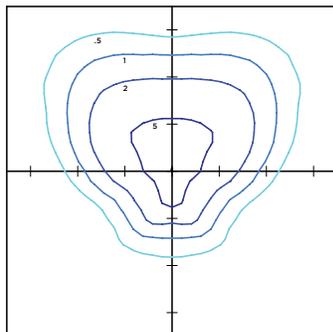
#### LUMINAIRE DATA

Type FT Distribution	
Description	4000 Kelvin, 70 CRI
Delivered Lumens	32,424
Watts	232
Efficacy	140
IES Type	Type IV - Short
BUG Rating	B3-U0-G4

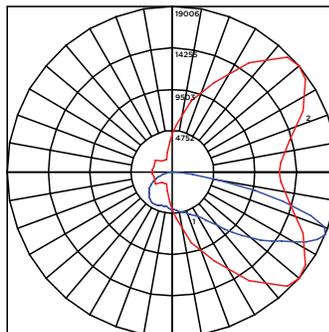
#### Zonal Lumen Summary

Zone	Lumens	%Luminaire
Low (0-30)°	3952	12%
Medium (30-60)°	15505	48%
High (60-80)°	12279	38%
Very High (80-90)°	688	2%
Uplight (90-180)°	0	0%
Total Flux	32424	100%

#### ISO FOOTCANDLE



#### POLAR CURVE



20' Mounting Height/15' Grid Spacing

■ 20 FC ■ 10 FC ■ 5 FC ■ 2 FC





# Mirada Medium Outdoor LED Area Light

## PHOTOMETRICS (CONT)

### MRM-LED-30L-SIL-5W-40-70CRI

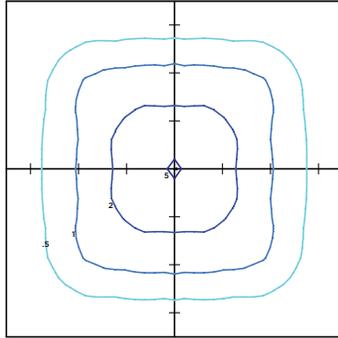
#### LUMINAIRE DATA

Type 5W Distribution	
Description	4000 Kelvin, 70 CRI
Delivered Lumens	31,267
Watts	232
Efficacy	135
IES Type	Type VS - Short
BUG Rating	B5-U0-G3

#### Zonal Lumen Summary

Zone	Lumens	%Luminaire
Low (0-30)°	3138	10%
Medium (30-60)°	13193	42%
High (60-80)°	14641	47%
Very High (80-90)°	296	1%
Uplight (90-180)°	0	0%
Total Flux	31267	100%

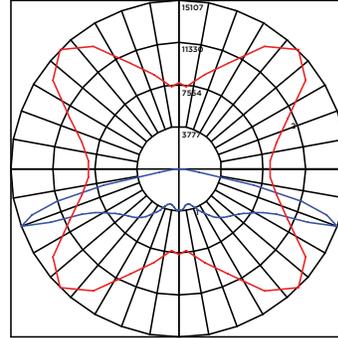
#### ISO FOOTCANDLE



25' Mounting Height/ 25' Grid Spacing

■ 5 FC ■ 2 FC ■ 1 FC ■ 0.5 FC

#### POLAR CURVE



### MRM-LED-30L-SIL-FTA-40-70CRI

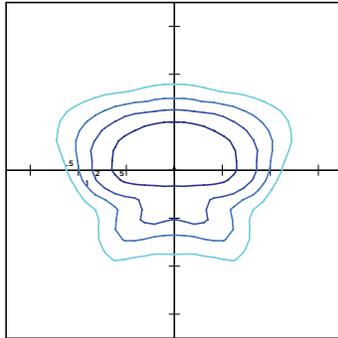
#### LUMINAIRE DATA

Type FTA Distribution	
Description	4000 Kelvin, 70 CRI
Delivered Lumens	32,566
Watts	232
Efficacy	140
IES Type	Type VS - Short
BUG Rating	B4-U0-G3

#### Zonal Lumen Summary

Zone	Lumens	%Luminaire
Low (0-30)°	6986	21%
Medium (30-60)°	19172	59%
High (60-80)°	5875	18%
Very High (80-90)°	534	2%
Uplight (90-180)°	0	0%
Total Flux	32566	100%

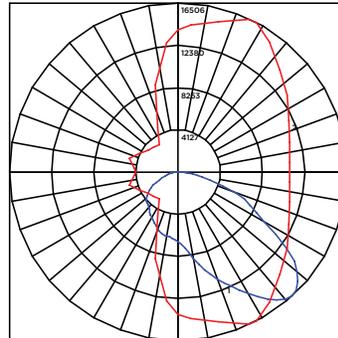
#### ISO FOOTCANDLE



25' Mounting Height/ 25' Grid Spacing

■ 5 FC ■ 2 FC ■ 1 FC ■ 0.5 FC

#### POLAR CURVE



### MRM-LED-30L-SIL-AM-40-70CRI

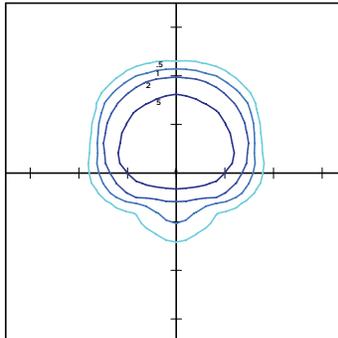
#### LUMINAIRE DATA

Type AM Distribution	
Description	4000 Kelvin, 70 CRI
Delivered Lumens	32,960
Watts	232
Efficacy	142
IES Type	Type III - Very Short
BUG Rating	B3-U0-G3

#### Zonal Lumen Summary

Zone	Lumens	%Luminaire
Low (0-30)°	6363	9%
Medium (30-60)°	22026	43%
High (60-80)°	4192	48%
Very High (80-90)°	379	1%
Uplight (90-180)°	0	0%
Total Flux	32960	100%

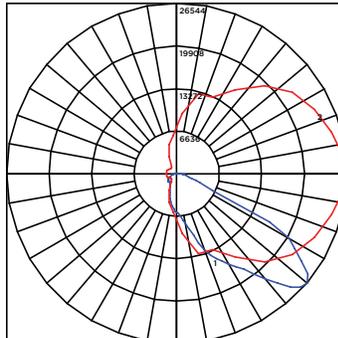
#### ISO FOOTCANDLE



25' Mounting Height/ 25' Grid Spacing

■ 5 FC ■ 2 FC ■ 1 FC ■ 0.5 FC

#### POLAR CURVE

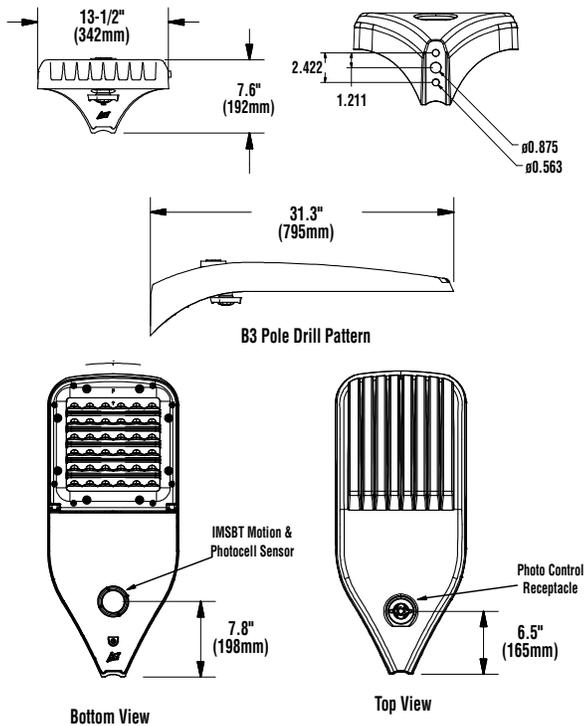




# Mirada Medium Outdoor LED Area Light

[Back to Quick Links](#)

## PRODUCT DIMENSIONS



LUMINAIRE EPA CHART - MRM									
Tilt Degree		0°	30°	45°	Tilt Degree		0°	30°	45°
	Single	0.5	1.5	1.9		T90°	1.0	2.5	2.8
	D180°	1.0	1.5	1.9		TN120°	1.0	3.3	3.9
	D90°	0.8	1.9	2.3		Q90°	1.0	2.5	2.8

## CONTROLS

### AirLink Wireless Lighting Controller

The AirLink integrated controller is a California Title 24 compliant lighting controller that provides real-time light monitoring and control with utility-grade power monitoring. It includes a 24V sensor input and power supply to connect a sensor into the outdoor AirLink wireless lighting system. The wireless integrated controller is compatible with this fixture.

Click the link below to learn more details about AirLink.

<https://www.lsicorp.com/wp-content/uploads/documents/products/airlink-outdoor-specsheet.pdf>

### Integral Bluetooth™ Motion and Photocell Sensor (IMSBT)

Slim low profile sensor provides multi-level control based on motion and/or daylight. Sensor controls 0-10 VDC LED drivers and is rated for cold and wet locations (-30° C to 70° C). Two unique PIR lenses are available and used based on fixture mounting height. All control parameters are adjustable via an iOS or Android App capable of storing and transmitting sensor profiles.

Click the link below to learn more details about IMSBT.

<https://www.lsicorp.com/wp-content/uploads/documents/products/imsbt-specsheet.pdf>

### AirLink Blue

Wireless Bluetooth Mesh Outdoor Lighting Control System that provides energy savings, code compliance and enhanced safety/security for parking lots and parking garages. Three key components; Bluetooth wireless radio/sensor controller, Time Keeper and an iOS App. Capable of grouping multiple fixtures and sensors as well as scheduling time-based events by zone. Radio/Sensor Controller is factory integrated into Area/Site, Wall Mounted, Parking Garage and Canopy luminaires.

Click the link below to learn more details about AirLink Blue.

<https://www.lsicorp.com/product/airlink-blue/>



# Mirada Medium Outdoor LED Area Light

## POLES & BRACKETS

LSI offers a full line of poles and mounting accessories to complete your lighting assembly. Aluminum and steel in both square and round shafts. In addition, LSI offers round tapered, fluted and hinge based poles. Designed and engineered for durability and protected with our oven baked DuraGrip Protection System. Also available with our DuraGrip+ Protection system for unmatched corrosion resistance and an extended warranty. American made in our Ohio facility with industry leading lead times.

Click the link below to learn more details about poles & brackets.

<https://www.lsicorp.com/products/poles-brackets/>



### BKA UMB CLR

The 3G rated UMB allows for seamless integration of LSI luminaires onto existing/ retrofit or new construction poles. The UMB was designed for square or round (tapered or straight) poles with two mounting hole spacings between 3.5" - 5".



### BKS PQM15 CLR

The Pole Quick Mount Bracket allows for preset 15° up tilt of LSI luminaires for greater throw of light and increased vertical illumination as well as fast installation onto poles with LSI's 3" or 5" bolt pattern.



### BKA ASF CLR

The adjustable Slip Fitter is a 3G rated rugged die cast aluminum adapter to mount LSI luminaires onto a 2" iron pipe, 2 3/8 OD tenon. The Adjustable Slip Fitter can be rotated 180° allowing for tilting LSI luminaires up to 45° and 90° when using a vertical tenon.



### BKS PQMH CLR

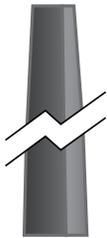
The Pole Quick Mount Bracket allows for lightning fast installation of LSI luminaires onto existing and new construction poles with LSI's B3 or B5 standard pole bolt patterns.



Square Pole  
14'-39'



Round Pole  
10'-30'



Tapered Pole  
20'-39'





Catalog #: \_\_\_\_\_ Project: \_\_\_\_\_

Prepared By: \_\_\_\_\_ Date: \_\_\_\_\_ Type: \_\_\_\_\_

# Mirada Small Area (MRS)

## Outdoor LED Area Light



OVERVIEW	
Lumen Package	6,000 - 24,000
Wattage Range	41 - 196
Efficacy Range (LPW)	112 - 156
Fixture Weight lbs (kg)	20 (9.1)

### QUICK LINKS

[Ordering Guide](#)
[Performance](#)
[Photometrics](#)
[Dimensions](#)

### FEATURES & SPECIFICATIONS

#### Construction

- Rugged die-cast aluminum housing contains factory prewired driver and optical unit. Cast aluminum wiring access door located underneath.
- Fixtures are finished with LSI's DuraGrip® polyester powder coat finishing process. The DuraGrip finish withstands extreme weather changes without cracking or peeling. Other standard LSI finishes available. Consult factory.
- Shipping weight: 27 lbs in carton.

#### Optical System

- State-of-the-Art one piece silicone optic sheet delivers industry leading optical control with an integrated gasket to provide IP66 rated seal.
- Proprietary silicone refractor optics provide exceptional coverage and uniformity in distribution types 2, 3, 5W, and FT.
- Silicone optical material does not yellow or crack with age and provides a typical light transmittance of 93%.
- Zero uplight.
- Available in 5000K, 4000K, and 3000K color temperatures per ANSI C78.377
- Minimum CRI of 70.
- Integral louver (IL) and house-side shield (IH) options available for improved backlight control without sacrificing street side performance. See page 3 for more details.

#### Electrical

- High-performance driver features over-voltage, under-voltage, short-circuit and over temperature protection.
- 0-10V dimming (10% - 100%) standard.

- Standard Universal Voltage (120-277 VAC) Input 50/60 Hz or optional High Voltage (347-480 VAC).
- L70 Calculated Life: >60k Hours
- Total harmonic distortion: <20%
- Operating temperature: -40°C to +50°C (-40°F to +122°F).
- Power factor: >.90
- Input power stays constant over life.
- Field replaceable 10kV surge protection device meets a minimum Category C Low operation (per ANSI/IEEE C62.41.2).
- High-efficacy LEDs mounted to metal-core circuit board to maximize heat dissipation
- Driver is fully encased in potting material for moisture resistance and complies with FCC standards. Driver and key electronic components can easily be accessed.

#### Controls

- Optional integral passive infrared Bluetooth™ motion and photocell sensor. Fixtures operate independently and can be commissioned via iOS or Android configuration app.
- LSI's AirLink™ wireless control system options reduce energy and maintenance costs while optimizing light quality 24/7.

#### Installation

- Designed to mount to square or round poles.
- A single fastener secures the hinged door, underneath the housing and provides quick & easy access to the electrical compartment.
- Included terminal block accepts up to 12 ga. wire.
- Utilizes LSI's traditional B3 drill pattern.

#### Warranty

- LSI luminaires carry a 5-year limited warranty. Refer to <https://www.lsicorp.com/resources/terms-conditions-warranty/> for more information.

#### Listings

- Listed to UL 1598 and UL 8750.
- Meets Buy American Act requirements.
- IDA compliant; with 3000K color temperature selection.
- Title 24 Compliant; see local ordinance for qualification information.
- Suitable for wet locations.
- IP66 rated Luminaire per IEC 60598-1.
- 3G rated for ANSI C136.31 high vibration applications are qualified.
- DesignLights Consortium® Listings in progress.

Specifications and dimensions subject to change without notice.





# Mirada Small Area Light (MRS)

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## ORDERING GUIDE

TYPICAL ORDER EXAMPLE: **MRS LED 18L SIL FT UNV DIM 40 70CRI ALBCS1 BLK IH**

Luminaire Prefix	Light Source	Lumen Package	Lens	Distribution	Orientation <sup>2</sup>	Voltage	Driver
MRS - Mirada Small Area Light	LED	6L - 6,000 lms 9L - 9,000 lms 12L - 12,000 lms 15L - 15,000 lms 18L - 18,000 lms 21L - 21,000 lms 24L - 24,000 lms Custom Lumen Packages <sup>1</sup>	SIL - Silicone	2 - Type 2 3 - Type 3 5W - Type 5 Wide FT - Forward Throw	(blank) - standard L - Optics rotated left 90° R - Optics rotated right 90°	UNV - Universal Voltage (120-277V) HV - High Voltage (347-480V)	DIM - 0-10V Dimming (0-10%)

Color Temp	Color Rendering	Controls (Choose One)	Finish	Options
50 - 5,000 CCT 40 - 4,000 CCT 30 - 3,000 CCT	70CRI - 70 CRI	(Blank) - None  <b>Wireless Controls System</b> ALSC - AirLink Synapse Control System ALSCS2 - AirLink Synapse Control System with 12-20' MH Motion Sensor ALSCS4 - AirLink Synapse Control System with 20-40' MH Motion Sensor ALBCS1 - AirLink Blue Wireless Motion & Photo Sensor Controller (8-24' MH) ALBCS2 - AirLink Blue Wireless Motion & Photo Sensor Controller (25-40' MH)  <b>Stand-Alone Controls</b> EXT - 0-10v Dimming leads extended to housing exterior CR7P - 7 Pin Control Receptacle ANSI C136.41 <sup>3</sup> IMSBT1 - Integral Bluetooth™ Motion and Photocell Sensor (8-24' MH) <sup>4</sup> IMSBT2 - Integral Bluetooth™ Motion and Photocell Sensor (25-40' MH) <sup>4</sup>	BRZ - Bronze BLK - Black GPT - Graphite MSV - Metallic Silver WHT - White PLP - Platinum Plus	(Blank) - None  IH - Integral Houseside Shield <sup>2</sup> IL - Integral Louver (Sharp Spill Light Cutoff) <sup>2</sup>

### Accessory Ordering Information<sup>5</sup>

Controls Accessories		Mounting Accessories	
Description	Order Number	Description	Order Number <sup>6</sup>
Twist Lock Photocell (120V) for use with CR7P	122514	Universal Mounting Bracket	684616CLR
Twist Lock Photocell (208-277) for use with CR7P	122515	Adjustable Slip Fitter (2" - 2 3/8" Tenon)	688138CLR
Twist Lock Photocell (347V) for use with CR7P	122516	Horizontal Slip Fitter (2" - 2 3/8" Tenon)	652761CLR
Twist Lock Photocell (480V) for use with CR7P	1225180	Quick Mount Pole Bracket (Square Pole)	687073CLR
AirLink 5 Pin Twist Lock Controller	661409	Quick Mount Pole Bracket (4-5" Round Pole)	689903CLR
AirLink 5 Pin Twist Lock Controller	661410	15 Tilt Quick Mount Pole Bracket (Square Pole)	688003CLR
Pole-Mounted Occupancy Sensor (24V)	663284CLR <sup>6</sup>	15 Tilt Quick Mount Pole Bracket (4-5" Round Pole)	689905CLR
Shorting Cap for use with CR7P	149328	Wall Mount Bracket	382132CLR
		Integral Louver/Shield	TBD
		Internal Houseside Shield	TBD

### Fusing Accessories<sup>7</sup>

Description	Order Number
Single Fusing (120V)	FK120
Single Fusing (277V)	FK277
Double Fusing (480V)	DFK480
Double Fusing (347V)	DFK347

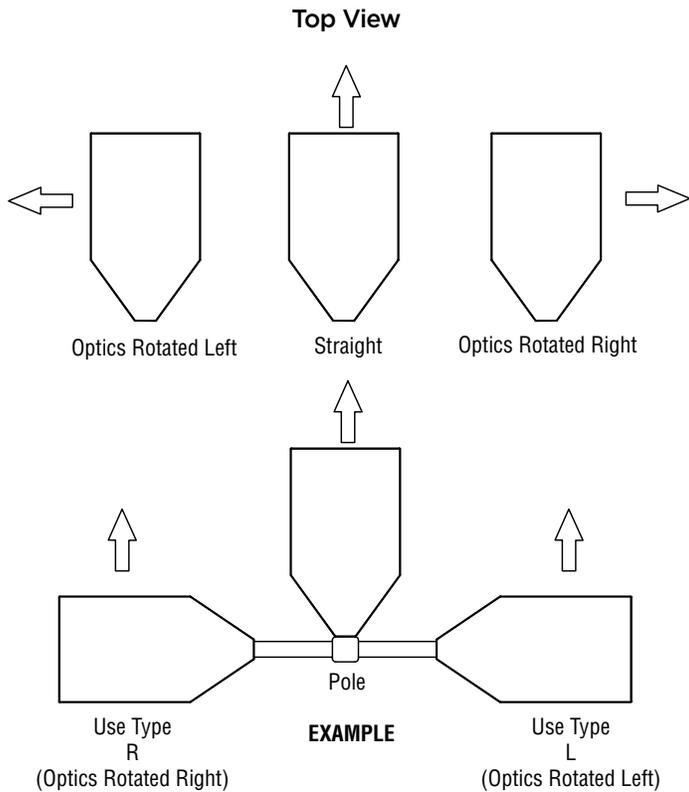
### FOOTNOTES:

1. Custom lumen and wattage packages available, consult factory. Values are within industry standard tolerances but not DLC listed.
2. Not available on "Type 5W" distribution.
3. Control device or shorting cap must be ordered separately. See Accessory Ordering Information.
4. IMSBT is field configurable via the LSI app that can be downloaded from your smartphone's native app store. Consult Factory for 347-480V.
5. Accessories are shipped separately and field installed.
6. "CLR" denotes finish. See Finish options.
7. Fusing must be located in hand hole of pole.



# Mirada Small Area Light (MRS)

## OPTICS ROTATION



## ACCESSORIES/OPTIONS

### Integral Louver (IL) and House-Side Shield (IH)

Accessory louver and shield available for improved backlight control without sacrificing street side performance. LSI's Integral Louver (L) and Integral House-Side Shield (IH) options deliver backlight control that significantly reduces spill light behind the poles for applications with pole locations close to adjacent properties. The design maximizes forward reflected light while reducing glare, maintaining the optical distribution selected, and most importantly eliminating light trespass. Both options rotate with the optical distribution.

**Luminaire Shown with Integral Louver (IL)**



**Luminaire Shown with IMSBT Option**



### 7 Pin Photoelectric Control

7-pin ANSI C136.41-2013 control receptacle option available for twist lock photocontrols or wireless control modules. Control accessories sold separately. Dimming leads from the receptacle will be connected to the driver dimming leads (Consult factory for alternate wiring).

**Luminaire Shown with CR7P**







# Mirada Small Area Light (MRS)

## PERFORMANCE

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Delivered Lumens*												
Lumen Package	Distribution	CRI	3000K CCT			4000K CCT			5000K CCT			Wattage
			Delivered Lumens	Efficacy	BUG Rating	Delivered Lumens	Efficacy	BUG Rating	Delivered Lumens	Efficacy	BUG Rating	
6L	2	70	6045	148	B2-U0-G1	6268	154	B2-U0-G1	6253	153	B2-U0-G1	41
	3		6145	151	B1-U0-G2	6372	156	B1-U0-G2	6357	156	B1-U0-G2	
	5W		5812	142	B3-U0-G1	6,026	148	B3-U0-G1	6012	147	B3-U0-G1	
	FT		5947	146	B1-U0-G1	6166	151	B1-U0-G1	6152	151	B1-U0-G1	
9L	2	70	9091	145	B2-U0-G2	9484	152	B2-U0-G2	9462	151	B2-U0-G2	63
	3		9241	148	B2-U0-G2	9641	154	B2-U0-G2	9619	154	B2-U0-G2	
	5W		8740	140	B3-U0-G2	9,118	146	B3-U0-G2	9097	144	B3-U0-G2	
	FT		8943	143	B2-U0-G2	9330	149	B2-U0-G2	9308	149	B2-U0-G2	
12L	2	70	12132	141	B3-U0-G2	12685	148	B3-U0-G2	12514	146	B3-U0-G2	86
	3		12333	143	B2-U0-G2	12894	150	B2-U0-G2	12721	148	B2-U0-G2	
	5W		11664	136	B4-U0-G2	12195	142	B4-U0-G2	12031	140	B4-U0-G2	
	FT		11935	139	B2-U0-G2	12479	145	B2-U0-G2	12311	143	B2-U0-G2	
15L	2	70	14220	128	B3-U0-G2	15167	137	B3-U0-G2	14488	131	B3-U0-G2	111
	3		14938	135	B2-U0-G2	15933	144	B2-U0-G2	15219	137	B2-U0-G2	
	5W		14304	129	B4-U0-G2	15257	137	B4-U0-G2	14574	131	B4-U0-G2	
	FT		14342	129	B2-U0-G2	15297	138	B2-U0-G2	14612	132	B2-U0-G2	
18L	2	70	16438	122	B3-U0-G3	17532	130	B3-U0-G3	16747	124	B3-U0-G3	135
	3		17267	128	B3-U0-G3	18417	137	B3-U0-G3	17592	131	B3-U0-G3	
	5W		16535	123	B4-U0-G2	17636	133	B5-U0-G3	16846	125	B4-U0-G2	
	FT		16578	123	B3-U0-G3	17682	131	B3-U0-G3	16890	125	B3-U0-G3	
21L	2	70	19488	118	B3-U0-G3	20786	126	B3-U0-G3	19885	120	B3-U0-G3	165
	3		20472	124	B3-U0-G3	21835	132	B3-U0-G3	20857	126	B3-U0-G3	
	5W		19604	119	B5-U0-G3	20,909	126	B5-U0-G3	19973	121	B5-U0-G3	
	FT		19655	119	B3-U0-G4	20964	127	B3-U0-G4	20025	121	B3-U0-G4	
24L	2	70	21976	112	B3-U0-G3	23439	120	B3-U0-G3	22390	114	B3-U0-G3	196
	3		23085	118	B3-U0-G3	24622	126	B3-U0-G3	23519	120	B3-U0-G3	
	5W		22105	113	B5-U0-G3	23578	120	B5-U0-G3	22522	115	B5-U0-G3	
	FT		22164	113	B3-U0-G3	23640	121	B3-U0-G3	22581	115	B3-U0-G3	

\*LEDs are frequently updated therefore values are nominal.

ELECTRICAL DATA (AMPS)*						
Lumens	120V	208V	240V	277V	347V	480V
6L	0.34	0.20	0.17	0.15	0.12	0.09
9L	0.52	0.30	0.26	0.23	0.18	0.13
12L	0.72	0.41	0.36	0.31	0.25	0.18
15L	0.93	0.53	0.46	0.40	0.32	0.23
18L	1.12	0.65	0.56	0.49	0.39	0.28
21L	1.38	0.80	0.69	0.60	0.48	0.34
24L	1.63	0.94	0.82	0.71	0.56	0.41

\*Electrical data at 25°C (77°F). Actual wattage may differ by +/-10%

RECOMMENDED LUMEN MAINTENANCE <sup>1</sup>					
Ambient Temp	Lumen Multiplier				
	0 hrs. <sup>2</sup>	25K hrs. <sup>2</sup>	50K hrs. <sup>2</sup>	75K hrs. <sup>3</sup>	100K hrs. <sup>3</sup>
0 C - 25 C	100%	95%	89%	94%	79%
40 C	100%	94%	87%	80%	74%

**FOOTNOTES:**

- Lumen maintenance values at 25°C are calculated per TM-21 based on LM-80 data and in-situ luminaire testing.
- In accordance with IESNA TM-21-11, Projected Values represent interpolated value based on time durations that are within six times (6X) the IESNA LM-80-08 total test duration (in hours) for the device under testing ((DUT) i.e. the packaged LED chip).
- In accordance with IESNA TM-21-11, Calculated Values represent time durations that exceed six times NA LM-80-08 total test duration (in hours) for the device under testing ((DUT) i.e. the packaged LED chip).



# Mirada Small Area Light (MRS)

## PHOTOMETRICS

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Luminaire photometry has been conducted by a NVLAP accredited testing laboratory in accordance with IESNA LM-79-08. As specified by IESNA LM-79-08 the entire luminaire is tested as the source resulting in a luminaire efficiency of 100%.

See <http://www.lsi-industries.com/products/led-lighting-solutions.aspx> for detailed photometric data.

### MRS-LED-18L-SIL-2-40-70CRI

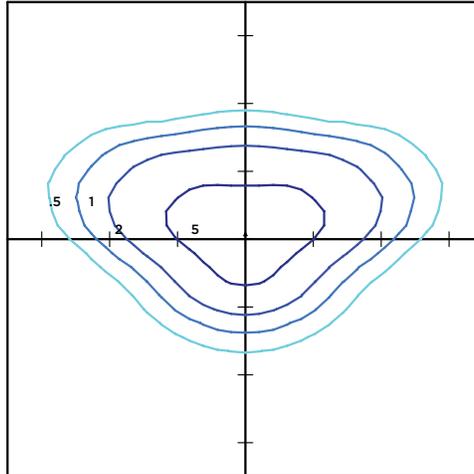
#### LUMINAIRE DATA

Type 2 Distribution	
Description	4000 Kelvin, 70 CRI
Delivered Lumens	17,532
Watts	135
Efficacy	130
IES Type	Type II - Short
BUG Rating	B3-U0-G3

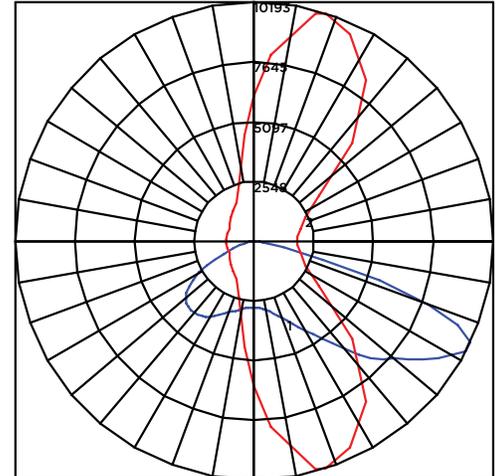
#### Zonal Lumen Summary

Zone	Lumens	%Luminaire
Low (0-30)°	2831	16%
Medium (30-60)°	10310	59%
High (60-80)°	4208	24%
Very High (80-90)°	184	1%
Uplight (90-180)°	0	0%
Total Flux	17532	100%

#### ISO FOOTCANDLE



#### POLAR CURVE



#### 20' Mounting Height/20' Grid Spacing

■ 5 FC ■ 2 FC ■ 1 FC ■ 0.5 FC

### MRS-LED-18L-SIL-3-40-70CRI

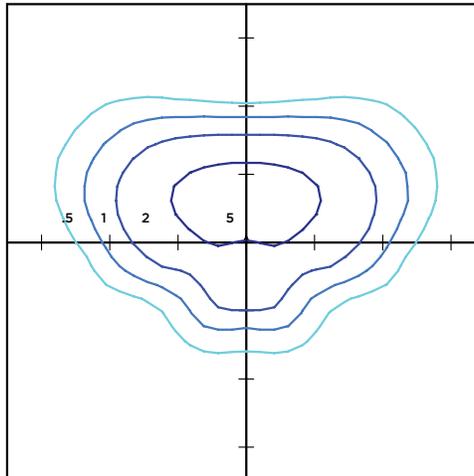
#### LUMINAIRE DATA

Type 3 Distribution	
Description	4000 Kelvin, 70 CRI
Delivered Lumens	18,417
Watts	135
Efficacy	137
IES Type	Type III - Short
BUG Rating	B3-U0-G3

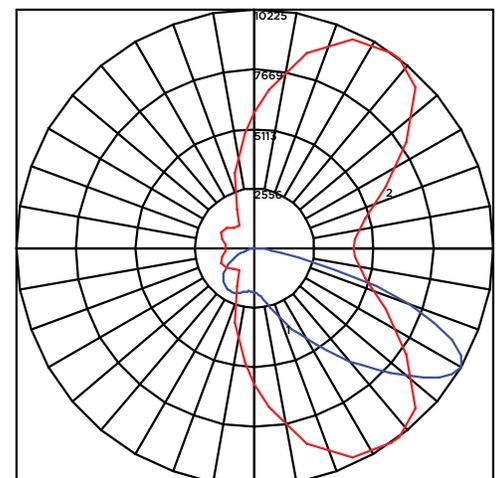
#### Zonal Lumen Summary

Zone	Lumens	%Luminaire
Low (0-30)°	2329	13%
Medium (30-60)°	10634	61%
High (60-80)°	5246	30%
Very High (80-90)°	208	1%
Uplight (90-180)°	0	0%
Total Flux	18417	100%

#### ISO FOOTCANDLE



#### POLAR CURVE



#### 20' Mounting Height/20' Grid Spacing

■ 5 FC ■ 2 FC ■ 1 FC ■ 0.5 FC





# Mirada Small Area Light (MRS)

## PHOTOMETRICS (CONT)

### MRS-LED-18L-SIL-FT-40-70CRI

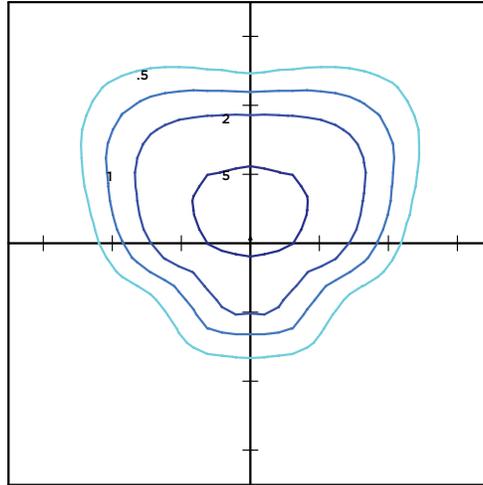
#### LUMINAIRE DATA

Type FT Distribution	
Description	4000 Kelvin, 70 CRI
Delivered Lumens	17,682
Watts	135
Efficacy	131
IES Type	Type III - Short
BUG Rating	B3-U0-G2

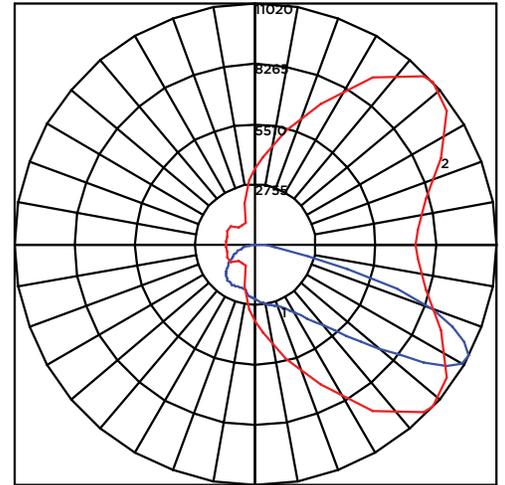
#### Zonal Lumen Summary

Zone	Lumens	%Luminaire
Low (0-30)°	2255	13%
Medium (30-60)°	9463	54%
High (60-80)°	5696	32%
Very High (80-90)°	268	2%
Uplight (90-180)°	0	0%
Total Flux	17682	100%

#### ISO FOOTCANDLE



#### POLAR CURVE



20' Mounting Height/20' Grid Spacing

5 FC
  2 FC
  1 FC
  0.5 FC

### MRM-LED-30L-SIL-5W-40-70CRI

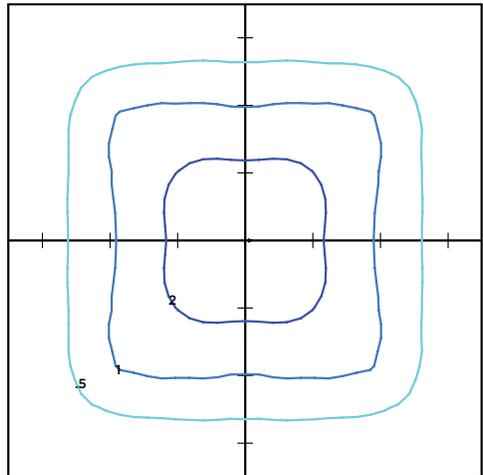
#### LUMINAIRE DATA

Type 5W Distribution	
Description	4000 Kelvin, 70 CRI
Delivered Lumens	17,636
Watts	135
Efficacy	131
IES Type	Type VS - Short
BUG Rating	B4-U0-G2

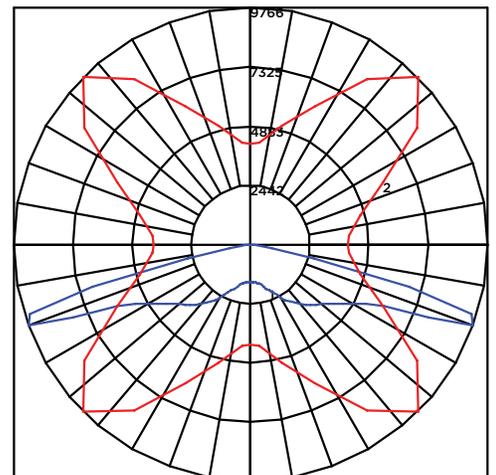
#### Zonal Lumen Summary

Zone	Lumens	%Luminaire
Low (0-30)°	1646	9%
Medium (30-60)°	7453	43%
High (60-80)°	8405	48%
Very High (80-90)°	132	1%
Uplight (90-180)°	0	0%
Total Flux	17636	100%

#### ISO FOOTCANDLE



#### POLAR CURVE



20' Mounting Height/20' Grid Spacing

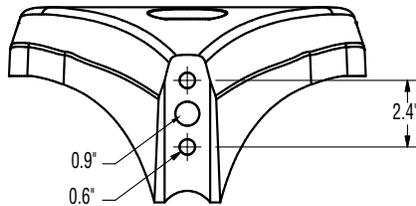
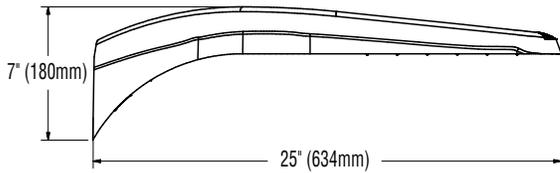
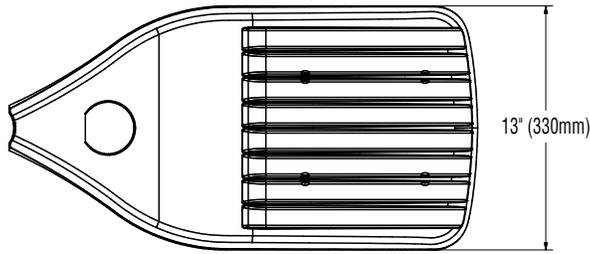
5 FC
  2 FC
  1 FC
  0.5 FC



# Mirada Small Area Light (MRS)

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## PRODUCT DIMENSIONS

**B3 Drill Pattern**

LUMINAIRE EPA CHART - MRS					LUMINAIRE EPA CHART - MRS				
Tilt Degree		0°	30°	45°	Tilt Degree		0°	30°	45°
	Single	0.5	1.3	1.8		T90°	1.4	2.3	2.6
	D180°	0.9	1.3	1.8		TN120°	1.4	1.9	2.3
	D90°	0.9	1.8	2.2		Q90°	1.4	2.3	2.6

## CONTROLS

### AirLink Wireless Lighting Controller

The AirLink integrated controller is a California Title 24 compliant lighting controller that provides real-time light monitoring and control with utility-grade power monitoring. It includes a 24V sensor input and power supply to connect a sensor into the outdoor AirLink wireless lighting system. The wireless integrated controller is compatible with this fixture.

[Click here to learn more about AirLink.](#)

### Integral Bluetooth™ Motion and Photocell Sensor (IMSBT)

Slim low profile sensor provides multi-level control based on motion and/or daylight. Sensor controls 0-10 VDC LED drivers and is rated for cold and wet locations (-30° C to 70° C). Two unique PIR lenses are available and used based on fixture mounting height. All control parameters are adjustable via an iOS or Android App capable of storing and transmitting sensor profiles.

[Click here to learn more about IMSBT.](#)

### AirLink Blue

Wireless Bluetooth Mesh Outdoor Lighting Control System that provides energy savings, code compliance and enhanced safety/security for parking lots and parking garages. Three key components; Bluetooth wireless radio/sensor controller, Time Keeper and an iOS App. Capable of grouping multiple fixtures and sensors as well as scheduling time-based events by zone. Radio/Sensor Controller is factory integrated into Area/Site, Wall Mounted, Parking Garage and Canopy luminaires.

[Click here to learn more about AirLink Blue.](#)





# Mirada Small Area Light (MRS)

## POLES & BRACKETS

LSI offers a full line of poles and mounting accessories to complete your lighting assembly. Aluminum and steel in both square and round shafts. In addition, LSI offers round tapered, fluted and hinge based poles. Designed and engineered for durability and protected with our oven baked DuraGrip Protection System. Also available with our DuraGrip+ Protection system for unmatched corrosion resistance and an extended warranty. American made in our Ohio facility with industry leading lead times.

[Click here to learn more details about poles & brackets.](#)



### BKA UMB CLR

The 3G rated UMB allows for seamless integration of LSI luminaires onto existing/ retrofit or new construction poles. The UMB was designed for square or round (tapered or straight) poles with two mounting hole spacings between 3.5" - 5".



### BKA ASF CLR

The adjustable Slip Fitter is a 3G rated rugged die cast aluminum adapter to mount LSI luminaires onto a 2" iron pipe, 2 3/8 OD tenon. The Adjustable Slip Fitter can be rotated 180° allowing for tilting LSI luminaires up to 45° and 90° when using a vertical tenon.



### BKS PQM15 CLR

The Pole Quick Mount Bracket allows for preset 15° uptilt of LSI luminaires for greater throw of light and increased vertical illumination as well as fast installation onto poles with LSI's 3" or 5" bolt pattern.



### BKS PQMH CLR

The Pole Quick Mount Bracket allows for lightning fast installation of LSI luminaires onto existing and new construction poles with LSI's B3 or B5 standard pole bolt patterns.



Square Pole  
14'-39'



Round Pole  
10'-30'



Tapered Pole  
20'-39'





PARAGON™

# COMMERCIAL SWIMMING POOL DECK EQUIPMENT

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# PARAGON™ DECK EQUIPMENT

For well over 60 years Paragon Deck Equipment has been the flagship of the aquatics industry for quality, craftsmanship, and innovation. We remain focused on the core values that helped make us the leader: build to our customer's specifications through a commitment to custom products and continuous improvement; provide superior customer service and communication; in short, listen and be responsive to our partners in the aquatics industry, whether they are architects, engineers, distributors, contractors, facility managers or competitive swimming and diving professionals.

## NEW INSIDE:

### Track Start PLUS+™ STS

Introduces a back plate option for our standard size tops. Page 7.



### Griff's Vision Guard Station™

Unique, Innovative. Lightweight. Easy to move and assemble. Page 18.

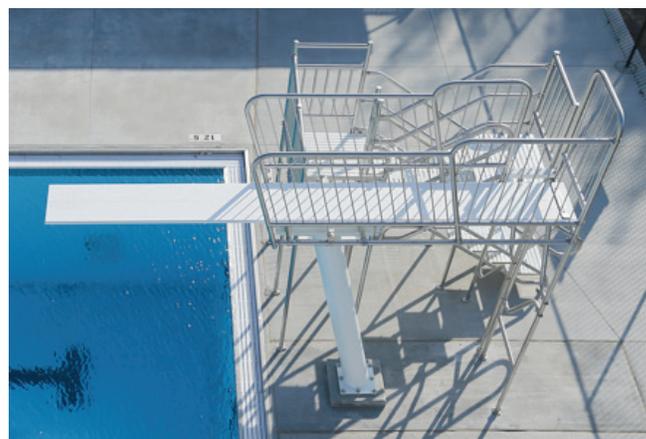


### All Terrain Griff's Guard Station®

Versatile and effective. Front and rear access. Page 19.

### Diving Tower Stair System

For new or retrofit. Many architectural/aesthetic options. Page 26.



For a full scope of the Pentair Aquatic product line visit: [pentaircommercial.com](http://pentaircommercial.com)

Call or e-mail for consultation.  
Paragon Customer Service  
888.534.7946 845.463.7291 fax  
[paragoncustserv@pentair.com](mailto:paragoncustserv@pentair.com)

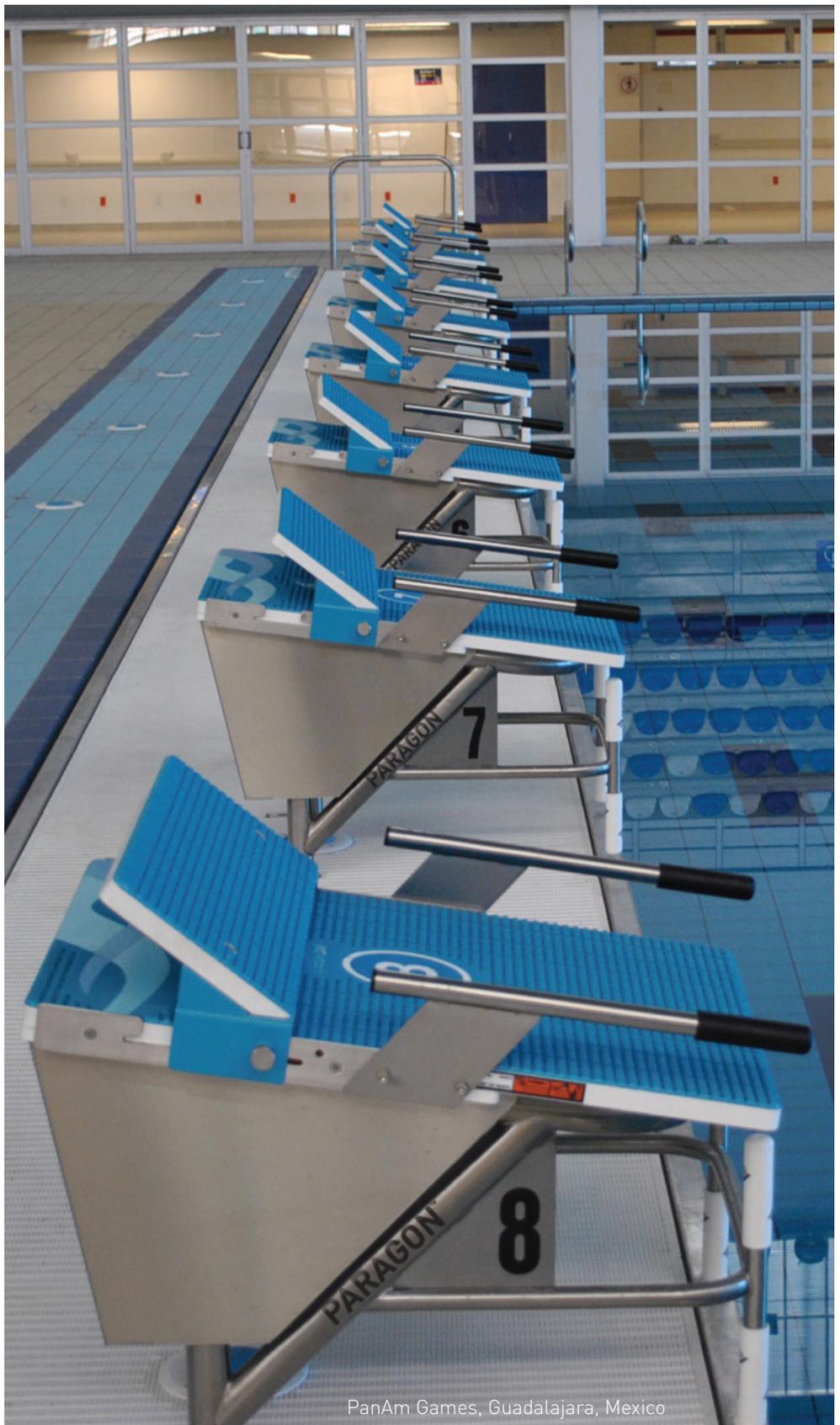
## STARTING PLATFORMS

Paragon Starting Platforms are used in competitive facilities across the United States and are widely used in FINA, NCAA, NFHS, USMS, and USAS events.

A combination of functional simplicity, contemporary design and unsurpassed workmanship make Paragon Starting Platforms a superior product. Their unique features help competitive swimmers improve training, technique and performance.

Each Starting Platform frame is a single weldment manufactured of high-grade stainless steel, polished and buffed to a 320 grit finish. All welds are electro-chemically passivated for maximum corrosion resistance. Each top is a solid sheet of 1-1/4" high density (UV inhibited) polypropylene with a patented, cross-grooved, non-skid, white sand finish.

Paragon platforms cannot absorb water, so they will never warp, shrink, rot or crack.



PanAm Games, Guadalajara, Mexico

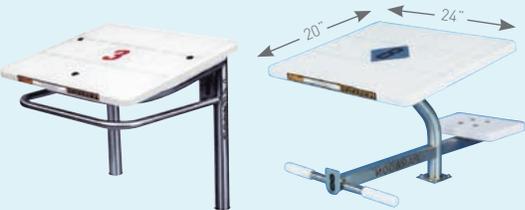


WARNING: Starting Platforms are to be used only by trained competitive swimmers. Only shallow racing dives should be executed. Impact with the pool bottom can cause serious injury. Please refer to applicable codes and regulations for your specific installation.



## HOW TO SELECT THE PARAGON STARTING PLATFORM MODEL

When choosing a starting platform, your first consideration should be the size of the platform top. (Note: All ruling bodies call for a minimum of 20" x 20" starting platform tops). Choose either the single leg (Paraflyte or Quickset Anchor) or dual legs (Competitor). Select the anchor style (Paraflyte, Quickset or Competitor). Then select color and graphics (Standard sand finish is white).

SELECT TOP SIZE	Track Start Size (top: 24" x 32")		Standard Size (top: 24" x 20")	
SELECT SINGLE OR DUAL	 <p>Single Leg or Dual Leg</p>		 <p>Dual Leg or Single Leg</p>	
TRACK START PLATFORM OPTIONS	<p><b>Backplate</b></p>  <p>Adjustable Full Backplate      STS Backplate (slides side to side)</p>		<p><b>Bars</b></p>  <p>Backstroke Bars (standard) or FINA Bars</p> <p><b>Grips</b></p>  <p>Side Hand Grips</p>	
SELECT ANCHOR STYLE	<p><b>Single Leg</b></p> <p>Paraflyte      Quickset</p>  <p>Standard      Long Reach      Quickset</p> <p>Single Leg only. Bolt mounted. Tools required for installation of starting platform.      Single Leg. Dual-Wedge™. No tools required for installation of starting platform.</p>		<p><b>Dual Leg</b></p> <p>Competitor</p>  <p>Dual Leg. Dual-Wedge. Taper lock. No tools required for installation of starting platform.</p>	
SELECT COLOR OR GRAPHICS OPTION	<p><b>Colors</b></p> <p>All Paragon Starting Platforms are available in any color in the Pantone Matching System. (Standard Sand Finish is White)</p> 		<p><b>Powder Coating</b></p> <p>Custom Color Powder Coating can be applied to all models.</p>  <p><b>Graphics</b></p> <p>Custom logos and numbering are available on all models.</p> 	
SELECT MODEL NUMBER	<p><b>Select Model</b></p> <p>See pages 15 and 16 for How to Size and to view Platform Selector Charts. When choosing a model consider the specific requirements of applicable ruling bodies, e.g. FINA, NCAA, USAS, USMS, NFHS as well as local, municipal and state statutes. If this selection does not meet your precise requirements, we will make something that does. Custom Platforms are our speciality. Please see the following pages for remaining selection criteria.</p>			



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## OUR TOP

Each Paragon™ top is made from solid sheet of 1-1/4" high density (UV Inhibited) polypropylene with a patented, cross-grooved, non-skid, white sand finish.

- Cross groove pattern enhances drainage and is crucial to a solid start.
- Impervious to corrosion.
- Cannot absorb water and will not crack, warp or rot.
- Non-metallic surface stays relatively cool in direct sunlight.
- Track Start size [24" x 32"]
- Standard size [24" x 20"]
- Safety Covers Available for both sizes.



## OUR PEDESTAL

Each pedestal is a single weldment of high-grade Certified T304L stainless steel, polished and buffed to a 320 grit finish. Welds are electro-chemically passivated for maximum corrosion resistance.

- Custom Fabricated for your Facility.
- Superior Workmanship.
- Dual Leg (Competitor) and Single Leg (Quickset or Paraflyte) Options.



## OUR ANCHORS

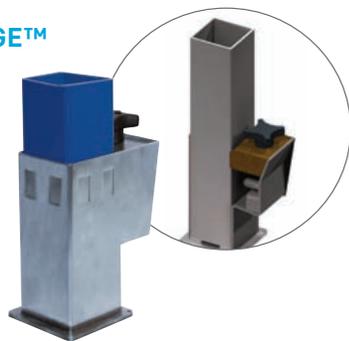
Dual-Wedge™ Tool-Less Clamping Anchors

Our unique taper-lock base (wedge #1) combined with a tool-less clamping wedge at the top of the anchor creates a simple, **zero-movement** installation. Anchor is tightened by hand using the knob shown. Wedge assembly stores in the anchor when the platform is not on deck.

Quickset anchor is available in custom depths to allow the same platforms to be used in multiple locations with different deck-to-water dimensions.

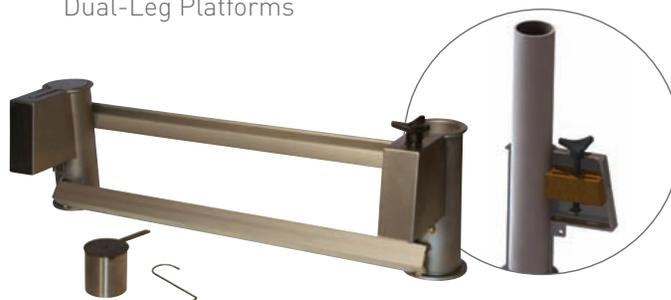
### QUICKSET® DUAL-WEDGE™ ANCHOR

Single-Leg Platforms



### COMPETITOR DUAL-WEDGE™ ANCHOR

Dual-Leg Platforms



### PARAFLYTE FIXED ANCHOR

Single-Leg Platforms

Ideal when the platform does not need to be removed. Platform is bolted to the cast bronze anchor. Tools required.



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## TRACK START PLUS+™

The Track Start PLUS+™ starting platform offers enhancements for the competitive swimmer. This is available for all new Track Start platforms, and can also be easily used as a retrofit to any existing Track Start starting platforms.\*

The PLUS+ Adjustable Backplate optimizes the position of the swimmers rear leg allowing for a more powerful start. Easily adjustable to five front-to-back positions using the knobs located on the side of the unit. It is so easy to adjust that it can be reset in the middle of a relay race. It can be used with or without relay platforms for timing systems and can be easily removed for storage.

The Adjustable Backplate can be used with or without the PLUS+ Side Hand Grip Kit which further enhances energy transfer during take-off.

This modular approach provides full flexibility for the individual swimming program and coaching technique.



Track Start PLUS+ Enhancements shown on Track Start Competitor Side Step

### \*IMPORTANT NOTE:

These kits are only for use on Paragon Aquatics Track Start starting platforms with solid, polypropylene tops.

## POWER + LEVERAGE = ULTIMATE STARTING SYSTEM

The Track Start Plus+™ is a modular concept that adds optional enhancements to new and existing Track Start starting platforms. These features will be factory installed if ordered with new Track Start platforms. The same kits, complete with mounting hardware and installation instructions will be provided for an easy retrofit in the field for existing platforms.



Track Start PLUS+ Enhancements shown on Track Start Quickset Side Step with graphics

Start with our leading Track Start platform. Then add either or both of the following kits.

### TRACK START PLUS+™ ADJUSTABLE BACKPLATE KIT

The Adjustable Backplate supporting frame is constructed of T304 stainless steel, factory spaced and assembled. It is powder coated in Black for additional corrosion resistance. The slide track is electro-polished T304 stainless steel precisely machined to mate with the support frame locking pins. Stainless steel knobs adjust the Backplate in 5 positions. The footrest is 9" x 24" polypropylene, cross-grooved, white sand coated finish, angled at 30° to render a 90° knee angle.

All hardware is stainless steel.

I.D. No. 27500

[Spec Sheet SP 10.75](#)



### OPTIONAL COLOR ADDER FOR SAND FINISH FOOTREST

Coordinate the footrest color to the platform color scheme.

NOTE: The optional color adder is included when ordered with a colored top.

I.D. No. 23994C

### TRACK START PLUS+™ SIDE HAND GRIP KIT

Contains 2 polished 1.0" OD., T304 stainless steel tubes welded to a heavy duty mounting plate, rubber non-slip grips, and stainless mounting hardware.

It is powder coated in Black for additional corrosion resistance

I.D. No. 27501

[Spec Sheet SP 10.76](#)



### CUSTOM COLOR POWDER-COATING FOR HANDGRIPS

Coordinate the Hand Grip color to the platform color scheme. NOTE: Optional custom color powder-coat is provided at no additional charge if ordered with a powder-coated starting platform pedestal.

I.D. No. 23995; Standard Color is Black



WARNING: Starting Platforms are to be used only by trained competitive swimmers. Only shallow racing dives should be executed. Impact with the pool bottom can cause serious injury. Please refer to applicable codes and regulations for your specific installation.

## TRACK START PLUS+™ STS

### Starting Platform Back Plate For Standard Platform Tops

Once only available on larger starting platforms, the STS brings a Back Plate option to standard (24" x 20") size PARAGON tops. This product is an excellent option to introduce swimmers to the new starting techniques, or for where existing standard size starting platforms have a lot of life left in them. It is the most cost-effective way to introduce a back plate to your facility.

The STS is a seamless upgrade to existing Quickset, Paraflyte, or Competitor style platform with standard size tops. It features side-to-side adjustment for unimpeded access to platforms using existing rear mounting step. The back plate removes in seconds without tools. It can be used with or without a relay judges platform (RJP). Non-skid white sand finish 9" x 10" UV inhibited polypropylene kick plate. Track and frame are constructed of black powder-coated T304 Stainless Steel. Custom powder-coat colors and top surface colors are available.

#### FOR QUICKSET/PARAFLYTE STYLE PLATFORM

I.D. No. 27510

#### FOR COMPETITOR STYLE PLATFORM

I.D. No. 27512

#### COLOR UPGRADE FOR POLY/SAND FOOTREST

I.D. No. 23994C; Standard Color is White

#### COLOR UPGRADE FOR POWDER-COATED TRACK/FRAME

I.D. No. 23997; Standard Color is Black

## SAFETY COVERS

### PLATFORM SAFETY COVERS

Constructed of tough, light-weight plastic, covers prevent unauthorized use of platforms. Easy installation with bungee cord (included). Stack easily for storage. Comes in safety orange per ANSI standards.

#### STANDARD PLATFORM SAFETY COVER

fits 24" x 20" tops

I.D. No. 23960

Spec Sheet AA 20.74

#### TRACK START SAFETY COVER

fits 24" x 32" tops

I.D. No. 23967

Spec Sheet AA 20.74

#### TRACK START PLUS + SAFETY COVER

I.D. No. 23969

Spec Sheet AA 20.74



Track Start Plus+ with Adjustable Backplate



La Mirada Splash, La Mirada, California



### PLATFORM SAFETY LABELS

Be sure every starting platform is labeled to advise users of proper racing dive technique. Set of 2 labels for labeling back and side of platform top.

I.D. No. 22621X



All platforms now come with molded-in safety label which cannot peel or be removed.

## FULL HEIGHT TRACK START TOP

For competitive swimming a deeper size starting platform top has become the more preferable option. The Track Start top is 24" x 32" and can be mounted to a single-leg quickset or dual leg stainless steel pedestal. Our anchoring systems allow for quick installation and provide a secure base. Custom designs are available for special facility circumstances.

## LONG REACH TRACK START COMPETITOR REAR MOUNT

The anchor setback ("B" dimension) is available from 36" to 40".

Uses 10" Competitor Dual-Wedge Anchor  
Anchor I.D. No. 23140DW  
B= 36" - 40"  
Spec Sheet SP 10.60.6



Track Start PLUS+ Enhancements shown on Long Reach Competitor Rear Mount

The Long Reach is designed for deck level pools with wide overflow gutter systems.

## Full Height Track Start Size

### Single Leg (Quickset)

The Track Start top (24" wide x 32" deep) is mounted to a single-leg quickset stainless steel pedestal. A seamless upgrade and replacement to your existing Paragon Quickset Platforms, it has been designed to use existing Quickset Anchors. Make your starting platforms one-of-a-kind.

### TRACK START QUICKSET STARTING PLATFORM

This Single Leg design utilizes the Track Start size top (24" x 32"). The anchor setback range ("B" dimension) is 21" to 26". It comes standard with a rear step but can have a side step when the deck constraints require it.

Uses Quickset Dual-Wedge Anchor  
Anchor I.D. No. 23302  
Spec Sheet SP 10.60.7



### Dual Leg (Competitor)

Our highly regarded Track Start Competitor Models (available in side step and rear mount) give swimmers an extra fast takeoff. The 24" x 32" top supports the "track-type" start now used by many competitive swimmers.

### TRACK START COMPETITOR SIDE STEP FULL HEIGHT

The anchor setback ("B" dimension\*) is available at 18" or 24". Uses 6" Competitor Dual-Wedge  
\* Anchor set back from pool wall

Anchor I.D. No. 23103DW  
B= 18", A < 24 1/2"  
Spec Sheet SP 10.60.3  
B= 18", A > 24"  
Spec Sheet SP 10.60.4  
B= 24", A = 17"-31"  
Spec Sheet SP 10.60.5



**WARNING:** Starting Platforms are to be used only by trained competitive swimmers. Only shallow racing dives should be executed. Impact with the pool bottom can cause serious injury. Please refer to applicable codes and regulations for your specific installation.

## FULL HEIGHT STANDARD SIZE TOP

### Dual Leg (Competitor)

The Competitor platform is our dual leg model starting platform. This versatile design accommodates our standard tops (24" x 20") as well as our track start tops (24" x 32"). All Competitor anchor systems (patented) come in two types of anchor assemblies, 6" Competitor Dual-Wedge (for anchor setbacks of under 30") or 10" Competitor Dual-Wedge (for anchor setbacks of over 30"). Colors and graphics are an option.

Note: All platforms are furnished with a tilted top unless otherwise specified.

## Standard Dual Leg (Competitor)

### CLASSIC STANDARD COMPETITOR

This Dual Leg design utilizes the standard size top (24" x 20"). The anchor setback ("B" dimension) is fixed at 18".

Uses 6" Competitor Dual-Wedge Anchor

Anchor I.D. No. 23103DW

Spec Sheet SP 10.59



### LONG REACH STANDARD COMPETITOR

(B = 20"-29-1/2")

Designed to accommodate most pool profiles. The anchor setback ("B" dimension) range is 20" to 29-1/2".

Uses 6" Competitor Dual-Wedge Anchor

Anchor I.D. No. 23103DW

Spec Sheet SP 10.60.1



### LONG REACH STANDARD COMPETITOR

(B = 30"-40")

For pools with wide overflow gutter systems. The anchor setback ("B" dimension) range is 30" to 40".

Uses 10" Competitor Dual-Wedge Anchor

Anchor I.D. No. 23140DW

Spec Sheet SP 10.60.2



Tupelo, Mississippi



WARNING: Starting Platforms are to be used only by trained competitive swimmers. Only shallow racing dives should be executed. Impact with the pool bottom can cause serious injury. Please refer to applicable codes and regulations for your specific installation.

## FULL HEIGHT

### Single Leg - Standard Top

These platforms are designed to render the maximum allowable height above water. They are available in a variety of configurations to accommodate your specific facility requirements and come with your choice of two anchoring systems, Paraflyte or Quickset. All Full Height Single Leg platforms come with anchors. Platform top is 24"x 20".

The Shortee Model is designed for pools where the deck-to-water dimension exceeds 12". The anchor setback ("B" dimension) is fixed at 18".



#### SHORTEE Paraflyte Model

Requires tools for installation and removal. [Uses Paraflyte Anchor](#)  
Anchor I.D. No. 22201  
[Spec Sheet SP 10.57](#)



#### SHORTEE Quickset Model

Requires no tools for installation or removal.  
[Uses Quickset Dual-Wedge Anchor](#)  
Anchor I.D. No. 23302  
[Spec Sheet SP 10.58](#)

The Classic Standard Model is designed to fit most pools. The anchor setback ("B" dimension) ranges from 21" to 26" depending upon platform height.



#### CLASSIC Standard Paraflyte Full Height

Requires tools for installation and removal.  
[Uses Paraflyte Anchor](#)  
Anchor I.D. No. 22201  
[Spec Sheet SP 10.51](#)



#### CLASSIC Standard Quickset Full Height

Requires no tools for installation or removal.  
[Uses Quickset Dual-Wedge Anchor](#)  
Anchor I.D. No. 23302  
[Spec Sheet SP 10.52](#)

The Long Reach Standard is designed for deck level pools with wide overflow gutter systems. The anchor setback ("B" dimension) is fixed at 34-1/2".



#### LONG REACH Standard Paraflyte Full Height

Requires tools for installation and removal.  
[Uses Long Reach Paraflyte Anchor](#)  
Anchor I.D. No. 22501  
[Spec Sheet SP 10.53](#)



#### LONG REACH Standard Quickset Full Height

Requires no tools for installation or removal.  
[Uses Quickset Dual-Wedge Anchor](#)  
Anchor I.D. No. 23302  
[Spec Sheet SP 10.54](#)

The Florida standard model is designed to be set atop an elevated curb adjacent to the gutter. Such protective curbs are required by some states to keep out debris and runoff. The anchor setback ("B" dimension) is fixed at 18".



#### FLORIDA Standard Paraflyte Full Height

Requires tools for installation and removal. [Uses Paraflyte Anchor](#)  
Anchor I.D. No. 22201  
[Spec Sheet SP 10.55](#)



#### FLORIDA Standard Quickset Full Height

Requires no tools for installation or removal.  
[Uses Quickset Dual-Wedge Anchor](#)  
Anchor I.D. No. 23302  
[Spec Sheet SP 10.56](#)



**WARNING:** Starting Platforms are to be used only by trained competitive swimmers. Only shallow racing dives should be executed. Impact with the pool bottom can cause serious injury. Please refer to applicable codes and regulations for your specific installation.

## LOW HEIGHT

### Varsity

Our varsity starting platform series was originally designed to accommodate the high school ruling of an allowable height above water in some venues of 18". This ruling has changed. However, the coaching community still utilizes this platform to render less than maximum height above water. All Low Height Varsity platforms include anchors with the exception of the Classic Standard and Long Reach Standard Paraflyte platforms. Platform top is 24"x 20". Varsity models do not include a mounting step and must be specified at time of order.

We recommend a mounting step be added when the "A" dimension is 15" or greater [at additional cost].



Photo Courtesy of Speedo

Note: All platforms are furnished with a tilted top unless otherwise specified.

## Single Leg

The Classic Standard Model is designed to fit most pools.



### VARSITY CLASSIC Standard Paraflyte

The anchor setback ("B" dimension) is available at 14", 18", 21" or 26".

Uses Paraflyte Anchor (not included)  
Anchor I.D. No. 22201

B = 21" or 26" – Spec Sheet SP 10.61  
B = 14" or 18" – Spec Sheet SP 10.62

Varsity Standard Platform Optional Step – I.D. No. 23950



### VARSITY CLASSIC Standard Quickset

The anchor setback ("B" dimension) is available at 14", 18", 21" or 26".

Uses Quickset Dual-Wedge Anchor  
Anchor I.D. No. 23302

Spec Sheet SP 10.63

The Long Reach Standard is designed for deck level pools with wide overflow gutter systems.



### VARSITY LONG REACH Standard Paraflyte

The anchor setback ("B" dimension) is fixed at 34 1/2".

Uses Long Reach Paraflyte Anchor  
(not included)  
Anchor I.D. No. 22501  
Spec Sheet SP 10.65

Varsity Long Reach Platform Optional Step I.D. No. 23951



### VARSITY LONG REACH Standard Quickset

The anchor setback ("B" dimension) is fixed at 34 1/2".

Uses Quickset Dual-Wedge Anchor  
Anchor I.D. No. 23302  
Spec Sheet SP 10.67

## Dual Leg - Competitor

This dual leg design utilizes the standard size top.



### VARSITY STANDARD COMPETITOR

The anchor setback ("B" dimension) is fixed at 18".

Uses 6" Competitor Dual-Wedge Anchor  
Anchor I.D. No. 23103DW  
Spec Sheet SP 10.69

### VARSITY COMPETITOR PLATFORM OPTIONAL STEP I.D. No. 24090

(must be ordered with platform)



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## COLORADO BLOCK BY PARAGON™

For competitive swimming venues, two companies have established their products as essential for accurate, problem-free racing. Paragon with its unrivaled starting platforms; Colorado Time Systems and its relay judging platforms (RJP) and other components.

The RJP, mounts securely atop the Paragon platform with an exclusive system which does not require tools, providing the most accurate way by far to judge a swimmer's departure for starts and relay exchanges. With the Colorado Block you can rely on accuracy to 1/100th of a second! The RJP portion of the block can decipher between weight shifts and actual starts.

The uniquely-engineered Colorado Block houses the connection plate, which protects the electronics from the harsh pool environment. Additionally, it enables the removal of the timing system without the use of tools.

The Colorado Block is also a great training device. Swimmers can fine-tune their start reaction times and their relay exchanges.



(Shown with FINA Backstroke Bars atop a Track Start Competitor Rear Step Model, and powder-coated platform and sponsor panel.)

### ADAPTER KIT FOR PARAGON STARTING PLATFORM

Sponsor's panel of stainless steel fits on platform's slide brackets to display sponsor info, school logo or other graphics. Also includes horn and deck plate mounting bracketry. Panel slides open for easy access to horn and deck plate. It is removable from the starting platform without tools.

Included: hardware, quick connectors, instructions, drill bit for retrofits and sponsor's panel slide brackets. These are factory installed on the starting platforms or can be easily retrofitted for field upgrades

### TRACK START SIDE STEP

I.D. No. 22670D  
Spec Sheet SP 10.70

### STANDARD COMPETITOR

I.D. No. 22672D

### STANDARD PARAFLYTE/QUICKSET

I.D. No. 22674D  
Spec Sheet SP 10.72



Sponsors panel with connection hub and horn



Shown atop a Track Start Competitor Rear Mount Model

### LONG REACH TRACK START REAR MOUNT

I.D. No. 22671D  
Spec Sheet SP 10.71

### LONG REACH COMPETITOR

I.D. No. 22673D

Rear mount models available with stainless steel sponsor's panel.



WARNING: Starting Platforms are to be used only by trained competitive swimmers. Only shallow racing dives should be executed. Impact with the pool bottom can cause serious injury. Please refer to applicable codes and regulations for your specific installation.

## STARTING PLATFORM ANCHORS

### Fixed Platform Anchors

Requires tools to install and remove platform.

#### PARAFLYTE ANCHOR

Ideal for situations where the platform does not need to be removed from the pool deck. Single-leg starting platform is bolted to the cast bronze anchor requiring tools for installation and removal of the platform.

I.D. No. 22201

[Spec Sheet SPA 20.94](#)



#### LONG REACH PARAFLYTE ANCHOR

Designed for the Long Reach Standard Paraflyte single-legged platform. Attaches to the heavy-duty stainless steel anchor with four bolts and requires the use of tools for installation and removal of the platform.

I.D. No. 22501

[Spec Sheet SPA 20.95](#)



## Dual-Wedge Anchors

### Removable Platform Anchors

Does not require tools to install and remove platform.

### Competitor Dual-Wedge Anchor

6" and 10" Dual-Wedge Competitor Anchors, featuring heavy duty cast, electro-polished T316 stainless steel sockets with patented taper lock base and wedge, eliminates all free movement in the anchor. Bronze wedge assembly is easily adjusted by hand using the integrated knob design allowing the starting platform to be installed and removed without the use of tools. When the platform is removed from the anchor the wedge assembly is stored inside the socket and the cover (included) can be installed. Welded spacers are factory installed to ensure proper alignment with platforms.

#### 6" COMPETITOR DUAL-WEDGE ANCHOR

This 6" deep anchor assembly is used on all Competitor starting platforms with an anchor setback ("B" dimension) of under 30".

I.D. No. 23103DW

[Spec Sheet SPA 20.96](#)



#### 10" COMPETITOR DUAL-WEDGE ANCHOR

This 10" deep anchor assembly is used on all Competitor starting platforms with an anchor setback ("B" dimension) of 30" to 40".

I.D. No. 23140DW

[Spec Sheet SPA 20.97](#)

#### QUICKSET® DUAL-WEDGE ANCHOR

Constructed of heavy duty T304 stainless steel, a combination of the patented taper lock base and dual acting wedge design eliminates front-to-back and side-to-side movement. Dual-Wedge Assembly has an integral adjusting knob which is easily turned by hand to install and remove the platform without the need for tools.

Self-contained wedge assembly, readily removable and stored within the anchor when not in use.

Anchor cover included.

[Dual-Wedge Anchor](#) I.D. No. 23302

[Cover](#) I.D. No. 22213

[Replacement Wedge Assembly](#)

I.D. No. 23304

[Spec Sheet SPA 20.90](#)



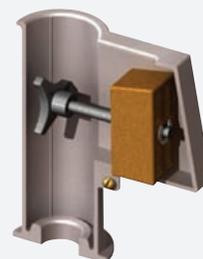
## Anchor Wedge Assembly Storage

When the anchor is not in use and the wedge assembly is inside the anchor, the cover slips on, preventing debris from entering the anchor.

Anchor does not require tools to operate. Integrated plastic knob allows for tightening of wedge assembly. Wedge assembly is removable for storage inside anchor socket when not in use.



Quickset® Anchor Interior  
Detail of storage



Competitor Anchor  
Interior Detail of storage

## Our Standard Colors



Red (#R1)



Blue (#B6)



White

Green  
(#GN23)

Yellow (#Y17)

Cranberry  
(#R12)Black  
(#BL1)

Adding color is an option. We're able to match any color within a color-coding system such as the Pantone Color Matching System. Virtually all school colors are matchable.

Color Upgrade I.D. No. 23990C  
(for color upgrade per unit)

## CUSTOMIZE YOUR SAND TOP STARTING PLATFORMS

### POWDER COATING

Pedestal powder coating is now available in a variety of colors. Combined with our platform top colors and graphics, this option can make your starting platform one-of-a-kind.



### POWDER COATING UPGRADE

I.D. No. 23992

(I.D. No. for powder coating upgrade only)

### RENEW . . .

your existing Paragon Starting Platform Tops (and steps) with the new patented and grooved sand finish.



Send us your old style Paragon white polypropylene tops and steps and take advantage of our refinishing program. You'll get the most recent groove patterns as well as the sand finish surface for a great value. Adding color is also an option for refinished platforms for minimal additional cost.

Please contact us or your authorized Paragon Aquatics distributor.

### GRAPHICS

Our custom logo sand top option has become a popular upgrade. We have been customizing and installing in facilities across the United States. Featured here are a few of our high quality finished sand tops.

This custom feature offers expanded design options (i.e., school or team logo). Paragon is again leading the field with new and innovative products.

Custom Logo Upgrade

I.D. No. 23991

(I.D. No. for logo upgrade only)



## HOW TO SIZE YOUR STARTING PLATFORMS



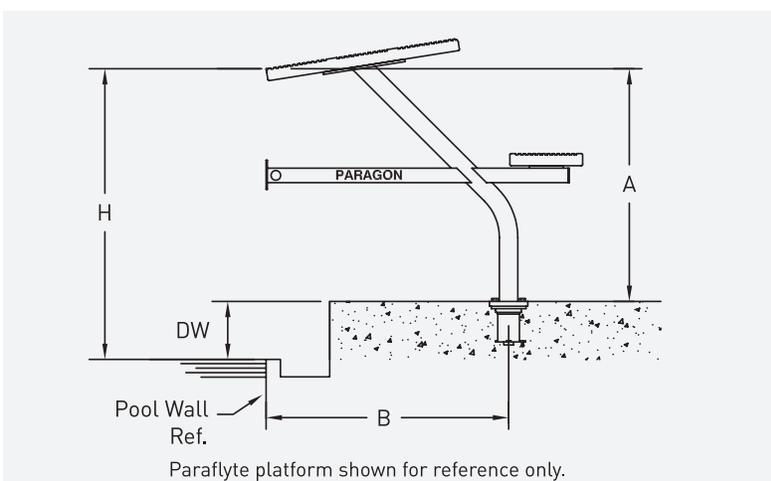
Photo Courtesy of Speedo

1. Review our catalog to become familiar with the variety of models, options and anchor systems available.
2. Establish the maximum desired height above water using applicable rulings that govern competitive swimming. Information provided is the latest available at the time of printing. Please confirm that rules have not changed.  
Important: Please refer to your local, municipal, and state statutes, ordinances, and regulations, which may vary from locale to locale.

STARTING PLATFORM HEIGHT REQUIREMENTS				
Ruling Body	Course Length	Water Depth		
		Less Than 4'-0"	4'-0" to 4'-6"	Greater Than 4'-6"
FINA	Long/Short	NO PLATFORM		20" - 29 1/2"
NCAA	Long/Short	NO PLATFORM	30" MAX	
USAS	Long	NO	20" - 29 1/2"	
	Short	PLATFORM	30" MAX	
USMS	Long	NO	20" - 29 1/2"	
	Short	PLATFORM	30" MAX	
NFHS	Long/Short	NO PLATFORM		30" MAX

Location of Water Depth Measurement from Pool Wall	
FINA	3'-3 1/2" (1 meter) to 19'-8 1/4" (6 meters)
NCAA	Minimum 4'-0" throughout pool recommended
USAS	3'-3 1/2" (1 meter) to 16'-5" (5 meters)
USMS	3'-3 1/2" (1 meter) to 16'-5" (5 meters)
NFHS	From pool wall (0 meters) to 16'-5" (5 meters)

3. Determine "B" Dimension: The dimension is always taken from the vertical pool wall to the center of the anchor socket.
4. Calculating The "A" Dimension: The "A" dimension is defined as the vertical dimension from the top of the anchor socket (flush with the pool deck slab) to the top, front edge of the starting platform top. The "A" dimension plus the deck to water dimension (DW) cannot exceed the maximum height above water (H) as determined by your ruling body. If your pool deck is sloped (for drainage), please account for the rise/drop in elevation of the deck in calculating the "DW" dimension.
5. For each given pool type, Paragon has general platform recommendations. These are provided for your convenience in selecting a platform. Select a platform with the appropriate "A" and "B" dimensions as determined above. The diagram references Paragon's standard platform style offerings.



NOTE: If you require a special configuration, please contact us or one of our authorized distributors.

# PLATFORM SELECTOR CHARTS

Now that you have sized your platform use the charts to determine the product that will work best at your pool facility. If this selection does not meet your precise requirements, we will make something that does. Custom platforms are our specialty.

SELECTOR CHART — FULL HEIGHT MODELS (UP TO 30" ABOVE WATER)													
Model	Classic		Long Reach		Florida		Competitor Classic Standard	Long Reach Competitor		Track Start Competitor		Track Start Quickset	
	Page 10		Page 11		Page 10		Page 9	Page 9		Page 6		Page 6	
A Dim In.	B Dim In.*	Paraflyte	Quickset	Paraflyte	Quickset	Paraflyte	Quickset			Side Step	Rear Mount		
		B=34-1/2"		B=18"		B=18"		B=18"	B=30"-40"	B=20"-29-1/2"	B=18", 24"	B=36"-40"	B=21"-26"
		I.D. Number		I.D. Number		I.D. Number		I.D. Number	I.D. Number		I.D. Number		I.D. Number
31.0				22401	23401				24301	24401	24501	24601	
30.5				22402	23402				24302	24402	24502	24602	
30.0	26	22101	23201	22403	23403			23001	24303	24403	24503	24603	24700
29.5	26	22102	23202	22404	23404			23002	24304	24404	24504	24604	24701
29.0	26	22103	23203	22405	23405			23003	24305	24405	24505	24605	24702
28.5	26	22104	23204	22406	23406			23004	24306	24406	24506	24606	24703
28.0	26	22105	23205	22407	23407	22901	23531	23005	24307	24407	24507	24607	24704
27.5	26	22106	23206			22902	23532	23006	24308	24408	24508	24608	24705
27.0	26	22107	23207			22903	23533	23007	24309	24409	24509	24609	24706
26.5	26	22108	23208			22904	23534	23008	24310	24410	24510	24610	24707
26.0	26	22109	23209			22905	23535	23009	24311	24411	24511	24611	24708
25.5	26	22110	23210			22906	23536	23010	24312	24412	24512	24612	24709
25.0	26	22111	23211			22907	23537	23011	24313	24413	24513	24613	24710
24.5	25	22112	23212			22908	23538	23012	24314	24414	24514	24614	24711
24.0	25	22113	23213			22909	23539	23013	24315	24415	24515	24615	24712
23.5	24	22114	23214					23014	24316	24416	24516	24616	24713
23.0	24	22115	23215					23015	24317	24417	24517	24617	24714
22.5	23	22116	23216					23016	24318	24418	24518	24618	24715
22.0	23	22117	23217					23017	24319	24419	24519	24619	24716
21.5	23	22118	23218					23018	24320	24420	24520	24620	24717
21.0	23	22119	23219					23019	24321	24421	24521	24621	24718
20.5	23	22120	23220					23020		24422	24522		24719
20.0	23	22121	23221					23021		24423	24523		24720
19.5	22	22122	23222					23022		24424	24524		24721
19.0	22	22123	23223					23023		24425	24525		24722
18.5	22	22124	23224					23024		24426	24526		24723
18.0	21	22125	23225					23025		24427	24527		24724
17.5	21	22126	23226					23026		24428	24528		24725
17.0	21	22127	23227					23027		24429	24529		24726

\* 'B' dimensions refer to Classic models only. 'B' dimensions vary on other models as indicated.

SELECTOR CHART — FULL HEIGHT MODELS (UP TO 18" ABOVE WATER)									
VARSITY LINE								SHORTEE	
Model	Classic Page 10			Long Reach Page 11		Competitor Page 11	(Full Height) Page 10		
A Dim In.	Paraflyte		Quickset		Paraflyte	Quickset	Varsity Standard	Paraflyte	Quickset
	B Dim's In.	I.D. Number	B Dim's In.		B=34-1/2"	B=34-1/2"	B=18"	B=18"	B=18"
		I.D. Number	I.D. Number		I.D. Number	I.D. Number	I.D. Number	I.D. Number	
19.0						23901		23921	
18.5						23902		23922	
18.0	21 or 26	23601	14, 18, 21 or 26		23801	23903	23923	24001	22920 23560
17.5	21 or 26	23602	14, 18, 21 or 26		23802	23904	23924	24002	22921 23561
17.0	21 or 26	23603	14, 18, 21 or 26		23803	23905	23925	24003	22922 23562
16.5	21 or 26	23604	14, 18, 21 or 26		23804	23906	23926	24004	22923 23563
16.0	21 or 26	23605	14, 18, 21 or 26		23805	23907	23927	24005	22924 23564
15.5	21 or 26	23606	14, 18, 21 or 26		23806			24006	22925 23565
15.0	21 or 26	23607	14, 18, 21 or 26		23807			24007	22926 23566
14.5	21 or 26	23608	14, 18, 21 or 26		23808			24008	22927 23567
14.0	21 or 26	23609	14, 18, 21 or 26		23809			24009	22928 23568
13.5	21 or 26	23610	14, 18, 21 or 26		23810			24010	22929 23569
13.0	21 or 26	23611	14, 18, 21 or 26		23811			24011	22930 23570
12.5	21 or 26	23612	14, 18, 21 or 26		23812			24012	22931 23571
12.0	21 or 26	23613	14, 18, 21 or 26		23813			24013	22932 23572
11.5	14 or 18	23614	14, 18, 21 or 26		23814			24014	
11.0	14 or 18	23615	14, 18, 21 or 26		23815			24015	
10.5	14 or 18	23616	14, 18, 21 or 26		23816			24016	
10.0	14 or 18	23617	14, 18, 21 or 26		23817			24017	
9.5	14 or 18	23618	14, 18, 21 or 26		23818			24018	
9.0	14 or 18	23619	14, 18, 21 or 26		23819			24019	
8.5	14 or 18	23620	14, 18, 21 or 26		23820			24020	
8.0	14 or 18	23621	14, 18, 21 or 26		23821			24021	

\*Note: Anchors not included with Classic Standard Varsity or Varsity Long Reach Standard Paraflyte models.

## LIFEGUARD CHAIRS

A wide selection of fixed, moveable, and portable chairs suitable for every need. The Paraflyte fixed-series chairs, designed to harmonize with our Paraflyte diving towers and starting platforms, feature both sloping pedestal and access ladder. We also have a variety of chairs that can easily be moved about as needed or to avoid the sun.

All fixed or semi-permanent chairs have a rugged platform extending to the pool edge permitting the lifeguard a safe, fast takeoff. All chairs (except Standard, Griff's high model, All Terrain Griff's Guard Station and Griff's Vision Guard Station) have a turquoise, molded fiberglass reinforced plastic seat. Chairs supported on seat pedestals have a 360° swivel.

Our Griff's Guard Station® Sun Shade gives lifeguards protection from harmful UV rays and increased visual effectiveness from their Griff's Guard Station®. The Sun Shade offers a unique range of adjustability, tilting side-to-side, forward-to-back, and up and down, providing maximum visibility by shielding the lifeguard from the sun's glare. A seamless upgrade for all Griff's Guard Stations, easy-to-install and can be retrofitted to existing Griff's Guard® Stations. Many color options are available.

New to our line of Lifeguard Guard Stations are the All Terrain Griff's Guard Station, which is adaptable to any terrain, is easily moveable and can be positioned at the waters' edge. And, the Griff's Vision Guard Station which offers a compact option with dual access and is lightweight for easy moving. The Griff's Vision Sun Shade is a seamless upgrade for the Vision Guard Stations.

All models have a non-skid surface that is vented with heavy duty construction that assures long lasting, trouble-free service.



La Mirada Splash, La Mirada, California

## GRIFF'S VISION GUARD STATION™

Lifeguard effectiveness is key for public water safety. The innovative Griff's Vision Guard Station™ is designed to increase lifeguard effectiveness by providing multiple guard positions and lines of sight, a maximum viewing edge, and dual access within a compact, easily moveable lifeguard station. Dual side access and wide deck allow uninterrupted coverage during shift changes. Steps are widely spaced for safe and quick exit. Cushion seat swivels and folds down to prevent UV damage and deter unauthorized use when not in use.



## GRIFF'S VISION GUARD STATION™

The Griff's Vision Guard Station is available in 1-step, 2-step and 3-step models. All models ship flat and assemble in minutes.

- 1-Step I.D. No. 20340  
Spec Sheet LG 40.29-1
- 2-Step I.D. No. 20341  
Spec Sheet LG 40.29-2
- 3-Step I.D. No. 20342  
Spec Sheet LG 40.29-3

**NEW**



MINIMUM FOOTPRINT...MAXIMUM IMPACT

## GRIFF'S VISION SUN SHADE

The Griff's Vision Sun Shade is a seamless upgrade to the Vision Griff's Guard Station, with no modifications required. Adjusts side-to-side, front-to-back and up and down, providing lifeguards with protection from harmful UV rays while increasing their visual effectiveness. Easily removed. Colors shown below.

- I.D. No. 20345  
Spec Sheet LG 40.295

## VISION SUN SHADE



## ALL TERRAIN GRIFF'S GUARD STATION®

The All Terrain Griff's Guard Station® was developed for adaptability to any terrain, indoor or outdoor, by the pool, at a waterpark or on the sand. This station was modeled from Tom Griffith's Five Minute Scanning Strategy with the focus on safety. The elevated platform offers lifeguards increased visibility and the front and rear access steps allow for uninterrupted water coverage during shift change. Front steps are widely spaced for safer, front-facing exit facilitating quicker response to emergencies.

The large pneumatic wheels aid in the ability to tip and roll this guard station, with ease, to the next location. Can be positioned near the water's edge, promoting movement with the tide. Cushion seat swivels and folds down to prevent UV damage and deter unauthorized use when not in use.



### ALL TERRAIN GRIFF'S GUARD STATION®

The decking is recessed into a stainless steel support. The overall platform area measures 40-3/8" x 26-3/4" and is located 2'-6" (for 4ft), 3'-6" (for 5ft), or 4'-6" (for 6ft) above the pool deck. Umbrella ring guide is attached to the superstructure and umbrella/life ring holder is attached to the fiberglass decking.

4' - I.D. No. 20330

[Spec Sheet LG 40.28-4](#)

5' - I.D. No. 20331

[Spec Sheet LG 40.28-5](#)

6' - I.D. No. 20332

[Spec Sheet LG 40.28-6](#)

[Powdercoat Upgrade Is Available On All Models](#)

I.D. No. 23996

THE MOST VERSATILE LIFEGUARD CHAIR - EVER!





## GRIFF'S WATER SAFETY SYSTEMS

The Griff's Guard Station® by Paragon, together with Tom Griffiths' 5-Minute Scanning Strategy helps to increase lifeguard effectiveness for increased water safety. The station offers room for movement, allowing lifeguard multiple viewing positions.

Griff's Guard Stations feature front entry, elevated viewing station, easy access, and non-skid surface. A wide front step provides additional station and brings the guard closer to the pool edge. Heavy duty wheels allow convenient, easy portability. Stainless steel and fiberglass construction assures long lasting and trouble-free service.

### THE 5-MINUTE SCANNING STRATEGY

A self-instruction CD for guard training by Tom Griffiths, President, Aquatics Safety Research, LLC. (Formerly Director of Aquatics and Safety Officer for intercollegiate athletics at Penn State University.) "I developed the 5-Minute Scanning Strategy to help lifeguards keep alert on the job. It is based on physiological and psychological task-involved research. The process requires guards to perform specific tasks in five minute segments." For further information, please visit:

[www.aquaticsafetygroup.com](http://www.aquaticsafetygroup.com).

### SHALLOW WATER BLACKOUT VIDEO

A comprehensive 30 minute presentation divided into four categories:

- 1) Introduction and Definitions
- 2) Shallow Water Blackout
- 3) Genetic "Drowning" Triggers
- 4) Summary & Quiz

Both CD's are included with every Griff's Guard Station purchase.



Shown with Sun Shade

### GRIFF'S ELEVATED STEP GUARD STATION

Provides three positions for better viewing. Platform size is 39" x 60" and is 24" above the deck. Front step is 14" x 43". Elevated step is 14" x 40" and 36" above pool deck.

I.D. No. 20386

[Spec Sheet LG 40.25](#)

[Sun Shade Upgrade](#)

I.D. No. 20396

[Spec Sheet LG 40.25.1](#)



### GRIFF'S FLAT GUARD STATION

This station has a wider access for easy entry. Platform size is 39" x 60". Step is 14" x 57". Platform is 24" above deck.

I.D. No. 20385

[Spec Sheet LG 40.26](#)

[Sun Shade Upgrade](#)

I.D. No. 20395

[Spec Sheet LG 40.26.1](#)



### GRIFF'S FULL HEIGHT GUARD STATION

Higher viewing angle for greater visibility. Bench size is 14" x 40" and 4' above pool deck. Platform size is 43" x 39" and is 33" above pool deck. Access steps are 14" x 40".

I.D. No. 20387

[Spec Sheet LG 40.27](#)

[Sun Shade Upgrade](#)

I.D. No. 20397

[Spec Sheet LG 40.27.1](#)

## PERMANENT PARAFLYTE LIFEGUARD CHAIRS

All Paraflyte chairs have a platform height of 4'6", a seat height of 6'0" above the deck, and are supported by a stainless steel flanged pedestal which is set back 3'0" from the pool wall. The ladder at side is set back 3' 1-5/8" from the pool wall. Combination ladder risers and guard rails are .065" wall x 1.90" diameter, Type 304 stainless steel, polished and buffed to a 320 grit finish.

All platforms (footboards) are constructed of laminated wood, coated with fiberglass and polyester resin and have a non-skid surface.

All permanent Paraflyte lifeguard chairs are furnished with pedestal, pedestal anchor, rear anchors, (where required) and escutcheon plates. All are furnished with holders for rescue tube and umbrella.

Paraflyte ladder at rear also comes in .145" wall thickness. Replacement ladder steps are 19" and are available in vertical and sloping designs.



### LIFEGUARD CHAIR PEDESTAL ANCHOR ASSEMBLY

Stainless steel factory welded assembly for fixed pedestal chairs.

I.D. No. 21005



### PARAFLYTE LADDER AT REAR

Recommended for general use. The rear ladder with flared guard rails provides easy access to the platform. The horizontal rails provide protection and serve as arm rests.

[Paraflyte \(Ultraflyte\) Chair](#)

I.D. No. 20001

Stainless steel rails are .145" wall

[Paraflyte \(Superflyte\) Chair](#)

I.D. No. 20002

Stainless steel rails are .065" wall

[Spec Sheet LG 10.41](#)



### PARAFLYTE LADDER AT SIDES

Two access ladders allow the lifeguard to dismount quickly and safely from either side. Two guards can each stand in an elevated position for unbroken surveillance during guard change and relay of instructions.

I.D. No. 20003

[Spec Sheet LG 10.43](#)



### PARAFLYTE CLUB

Acclaimed Paraflyte styling and quality. A single anchor at pedestal base supports the entire chair. The vertical access ladder requires less deck space and does not need separate anchors. Pedestal Anchor furnished. Rear anchors and escutcheon plates not required.

I.D. No. 21001

[Spec Sheet LG 10.47](#)



### PARAFLYTE OSHA CHAIR

This chair is designed specifically to comply with federal OSHA regulations. Guard rails are 42" above the platform and extend to the front of the platform.

I.D. No. 20004

[Spec Sheet LG 10.45](#)

## MOVEABLE AND PORTABLE LIFEGUARD CHAIRS



6' Moveable

### MOVEABLE (Wheel-A-Round)

An ideal solution for a chair that is needed at different locations. Both rugged and stable, yet can be easily moved by one person. The heavy duty 7" diameter wheels roll easily on deck or lawn. The perfect chair for supervision, instruction, and judging. The wide ladder at front leads directly to platform. Furnished with 26" steps. Available with seat at eight-feet, six-feet and four-feet above deck. (Not suitable for diving.)

- 8-feet I.D. No. 20301  
[Spec Sheet LG 20.39-8](#)
- 6-feet I.D. No. 20302  
[Spec Sheet LG 20.39-6](#)
- 4-feet I.D. No. 20305  
[Spec Sheet LG 20.39-4](#)

## PORTABLE CHAIRS

Portable 2-, 3-, and 4-step models are for areas not requiring a full height chair. Light enough to be lifted easily by one person (the 4-step weighs only 70 lbs.). Sloping front ladder with 19" sloping steps allows access to molded contour seat. Angled legs add stability. (WARNING: Chairs are not suitable for diving nor recommended for use with umbrellas under windy conditions.)



**4-STEP**  
(6'-0" above deck)  
I.D. No. 20401  
[Spec Sheet LG 20.37](#)



**3-STEP**  
(4'-6" above deck)  
I.D. No. 20460  
[Spec Sheet LG 20.37](#)



**2-STEP**  
(3'-10" above deck)  
I.D. No. 20450  
[Spec Sheet LG 20.37](#)

Optional wheels can be retrofit for added mobility. Includes 4" wheels with mounting bracket and hardware.

- [4-Step Kit](#)  
I.D. No. 20404
- [3-Step Kit](#)  
I.D. No. 20403
- [2-Step Kit](#)  
I.D. No. 20402



## LOOKOUT FAMILY

Lookout chairs have a roomier, non-skid surface platform. Stand is at a low height to allow for a faster dismount. These chairs can be placed closer to pool edge for circumstances where space is a consideration.



### LOOKOUT DUAL SIDE MOUNT

Ideal for pools with limited deck space. Convenient access from both sides allows lifeguard change with uninterrupted coverage. Portable, solid stainless steel frame, swivel seat is mounted on a 4' x 4' platform. Access steps are 26". Seat height is 54" from deck. Platform height is 36" from deck. Wheels allow for easy relocation.

I.D. No. 20380

[Spec Sheet LG 20.34](#)



### LOOKOUT PLATFORM CHAIR

Engineered especially for busy aquatic facilities and water parks. Access from both sides allows uninterrupted guard change. Sloping steps allow quicker dismount. Portable, solid stainless steel frame, seat mounted on an extra large 60" x 40" platform. Utilizes 26" steps. Seat height is 54" from deck. Platform height is 36" from deck.

I.D. No. 20370

[Spec Sheet LG 20.32](#)

## THE "LOOKOUT CHAIR" FAMILY

"Lookout Chairs" have grown into an extended family of their own with 5 models designed for pools that do not require a full height chair. All Lookout chairs offer an elevated, 360° swivel seat which sits on a non-skid, fiberglass platform. Station provides easy access and dismount. Seat is molded plastic. The supporting frames are constructed of 1.90" O.D. x .065" T304 stainless steel. All models come with an umbrella holder and the 3-step also has a rescue tube holder. 4" diameter wheels are included on 2- and 3-step models for portability.

(WARNING: Umbrella use should be discontinued under windy conditions.)



### 1-STEP STANDARD MODEL

Seat 30" above deck.

Platform size is 36" x 38" and is 12" above deck.

I.D. No. 20350

[Spec Sheet LG 20.31-1](#)

[1-Step Lookout Wheel Kit \(optional\)](#)

I.D. No. 20377



### 3-STEP MODEL WITH WHEELS

Seat 54" above deck. Furnished with 19" steps. Platform size is 48" x 48" and 36" above pool deck.

I.D. No. 20365

[Spec Sheet LG 20.36](#)



### 2-STEP MODEL WITH WHEELS

Seat 42" above deck.

Furnished with 19" step.

Platform size 36" x 38" and is 24" above pool deck.

I.D. No. 20360

[Spec Sheet LG 20.31-2](#)

## LIFEGUARD CHAIRS

### ACCESSORIES

#### LIFEGUARD CHAIR SEAT

One piece molded fiberglass reinforced, turquoise, plastic seat with stainless steel mounting bolts.

I.D. No. 20701

White Seat

I.D. No. 20701W



#### CUSHIONED SEAT UPGRADE/RETROFIT

The Cushioned Seat mounts to our existing swivel support pedestals and is offered as an upgrade for new lifeguard chair orders. The seat can also be retrofitted to existing lifeguard chairs with a swivel support pedestal in the field. Made from high impact plastic with cushions covered in marine grade vinyl. Seat folds down to prevent UV damage. Mounting adaptor plate and hardware kit included.

Upgrade for New Lifeguard Chairs

I.D. No. 20703

Retrofit for Existing Lifeguard Chairs

I.D. No. 20705

NEW



#### SWIVEL CHAIR SEAT SUPPORT

Stainless steel welded assembly ready for installation. Designed to render proper seating angle when mounted to plastic seat.

Has 360° swivel capability with bearing surface of low friction non-metallic disc to prevent seizing or binding due to corrosion.

Rugged construction. Hardware is not included.

I.D. No. 20702

Seat Support Hardware I.D. No. 93970



#### Semi-Permanent Chair

##### ROVER SEMI-PERMANENT

Designed for those pools where the lifeguard chair must be anchored, yet still be capable of being readily moved. Chair might be moved to opposite sides of the pool each day. The rear legs are set into sockets anchored in the deck, while the front legs with 7" diameter wheels allow for easy relocation. Ladder has 19" steps. Furnished with two pairs of anchor sockets (for two locations), additional sets must be ordered separately.

I.D. No. 20303

Spec Sheet LG 20.33



#### Original Fixed Chair

##### STANDARD

Our original, basic guard chair. The seat, backrest, and non-skid footrest are fabricated of laminated wood coated with fiberglass and polyester resin. The frame is constructed of stainless steel tube and ABS steps. Platform height is 4'4" and seat height is 6'0" above the deck. Furnished with 19" steps and holder for rescue tube and umbrella. Optional anchor socket (28102) and escutcheon plates (28301 or 28302) available.

I.D. No. 20601

Spec Sheet LG 20.35



## DIVING TOWERS

Our diving towers offer significant differences to satisfy varying needs, including budgets, preferences, and job conditions. Depending upon model, sizes vary from 1/2 meter to 3 meters in height. Paraflyte towers are available in one meter and three meter models.

Each tower is furnished complete with railings, rear anchor, front anchor, pedestal, and fulcrum. These can be varied to suit specific job requirements or specifications. Models satisfy most pool configurations, however, custom designs are available. Specification sheets, AutoCAD® drawings and Revlt models are available for each model.

Anchors are included and are shipped with each tower. Anchors needed in advance for construction purposes can be ordered by identification numbers.

Standard tower pedestals come in red prime coat, ready for painting to match your facility, or in stainless steel (at extra cost), with flanged base.

Each Paraflyte tower is available in several different grades. The variations among grades apply only to materials. There is no difference in design or detail between grades of the same tower.



# STAIR ENTRY SYSTEMS AVAILABLE FOR PARAGON DIVING TOWERS

**NEW**

Available both as part of a new diving tower, or as a retrofit to an existing PARAGON 3 meter diving tower.

All stair and guard rails (including both sides of diving board for new towers) to be provided with 1" OD pickets, not greater than 5" on center. All treads and platforms to be made from Duradeck Fiberglass Decking (White). Stair treads shall be 11" standard and risers shall not exceed 9". All new stair entry towers provided with flanged pedestals and Sportflyte grade materials unless otherwise specified.

Many custom architectural elements are also available including plexiglas panels (in place of pickets) and alternate stair plan views where access is limited. Additionally, AutoCAD 2D views and Revit 3D models can be provided for all standard and custom solutions. Call for a consultation.



## NEW PARAGON 3-METER DIVE TOWER WITH STAIR ENTRY SYSTEM

Tower Model	Paraflyte		Duradapt		Sportflyte	
Stair Position	Right	Left	Right	Left	Right	Left
I.D. No.	12193R	12193L	12190R	12190L	13505R	13505L
Spec Sheet	DT10.31		DT10.32		DT10.33	

## RETROFIT STAIR ENTRY SYSTEM TO EXISTING PARAGON SIDE OR REAR LADDER 3-METER DIVE TOWER

Tower Model	Paraflyte			Duradapt		Sportflyte	
Existing Ladder			Rear			Rear	Rear
Stair Position	Right	Left	Right*	Right	Left	Right*	Right*
I.D. No.	12196R	12196L	12198	12196R	12196L	12199	12198
Spec Sheet	DT10.34		DT10.36	DT10.35		DT10.37	DT10.36

\*Standard access is on Right Side (viewed from rear of tower, facing pool). Left side access also available upon request.

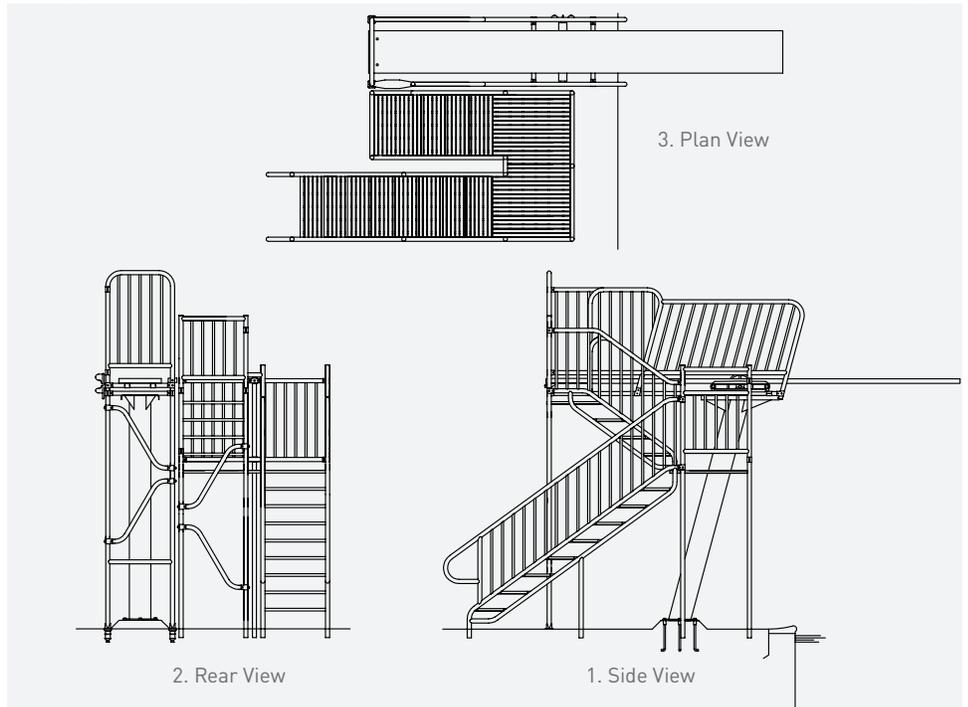
Diving board style and configuration must be specified at time of order. Please see page 29 for specifications and board selection.

For NEW models, please specify diving board type and length when ordering.

Call or e-mail for consultation:  
1-888-534-7946

PoolApplicationsRFQ@pentair.com

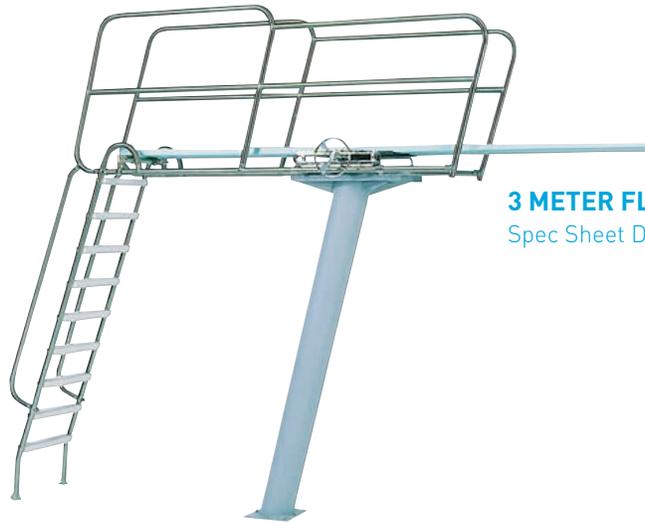
Custom retrofit solutions available for other styles.



## PARAFLYTE DIVING TOWERS

### PARAFLYTE, LADDER AT REAR

The most common option, designed for competition and larger commercial or institutional pools where ample space is available. May be installed outdoors or indoors. Utilizes 26" steps. Guard rails and hand rails are welded and extend to pool edge.



**3 METER FLANGED PEDESTAL**  
Spec Sheet DT 10.05



**1 METER FLANGED PEDESTAL**  
Spec Sheet DT 10.09

### PARAFLYTE, LADDER AT SIDE

Designed for limited space, particularly natatoriums. Uses three feet less deck space than ladder-at-rear towers. Ladder can be mounted on either side. Utilizes 19" steps. Guard rails and hand rails are welded and extend to pool edge.

The **Anchor Bolt Assembly** is included as a standard component with all diving towers with flanged pedestals. The flanged stub or the cage anchor can be noted in the specifications and/or purchase order and will be an added cost. See page 31 for complete details on anchors and accessories.



**3 METER FLANGED PEDESTAL**  
Spec Sheet DT 10.17



**1 METER FLANGED PEDESTAL**  
Spec Sheet DT 10.21

### ANCHOR BOLT ASSEMBLY

I.D. No. 12307  
Spec Sheet DA 10.31

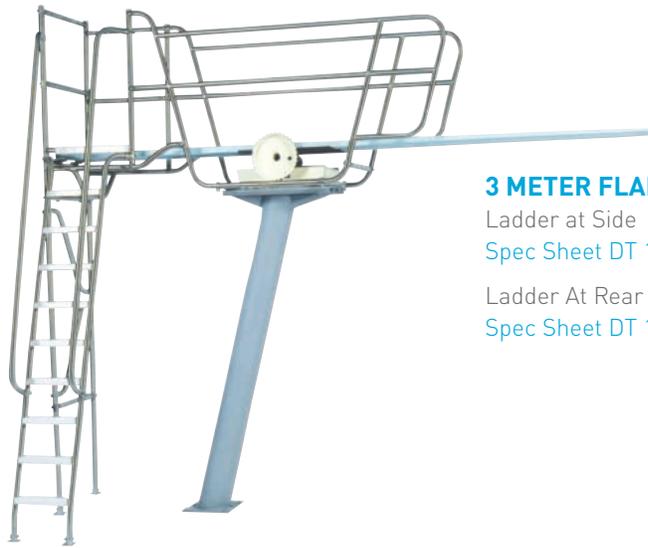


WARNING: Diving equipment shown here should be used only on pools that conform to FINA, NCAA, NFHS and US Diving standards. Please refer to your local, municipal and state statutes, ordinances, rules and regulations which may vary.



## DURADAPT DIVING TOWERS

Made for Durafirm short stand (fulcrum and anchor/hinged assembly). Recommended only for competition pools and only for 16' Duraflex or Maxiflex boards. Ladder at side (as shown) or can be mounted at rear if specified. Utilizes 19" steps. Comes with flanged pedestal only. Guard rails and hand rails are welded and extend to pool edge. Durafirm fulcrum and anchor/hinged assembly are not included and must be ordered separately.



### 3 METER FLANGED PEDESTAL

Ladder at Side  
Spec Sheet DT 10.01S

Ladder At Rear  
Spec Sheet DT 10.01R



### 1 METER FLANGED PEDESTAL

Ladder at Side  
Spec Sheet DT 10.03S

Ladder At Rear  
Spec Sheet DT 10.03R

## SPORTFLYTE DIVING TOWERS

Not suitable for competition. The Economy model is designed for recreational use. Utilizes 19" steps. Fulcrum may be repositioned. Guard rails and hand rails are welded and extend to pool edge.

All towers provided with flanged pedestals unless otherwise specified.



### 3 METER FLANGED PEDESTAL

Spec Sheet DT 10.25



### SPORTFLYTE FULCRUM

Used with the Sportflyte Diving Tower  
I.D. No. 13554



### 1 METER FLANGED PEDESTAL

Spec Sheet DT 10.29

BOARD LENGTH				
Height Above Water	16'	14'	12'	10'
3m	13501	13502	N/A	N/A
1m	13511	13512	N/A	N/A
3/4 m	N/A	N/A	13517	N/A
1/2 m	N/A	N/A	N/A	13507

\* Specify Century or Paraflex board at time of order. Sportflyte Towers are not intended for use with Duraflex or Maxiflex boards.



WARNING: Diving equipment shown here should be used only on pools that conform to FINA, NCAA, NFHS and US Diving standards. Please refer to your local, municipal and state statutes, ordinances, rules and regulations which may vary.

## DIVING BOARDS

Paraflyte stands are designed to receive either 16' or 14' diving boards. A 16' diving board by 20" wide, with a 24" fulcrum range, is the only board acceptable for official, competitive diving. A 14' board may be used on a recreational diving stand when less spring is desired. All diving boards have an integral non-skid surface.

**DURAFLEX:** Acknowledged as one of the finest aluminum boards, the Duraflex can be found at leading competitive pools. It tapers from tip to fulcrum while maintaining the thicker section from fulcrum to butt end

**MAXIFLEX B:** A double tapered version of the Duraflex. This board tapers from tip to fulcrum maintaining a constant thickness through the fulcrum range, then thinning out toward the butt end. The double tapering offers livelier action. The top surface is perforated to reduce aerodynamic drag during flexing and rebound. Available in 16' length only.

**PARAFLEX:** A high-quality aluminum board for general commercial and institutional use. Uniform thickness throughout entire length.

**CENTURY (EUREKA):** The very best of the wood-fiberglass boards. The core has 26 laminations with complete fiberglass wrap on all sides and edges, with extra layers of fiberglass over the fulcrum area.

### ALUMINUM BOARDS

Spec Sheet DA 20.17

Board	I.D. No.
16' Duraflex	26101-1
14' Duraflex	26103-1
16' Maxiflex B	26107-1
16' Paraflex	26201-1
14' Paraflex	26202-1

### WOOD BOARDS

Spec Sheet DA 20.19

16' Century	26301-1
14' Century	26302-1

## Diving Tower Selection

Each diving tower identification number defines a complete tower. It must be selected to reflect the following choices:

**CONFIGURATION**—Each configuration covers a particular style of tower (ladder at rear, ladder at side, etc.), the height (3 meter or 1 meter) and the type and length of diving board to be used.

**GRADE**—Paraflyte towers are made in three different grades—Ultraflyte, Superflyte and Topflyte.

Your choices include:

- 1. Ultraflyte**—Premier grade. All tube is 1.90" O.D. x .145" wall T304 stainless steel.
- 2. Superflyte**—General purpose, middle grade. All tube is T304 stainless steel 1.90" O.D., with wall thicknesses of .145", .109", .065". The wall thickness of each member is dependent upon structural requirements.

**3. Topflyte**—Economy grade. All tube with the exception of the flexural members, are T304 stainless steel 1.90" O.D. x .065" wall. The members requiring additional strength are T304 stainless steel tube 1.90" O.D. x .145" wall.

**NOTE:** For Paraflyte Towers, the Deluxe Geared Adjustable Fulcrum is provided with all Ultraflyte and Superflyte models. The Economy Geared Adjustable Fulcrum is provided with the Topflyte models.

**Diving Board**— Although a diving board is not included, the tower is fabricated to accommodate the type and length board to be used. Fabrication and setting dimensions may vary dramatically among boards.

DIVING TOWER SELECTION BY DIVING BOARD STYLE AND CONFIGURATION							
Identification Numbers							
Grade	16' Duraflex	14' Duraflex	16' Maxiflex	16' Paraflex	14' Paraflex	16' Century	14' Century
<b>3 METER PARAFLYTE TOWER, LADDER AT REAR, FLANGED PEDESTAL</b>							
Ultraflyte	12009	12010	12011	12012	12013	12014	12015
Superflyte	12016	12017	12018	12019	12020	12021	12022
Topflyte	12023	12024	12025	12026	12027	12028	12029
<b>1 METER PARAFLYTE TOWER, LADDER AT REAR, FLANGED PEDESTAL</b>							
Ultraflyte	12093	12094	12095	12096	12097	12098	12099
Superflyte	12100	12101	12102	12103	12104	12105	12106
Topflyte	12107	12108	12109	12110	12111	12112	12113
<b>3 METER PARAFLYTE TOWER, LADDER AT SIDE, FLANGED PEDESTAL</b>							
Ultraflyte	12051	12052	12053	12054	12055	12056	12057
Superflyte	12058	12059	12060	12061	12062	12063	12064
Topflyte	12065	12066	12067	12068	12069	12070	12071
<b>1 METER PARAFLYTE TOWER, LADDER AT SIDE, FLANGED PEDESTAL</b>							
Ultraflyte	12135	12136	12137	12138	12139	12140	12141
Superflyte	12142	12143	12144	12145	12146	12147	12148
Topflyte	12149	12150	12151	12152	12153	12154	12155
<b>3 METER DURADAPT TOWER</b>							
Ultraflyte	12001		12001				
Superflyte	12002		12002				
<b>1 METER DURADAPT TOWER</b>							
Ultraflyte	12003		12003				
Superflyte	12004		12004				

## STURDEE STAND

Ideal for replacing existing or obsolete diving towers up to one meter. No pedestal required. For recreational, non-competitive facilities.

Anchors are included and are shipped with each tower. Anchors needed in advance for construction purposes should be ordered by identification numbers.

### HAND ADJUSTABLE FULCRUM FOR THE STURDEE STAND

The hand adjustable fulcrum is provided as an economical alternative for pools where a readily adjustable fulcrum is not required.

White and Chrome  
I.D. No. 12518HAF  
Spec Sheet DA 20.26



## STURDEE STAND

Sturdee Stand is complete with frames, rear rails with one or two mounting steps, four bronze anchor sockets (28102), two deluxe rear anchors (28201), four deluxe escutcheon plates (28301) and a hand adjustable fulcrum (12518HAF). Side and intermediate guard rails are also included. Steps are 26". Rear swivels are included for Duraflex (18401) and Maxiflex (18402) diving boards.

1-Step [Spec Sheet DS 20.50.1](#)

2-Step [Spec Sheet DS 20.50.2](#)



### STURDEE STAND SELECTOR CHART

Model	16' Duraflex	14' Duraflex	16' Maxiflex	16' Paraflex	14' Paraflex
Heavy Duty 1-Step	14101	14102	14103	14104	14105
Heavy Duty 2-Step	14108	14109	14110	14111	14112
Deluxe 1-Step	14115	14116	14117	14118	14119
Deluxe 2-Step	14122	14123	14124	14125	14126

Model	16' Century	14' Century	12' Board	10' Board
Heavy Duty 1-Step	14106	14107	14132	14142
Heavy Duty 2-Step	14113	14114	N/A	N/A
Deluxe 1-Step	14120	14121	14131	14141
Deluxe 2-Step	14127	14128	N/A	N/A

For assistance with diving tower selection, please contact us or your local Paragon Aquatics distributor.

## RAILS FOR TOWERS

Prior to 1993, industry standards did not require guard rails or hand rails. Since our products last much longer than this, we offer retrofit rails for your convenience. When ordering retrofit rails, please specify tower height (1- or 3-meter) and diving board manufacturer, model, and length.

### RETROFIT RAILS FOR TOWERS

#### LADDER HAND RAILS (pair):

**For 3-meter Paraflyte towers with ladder at rear:**

Ultraflyte I.D. No. 12401

Superflyte I.D. No. 12402

Topflyte I.D. No. 12403

#### FRONT GUARD RAILS (pair):

**For 1-meter or 3-meter Paraflyte towers with ladder at rear:**

Ultraflyte I.D. No. 12404

Superflyte I.D. No. 12405

Topflyte I.D. No. 12406

#### MIDDLE GUARD RAILS (pair-includes front and back rail):

**For 1-meter or 3-meter Paraflyte towers with ladder at rear:**

Ultraflyte I.D. No. 12407

Superflyte I.D. No. 12408

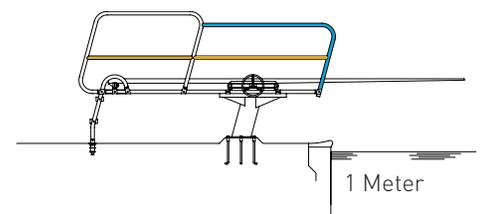
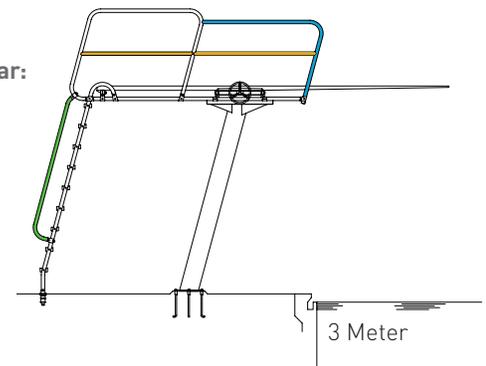
Topflyte I.D. No. 12409

**For 1-meter or 3-meter Paraflyte towers with ladder at side:**

Ultraflyte I.D. No. 12410

Superflyte I.D. No. 12411

Topflyte I.D. No. 12412



WARNING: Diving equipment shown here should be used only on pools that conform to FINA, NCAA, NFHS and US Diving standards. Please refer to your local, municipal and state statutes, ordinances, rules and regulations which may vary.

# DIVING TOWER AND STAND ACCESSORIES

## GEARED ADJUSTABLE FULCRUM

A readily adjustable fulcrum is required for competitive diving. A geared fulcrum permits divers to select the right amount of spring for his or her weight and for specific dives. Calibrated markings on the gear-holder make it easy for the diver to re-set the fulcrum where desired. Smooth, precise adjustments are easy due to the machined gears and freely turning sleeve on the axle. The adjusting wheel is operable by hand or foot for the full 24" fulcrum range. (Stops are provided to limit the range for recreational use.) Holders keep the rolling gears locked into the gear track and shields all gears from contact by divers and spectators.

The Deluxe model contains chrome-plated bronze and stainless steel components.

[26" Deluxe Geared](#) I.D. No. 24101

[30" Deluxe Geared](#) I.D. No. 24102

[Custom Deluxe Geared](#) I.D. No. 24105



The Economy model contains painted cast aluminum and stainless steel components.

[26" Economy](#) I.D. No. 24106

[30" Economy](#) I.D. No. 24107

[Custom Economy](#) I.D. No. 24110

[Spec Sheet DA 20.25](#)

## REAR SWIVELS FOR DIVING STANDS

Permit free movement of the butt end of the diving boards, thereby improving diver performance and increasing board life. Strongly recommended for competition and/or high performance diving boards.

[For Duraflex Diving Boards](#) I.D. No. 18401

[For Maxiflex Diving Boards](#) I.D. No. 18402

[For All Other Diving Boards](#) I.D. No. 18403

[Spec Sheet DA 20.21](#)



## PEDESTAL ANCHORS

The Anchor Bolt Assembly is included as a standard component with all Paraflyte towers. The Flanged Stub or the Cage Anchor can be substituted as the anchor for the flanged pedestal and should be noted in the specifications and/or purchase order and will be an added cost.

[Spec Sheet DA 10.31](#)



### ANCHOR BOLT ASSEMBLY

Anchor j-bolts are carbon steel 3/4" in diameter and eight are furnished. Each bolt is hooked at the bottom. A threaded bushing is provided at the top. A template is included for accurate setting for alignment with tower pedestal.

I.D. No. 12307

[Spec Sheet DA 10.31](#)

## FLANGED STUB

Consists of a 3/4" thick steel plate welded to a 10" diameter pipe, with blind, threaded bushings. Can be used if the tower is supported by a foundation pad on grade or in a framed beam if it is at least 18" deep.

[Carbon Steel](#) I.D. No. 12301

[Stainless Steel](#) I.D. No. 12303 (available upon request)

[Spec Sheet DA 10.31](#)



### CAGE ANCHOR

Must be used as the pedestal anchor when the tower is to be supported on a framed slab. Anchor consists of 3/4" thick steel plates, 3/4" threaded rods and threaded bushings, which can be made to suit a beam or slab of any thickness greater than 6".

[Carbon Steel](#) I.D. No. 12304

[Stainless Steel](#) I.D. No. 12306 (available upon request)

[Spec Sheet DA 10.31](#)

## REAR ANCHOR DELUXE

To anchor rear legs of all diving towers or stands or for any other application where there is an uplift on the leg being held. Two piece, heavy cast bronze construction. The upper flange is chrome-plated. Body has threaded hole at bottom to allow addition of 1/2" diameter bolt if required for additional bond.

I.D. No. 28201

[Spec Sheet AA 20.80](#)



**APPLIED LOADS:** It is the designer's responsibility to provide a supporting structure able to carry the applied loads for a tower supported on a framed beam or slab. The loads to be used for this purpose are:

#### THREE METER:

Front Anchor: A downward, vertical load of 4,500 lbs., plus a moment of 9,000 ft. lbs.

Rear Anchors: A combined upward, vertical load of 1,500 lbs.

#### ONE METER:

Front Anchor: A downward, vertical load of 4,200 lbs., plus a moment of 2,000 ft. lbs.

Rear Anchors: A combined upward, vertical load of 1,800 lbs.

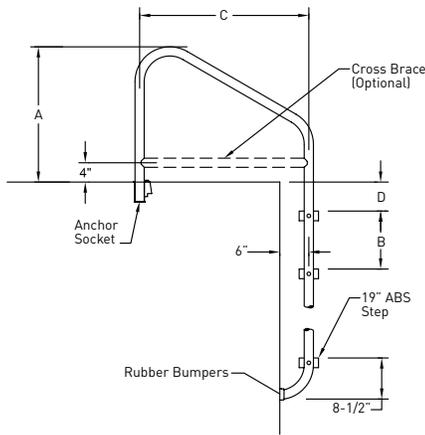


**WARNING:** Diving equipment shown here should be used only on pools that conform to FINA, NCAA, NFHS and US Diving standards. Please refer to your local, municipal and state statutes, ordinances, rules and regulations which may vary.

## VERTICAL LADDERS

The ladders shown on these pages offer the most convenient method of pool entry wherever stairs cannot be used. Each ladder comes standard with two frames and injection molded ABS-UV inhibited steps bolted between them. They can also be provided with stamped stainless steel steps upon request. All frames are made of corrosion resistant T304 stainless steel, 1.90" O.D. tube and provide ample length for a 4" anchor penetration. The bolts have contoured heads curved to fit the tubing of the frames. All ladder styles with frames resting against the pool wall have rubber bumpers to prevent damage to the wall. All vertical ladders use 19" vertical steps, are similar in appearance and vary only in:

- Wall thickness of tubing (.065", .109" or .145")
  - Width of frames from front to back (24", 29", or 35")
  - Number of steps (2 to 5)
  - Florida and Therapy styles
- Anchor sockets and escutcheon plates are not included with ladders and must be ordered separately.



LADDER REFERENCE DIMENSIONS WITH AND WITHOUT CROSS BRACE				
	A	B	C	D
Heavy Duty	28"	12"	24", 29", 35"	6"
Deluxe	28"	12"	24", 29"	6"
Florida	32"	12"	36"	4"

**HEAVY DUTY** (.109" or .145" wall thickness). For commercial and institutional use. Made only in thicker grades of stainless steel to withstand heavier usage.

Spec Sheet LD 30.01

**HEAVY DUTY WITH CROSS BRACE** Recommended for heavy duty commercial use at public and institutional pools. Reinforced with cross braces for extra rigidity and strength.

Spec Sheet LD 30.03

**FLORIDA STYLE** Offered in 3 grades (.065", .109", or .145" wall thickness). Extends extra high over deck to clear the 6" curb required on all Florida pools.

Spec Sheet LD 30.02

**FLORIDA STYLE** with Cross Brace Same as Florida Style but with cross braces for extra rigidity.

Spec Sheet LD 30.04

**DELUXE** (.065" wall thickness). Recommended for residential pools and light commercial use. Ladder frames go slightly deeper into water and extend slightly higher above deck compared to normal residential ladders. Recommended only for concrete or vinyl-lined pools.

Spec Sheet LD 30.01



Cross-brace (optional)

HEAVY DUTY LADDERS							DELUXE LADDERS	
	24" Width		29" Width		35" Width		24" W	29" W
	.145"	.109"	.145"	.109"	.145"	.109"	.065"	.065"
2 Step	42201	42213	42205	42217	42209	42221	42301	42305
3 Step	42202	42214	42206	42218	42210	42222	42302	42306
4 Step	42203	42215	42207	42219	42211	42223	42303	42307
5 Step	42204	42216	42208	42220	42212	42224	42304	42308

CROSS BRACED LADDERS									
	24" Width			29" Width			35" Width		
	.145"	.109"	.065"	.145"	.109"	.065"	.145"	.109"	.065"
eSt 2	42101	42113	42125	42105	42117	42129	42109	42121	42133
eSt 3	42102	42114	42126	42106	42118	42130	42110	42122	42134
eSt 4	42103	42115	42127	42107	42119	42131	42111	42123	42135
eSt 5	42104	42116	42128	42108	42120	42132	42112	42124	42136

FLORIDA STYLE LADDERS				FLORIDA STYLE WITH CROSS BRACE		
	36" Width			36" Width		
	.145"	.109"	.065"	.145"	.109"	.065"
2 step	42519	42515	42511	42159	42155	42151
3 Step	42520	42516	42512	42160	42156	42152
4 Step	42521	42517	42513	42161	42157	42153
5 Step	42522	42518	42514	42162	42158	42154

### THERAPEUTIC LADDER (shown with Safety Wedge)

Designed for hospital and/or handicapped treatment pools. Sloping design, handrails and steps spaced 10" apart permit easy entry by the elderly or infirm. If dimension from deck to pool floor is:

- 18" to 27" use 2-step
- 28" to 37" use 3-step
- 38" to 47" use 4-step
- 48" to 57" use 5-step

2 step	42701	42705	42709
3 step	42702	42706	42710
4 step	42703	42707	42711
5 step	42704	42708	42712

Spec Sheet TA 30.21

**SAFETY WEDGE** The protective wedge prevents swimmers from lodging between pool wall and ladder. To ensure maximum effectiveness each wedge is custom fit to each facility. Made from white polypropylene with stainless steel mounting brackets for easy installation or retrofit.

I.D. No. 42725 (must be ordered separately)



Uses 19" sloping steps

# LADDER SOLUTIONS

## SLOPING AND VERTICAL STEPS

(include hardware)

Shipped in individual bags containing installation instructions and maintenance information. These are molded from UV inhibited ABS.

19" Vertical Step I.D. No. 44101

19" Sloping Step I.D. No. 44104

26" Vertical Step I.D. No. 44107

26" Sloping Step I.D. No. 44109



Sloping



Vertical

## STAINLESS STEEL STEP

19" Vertical Step (includes hardware)  
[4" Deep x 1.9" O.D. tubing]

I.D. No. 44102



# Coping and Waterfront Ladders



Uses 19" vertical steps

## COPING LADDER

For vertical wall pools where anchorage to pool structure is desired rather than to deck.

[Spec Sheet LD 30.07](#)



Uses 19" vertical steps

## PIER LADDER

For installation on fixed concrete piers where bottom support for ladder is not possible. Installed in anchor sockets cast into deck.

[Spec Sheet LD 30.11](#)

1.90" x .065" WALL THICKNESS

	Coping	Pier	Raft	Dock
2 step	42501	N/A	N/A	N/A
3 Step	42502	42601	42604	42607
4 Step	42503	42602	42605	42608
5 Step	N/A	42603	42606	42609



Uses 19" vertical steps

## DOCK LADDER

For installation on fixed wooden docks where bottom support for ladder is not possible. Fastened to decking with lag screws (included).

[Spec Sheet LD 30.13](#)



Uses 19" sloping steps

## RAFT LADDER

For installation on floating wooden rafts. Fastened with lag screws (included).

[Spec Sheet LD 30.12](#)

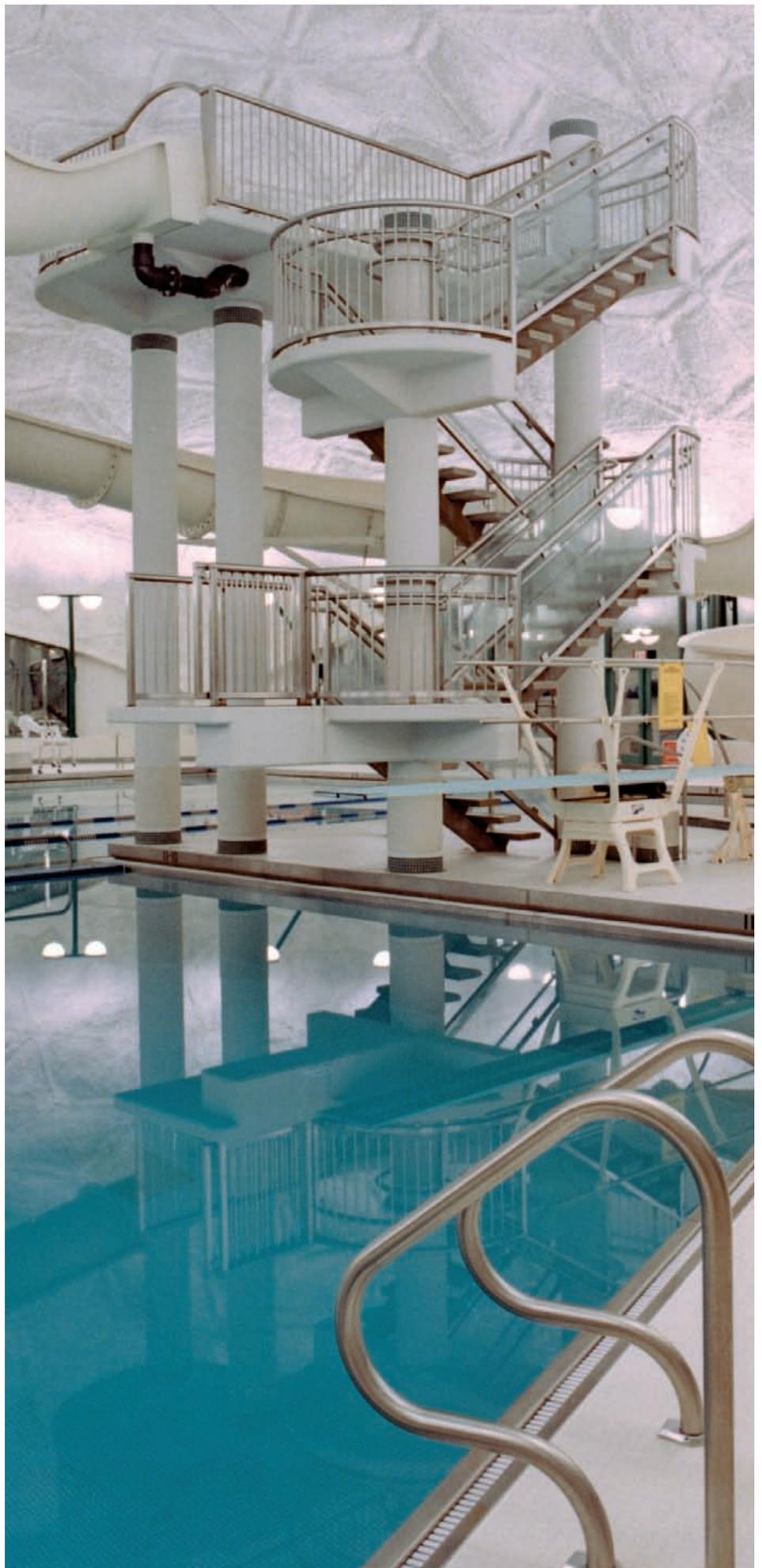
## RAIL SOLUTIONS

Choose from various styles of grab, deck and stair-mounted rails to fit your needs. The heavier the traffic, the heavier the tubing you should select. Custom designs are also available. Order separately: four anchor sockets and escutcheon plates for each pair of grab rails.

Rails are available in 1.90" x .065, 1.90" x .109, 1.90" x .145 O.D., T304/T304L or T316L stainless steel tubing, polished and buffed to a 320 grit finish. Manufactured custom rails are available in 1.50" x .120 O.D. Rectangular and square tubing can be provided upon request. Passivation is in compliance with ASTM 967-99.

Standard finish is T304/T304L stainless steel polished and buffed to a 320 grit finish. Other materials and finishes including T316 stainless steel and custom powder-coating is available by custom quotation.

If rails are not being installed directly into the concrete, anchor sockets are available to accommodate 1.90" and 1.50" rails. New 1.50" O.D. x 6" deep stainless steel anchors and escutcheons can be provided where specified.



## GRAB RAILS

Grab rails come in pairs. They are used to keep racing lanes free of obstructions when used in conjunction with built-in steps.

### STAINLESS STEEL RECESSED STEP

(15"W x 5"H x 5"D) sets flush in wall. Built-in step is grouted into a rough hole and has a sloped tread to promote drainage. Polished, corrosion-resistant, non-skid sand blasted bottom tread for added traction. Recommended for use in all climates.

I.D. No. 32104

Spec Sheet AA 20.73



### FROST PROOF RECESSED STEP

(15-1/2"W x 5"H x 5-1/2"D) is heavy duty, foamed plastic without projecting lip. Textured bottom tread for added traction. Built-in step is grouted into a rough hole. Specifically recommended for use in freezing climates. White.

I.D. No. 32102

Spec Sheet AA 20.72



### LONG REACH PRETZEL

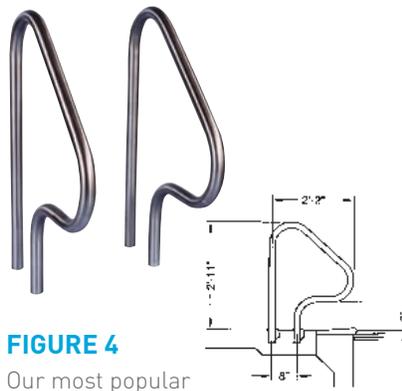
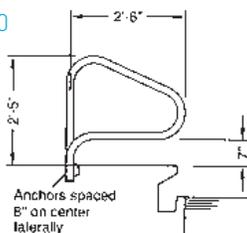
Similar to standard pretzel but recommended for installations with wide gutters. Legs are offset laterally to accommodate joints or obstructions in the pool deck.

.145" wall I.D. No. 30211

.109" wall I.D. No. 30212

.065" wall I.D. No. 30213

Spec Sheet GR 20.50



**FIGURE 4**

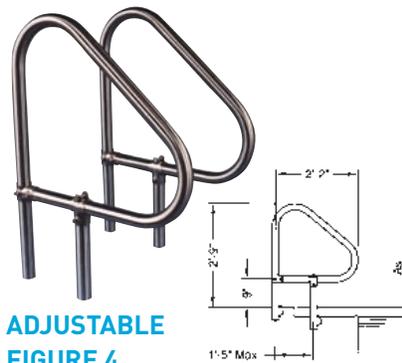
Our most popular model. For flat deck without unusual curbs or coping.

.145" wall I.D. No. 30101

.109" wall I.D. No. 30102

.065" wall I.D. No. 30103

Spec Sheet GR 20.41



**ADJUSTABLE FIGURE 4**

Front leg is adjustable in field so it can be set atop curbs or into gutters. Choose this model when unusual conditions will not permit use of Figure 4 style.

.145" wall I.D. No. 30301

.109" wall I.D. No. 30302

.065" wall I.D. No. 30303

Spec Sheet GR 20.45



**LONG REACH ADJUSTABLE**

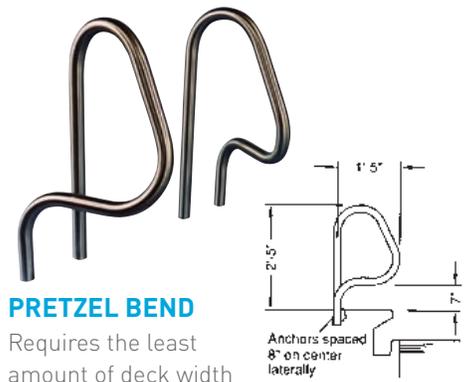
Available in sizes to fit extra-wide gutter systems in the increasingly popular "fast-pool" design concept. Specify "B" dimension. Custom fabricated to pool profile.

.145" wall I.D. No. 30320

.109" wall I.D. No. 30321

.065" wall I.D. No. 30322

Spec Sheet GR 20.49



**PRETZEL BEND**

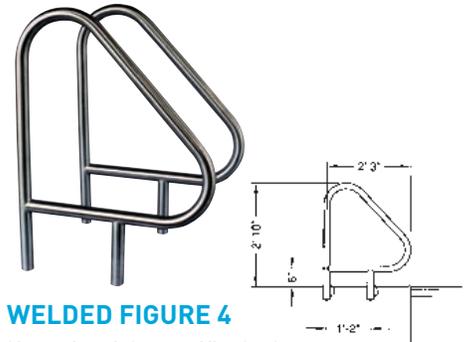
Requires the least amount of deck width with the narrowest profile as the legs are offset laterally instead of front to back. Can usually be mounted on pool wall rather than the deck slab.

.145" wall I.D. No. 30201

.109" wall I.D. No. 30202

.065" wall I.D. No. 30203

Spec Sheet GR 20.43



**WELDED FIGURE 4**

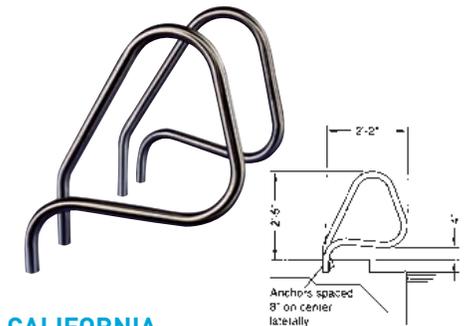
If you furnish specific deck and gutter dimensions we can supply our Adjustable Grab Rail styling as a fixed, fully-welded unit.

.145" wall I.D. No. 30511

.109" wall I.D. No. 30512

.065" wall I.D. No. 30513

Spec Sheet GR 20.46



**CALIFORNIA**

Made extra-wide to clear wide gutters or when deck-to-water distance is exceptionally great. Legs offset laterally to minimize deck width requirements. Front end dips downward for a shorter reach for low water level pools.

.145" wall I.D. No. 30401

.109" wall I.D. No. 30402

.065" wall I.D. No. 30403

Spec Sheet GR 20.47

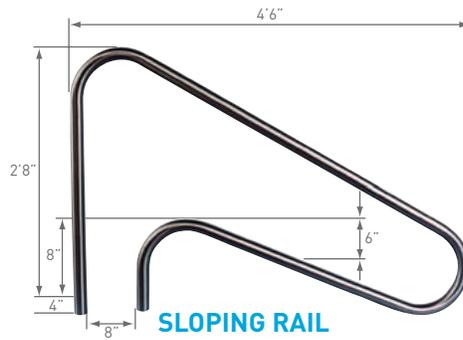


## DECK MOUNTED RAILS

Deck Mounted Rails are intended for use with vinyl or fiberglass pools having premolded steps. Anchorage of the rails to the deck is 8" on center and provides the stability needed without penetrating the molded steps.

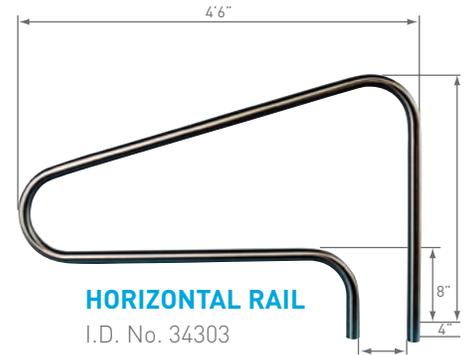
A variety of models are available to meet any pool or spa configuration.  
 1.90" O.D. x .065" wall thickness.  
 1.50" O.D. available upon request.

Heavier gauges available upon request.  
 All rails are 54" long and 32" high.



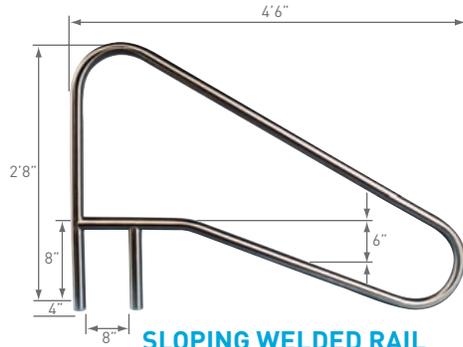
**SLOPING RAIL**

I.D. No. 34301  
 Spec Sheet SR 20.63



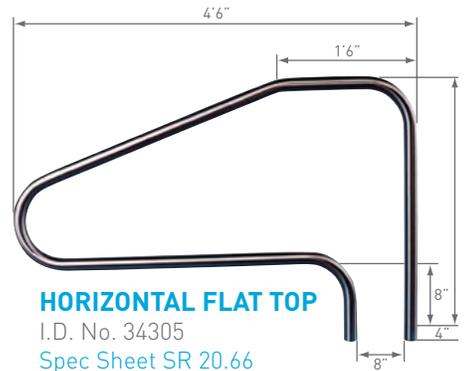
**HORIZONTAL RAIL**

I.D. No. 34303  
 Spec Sheet SR 20.65



**SLOPING WELDED RAIL**

I.D. No. 34307  
 Spec Sheet SR 20.64

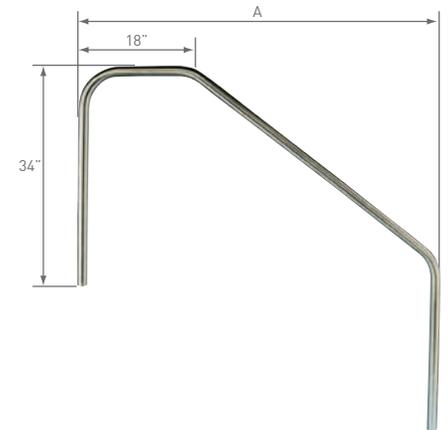
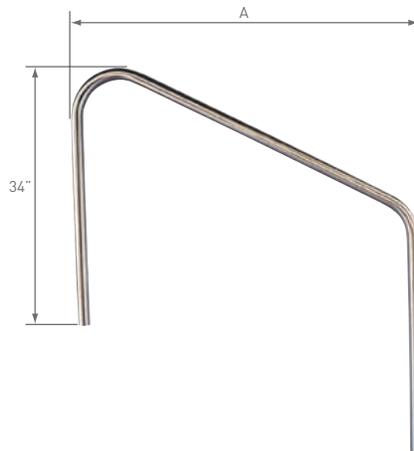


**HORIZONTAL FLAT TOP**

I.D. No. 34305  
 Spec Sheet SR 20.66

## STAIR MOUNTED RAILS

Stair Rails should be used on all pool entry steps as a necessary safety feature to allow safe entry and exit from the pool.



	48" wide	60" wide	72" wide
<b>1.90" O.D. x .065" wall thickness</b>			
2 bend	34101	34102	34103
<b>1.90" O.D. x .109" wall thickness.</b>			
2 bend	34104	34105	34106
<b>1.90" O.D. x .145" wall thickness</b>			
2 bend	34107	34108	34109
Spec Sheet SR 20.61			

	48" wide	60" wide	72" wide
<b>1.90" O.D. x .065" wall thickness</b>			
3 bend	34201	34202	34203
<b>1.90" O.D. x .109" wall thickness</b>			
3 bend	34204	34205	34206
<b>1.90" O.D. x .145" wall thickness</b>			
3 bend	34207	34208	34209
Spec Sheet SR 20.62			

## EXERCISE AND THERAPEUTIC RAILS

For exercise or therapy, we offer wall mounted and free standing solutions.



### TRANSFER RAILS

Stainless Steel Transfer Rails are available in 4 lengths...

**NEW**



All Transfer Rails come with Flanges and Hardware

- 10" Transfer Rail I.D. No 34519
  - 12" Transfer Rail I.D. No 34520
  - 14" Transfer Rail I.D. No 34522
  - 16" Transfer Rail I.D. No 34524
- [Spec Sheet TA 20.66](#)



### EXERCISE RAILS

May be used as wall rails for additional stability for persons entering pools, showers, locker rooms, hallways and ramps. They may also help in aiding the therapist or client by providing wall-mounted support for warming and stretching exercises, as well as wall-mounted in the pool for hydrotherapy sessions. Mounted with lag bolt and shield to maintain a 1-1/2" clear opening between rail and wall. 1.90" O.D. x .065" wall thickness. Heavier gauges and O.D.'s available upon request.

[Spec Sheet TA 20.80](#)



Length (ft)	Plain Ends		Return Ends	
	2 Brackets	3 Brackets	2 Brackets	3 Brackets
5	34401			
6	34402		34411	
7	34403		34412	
8			34413	
9		34404		
10				34414
11		34405		
12				34415
13		34406		
14				34416

### LIGHTWEIGHT STAINLESS STEEL THERAPY PARALLEL BARS

Straddle bars are adjustable from a 28" to a full height of 40". Hand grips are comfortable to use. The supporting base is a solid one-piece welded construction which includes rubber pads to help stabilize the unit on a variety of floor surfaces so that it can be used in the therapy room, as well as in the pool.

Custom lengths can be ordered.

- 6' Length I.D. No 34510
  - 8' Length I.D. No. 34515
- [Spec Sheet TA 20.66](#)



### ADJUSTABLE HEIGHT TEACHING PLATFORM

Instructional platform constructed of T304 stainless steel with non-skid, cross-grooved sand textured deck. Multi-level permanent hand rails on three sides create a controlled teaching environment. Legs adjust to 5 different height positions. Platform places swimmer 18"-26" above pool floor.

60"x39" platform with slip resistant deck.

I.D. No. 34700

[Spec Sheet SR TP 10.01](#)



**NEW**

## CUSTOM-MADE RAILINGS

We will fabricate railings to your specifications whenever custom fabricated, corrosion-resistant, stainless steel railings are required. Can be used for any pool application including entry, ADA compliant, stairs, deck guards and diving towers. Design and engineering support are readily available.

Our railings are manufactured and verified to meet your project's unique specifications. All rails are factory welded and are shipped ready for installation requiring no field cutting, drilling or modifications.



ORLANDO, FLORIDA

We manufacture most rail goods in 1.90" O.D. stainless steel tubing, and have extensive experience manufacturing custom rails in 1.50" O.D. as well. If rails are not being installed directly into the concrete, anchor sockets are available to accommodate 1.90" and 1.50" rails.



PHOENIX, ARIZONA

## ANCHORS

### DELUXE STAINLESS STEEL ESCUTCHEON

With set screw to cover anchor sockets. Fit 1.90" O.D. tubing. The deluxe unit is heavy duty stainless steel casting with set screw.

1.90" SS

I.D. No. 28301SS

Spec Sheet AA 20.90SS

1.50" SS

I.D. No. 28303SS

Spec Sheet AA 20.93



### DELUXE BRONZE ESCUTCHEON

Covers anchor sockets. Fit 1.90" O.D. tubing. The deluxe unit is a chrome-plated bronze casting with set screw.

Escutcheon Plate, Deluxe

1.90" CPB

I.D. No. 2830

Spec Sheet AA 20.90



### STANDARD ESCUTCHEON

Made from a stainless steel stamping to fit 1.90" O.D. tubing.

Escutcheon Plate –  
Stainless Steel, Standard

I.D. No. 28302

Spec Sheet AA 20.91

1.50" x 4-1/2" round

I.D. No. 28303

Spec Sheet AA 20.92



### STAINLESS STEEL 1.50" WEDGE ANCHOR

For anchoring 1.50" O.D. deck equipment where specified. Heavy duty cast T316 stainless steel, 6" deep with bronze wedge and stainless hardware.

I.D. No. 28105SS

Spec Sheet AA20.82A



### ANCHOR SOCKET, BRONZE

For anchoring all 1.90"/1.50" O.D. deck equipment (except rear legs of diving towers and stands, starting platforms, and stanchions). Cast bronze with locking bronze wedge and stainless steel bolt.

1.90" O.D. x 4" Deep

I.D. No. 28102

Spec Sheet AA 20.81

1.50" O.D. x 4" Deep

I.D. No. 28105

Spec Sheet AA 20.82



### ANCHOR SOCKET COVER

Sold Separately

I.D. No. 28104



### STAINLESS STEEL COMMERCIAL CUP ANCHORS

Anchored into pool wall for use with racing lanes and life lines. New cast stainless steel cup anchor with integral bar or triangular eye bolt for attaching multiple lanes.

### CUP ANCHOR WITH INTEGRAL ANCHOR BAR

I.D. No. 70316SS

Spec Sheet AA 20.70



### CUP ANCHOR WITH TRIANGULAR EYE BOLT

Eye Bolt is removable and replaceable

I.D. No. 70316SE

### TRIANGULAR EYE BOLT

I.D. No. 70321

Spec Sheet AA 20.71



### HEAVY DUTY EYE BOLT

I.D. No. 70317

### THREADED WALL INSERT FOR HEAVY DUTY EYE BOLT

I.D. No. 70318

Spec Sheet AA 20.83



### STANDARD EYE BOLT

I.D. No. 70319

### THREADED WALL INSERT FOR STANDARD EYE BOLT

I.D. No. 70320

Spec Sheet AA 20.84

## UNDERWATER LIGHTS

This superb collection of underwater lights includes the ultra-thin, 500W Slimlite and the new Slimlite 5G LED light which uses less energy. All lights are bronze and copper construction with chrome-plated reflector shells and grille has protective cast bronze powder coating. The 110-volt lights come with a protective grille. Each light is rigidly inspected and submersion tested for water tightness and performance. All lights come with halogen bulbs.

All lights are UL listed, when used with our niches. Lights and niches are designed for use in fresh water only. Niches have a 3/4" or a 1" threaded connection for installation in concrete or vinyl pools, and should be ordered separately.

## UNDERWATER SPEAKERS

Sealed speaker for an underwater communication system between coach and swimmers, for providing background music for synchronized swimming and for scuba instruction. One speaker required for each 900 sq. ft. of pool surface area in deep water and one per 1200 sq. ft. in shallow area. Speakers are installed flush in niches within the pool wall and are covered by a protective grille. UL listed and recommended for use with Paragon niche.

### SLIMLITE 5G/500 WATT EQUIVALENT

Energy efficient Slimlite 5G LED light utilizes up to 86% less energy than comparable incandescent lights. This is a direct replacement for existing standard 500W Slimlite. The light has superior lens geometry and innovative reflector design combined to create a wider beam and more uniform light distribution.

30' cord I.D. No. 56400  
 50' cord I.D. No. 56401  
 100' cord I.D. No. 56402  
 150' cord I.D. No. 56403  
 200' cord I.D. No. 56404  
[Spec Sheet SS-UL 80.50](#)

NEW



#### NICHES FOR 500 WATT SLIMLITE

Model	Concrete	
	3/4"	1"
500w	56503	56504

### SLIMLITE/110V-500 WATT

10" diameter and only 3-1/2" deep, designed for fresh water, concrete pools. Installs in any wall without haunching the concrete, simplifying installation and construction. Dual bulb is wired parallel: one bulb stays lit even if the other burns out. Uses (2) 250-watt, double tube tungsten halogen bulbs with an average life rating of 2000 hours and 5000 initial lumens. All lights are UL listed. Various cord lengths available.

13' cord I.D. No. 56301  
 26' cord I.D. No. 56302 (standard)  
 50' cord I.D. No. 56303-50  
 75' cord I.D. No. 56303-75  
[Custom Cord Length I.D. No. 56303](#)

#### LIGHTS

[Spec Sheet UL 80.20](#)

#### NICHES

[Spec Sheet UL 80.50](#)

#### REPLACEMENT BULB

I.D. No. 56811

### UW30 UNDERWATER LOUD SPEAKER

A single 30-watt speaker adequately covers a 30' x 30' pool. Encased in blue high-impact ABS cover and sealed for underwater use to a depth of up to 10 feet. (Niche and grill sold separately).

50' cord I.D. No. 68101-1  
[Spec Sheet US 20.30](#)

#### NICHE FOR UW30 SPEAKER

Heavy-duty, cast bronze construction with 3/4" IPS threaded connection. Includes mounting hardware. Recommended mounting location is up to 4 feet below surface of the water and flush with the pool wall.

I.D. No. 68102

#### STAINLESS STEEL GRILLE

Mounts flush with pool wall.

I.D. No. 68103SS

[Spec Sheet US 80.07](#)



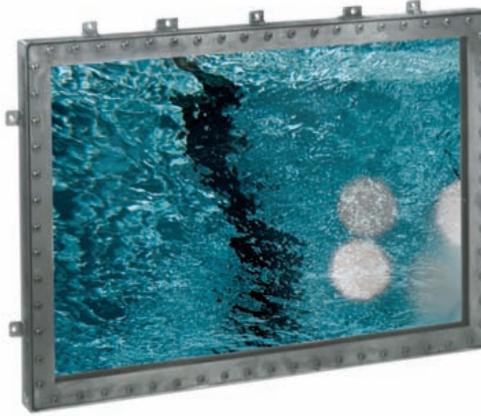
## UNDERWATER WINDOWS

Commonly used as an aid to swimming and diving instruction enabling coach to observe swimmers and divers in action. Permits photography and televising of all aquatic activities. Can be installed in any concrete pool – poured or gunite – and with any finish – plain, plastered or tiled. The windows are set flush in the wall with no projections into the pool. All windows are shipped factory sealed and pressure tested for water tightness.



## RECTANGULAR UNDERWATER OBSERVATION WINDOW

Glazing can be either a glass laminate consisting of three plies of 3/8" thick tempered glass in accordance with ANSI specification Z-97.1, ASTM C-1036-85 and C-1048-85, and 16 CFR 1201 Category II, with interfaces of polyvinyl Butyral .060" thick or a single thickness of 1-1/4" plexiglass. Frame is constructed entirely of stainless steel.



Note: If a window must be submerged at greater depths than listed, or a special size is needed, please contact our Engineering Department for recommendations.

PLEXIGLASS GLAZING		
Window Size (Clear Opening)	Max Depth of Water to Center of Window	I.D. No.
24" x 24"	16' - 6"	66201SS
24" x 36"	9' - 3"	66202SS
24" x 48"	6' - 6"	66203SS
24" x 60"	6' - 0"	66204SS
36" x 36"	4' - 9"	66205SS
36" x 48"	3' - 0"	66206SS

Spec Sheet UW 80.02

LAMINATED TEMPERED GLASS GLAZING		
Window Size (Clear Opening)	Max Depth of Water to Center of Window	I.D. No.
24" x 24"	14' - 6"	66101SS
24" x 36"	8' - 6"	66102SS
24" x 48"	7' - 0"	66103SS
24" x 60"	6' - 3"	66104SS
36" x 36"	6' - 6"	66105SS
36" x 48"	4' - 3"	66106SS
36" x 60"	3' - 6"	66107SS

Spec Sheet UW 80.01

## ROUND UNDERWATER OBSERVATION WINDOW

Recommended where multiple viewing areas are required in swimming pools and thermostat-age water tanks. Window has an 18" diameter viewing area and construction is of cast bronze. Entire frame is finished in chrome-colored powder coating. Glazing is either a glass laminate consisting of two plies of 3/8" thick tempered glass in accordance with ANSI Spec Z-97.1 with interfaces of polyvinyl Butyral .060" thick or a single thickness of 3/4" plexiglass.



18" DIAMETER ROUND WINDOWS (clear viewing area)		
Glazing Material	Max Depth of Water to Center of Window	I.D. No.
Laminated Glass	14' - 6"	66302 Spec Sheet UW 80.03
Plexiglass	8' - 9"	66301 Spec Sheet UW 80.04

## WATER POLO GOALS

Designed to meet the official rulings of FINA, NCAA, NFHS, and USA Water Polo.

Goal cages can be adjusted vertically to have the top of the cage at regulation height. Supporting legs fold flat against the cage for compact storage on the deck. The facia is a white, channel section made of glass reinforced polyester resin. Heavy duty frame is constructed of stainless steel tube. Goals are furnished as a pair, but backings/nets and anchors must be ordered separately. Each pair of cages requires four stanchion sockets and one pair of backings/nets.



### WATER POLO GOALS (pair)

Goal posts and crossbar are rigidly constructed and come with 3" white fiberglass facia facing the field of play. The inner sides of the goal posts are 118" apart.

I.D. No. 36104

[Spec Sheet WPG 20.71](#)

### NYLON BLACK TARRED NET (pair)

Water polo nets are constructed of 100% nylon netting with a 1-1/2" square mesh. The nets are treated for weather and water resistance.

I.D. No. 36201

[Spec Sheet WPG 20.71.1](#)

### SOLID BLUE BACKINGS (pair)

Backings are constructed of #80 navy blue vinyl. The outside perimeter of the product is sewn with a binding of the same material and has grommets on 10" centers on all outside edges.

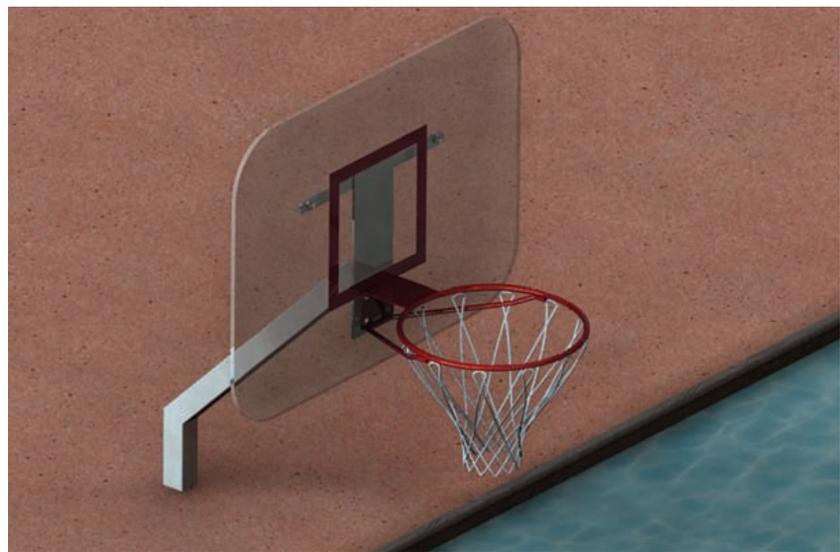
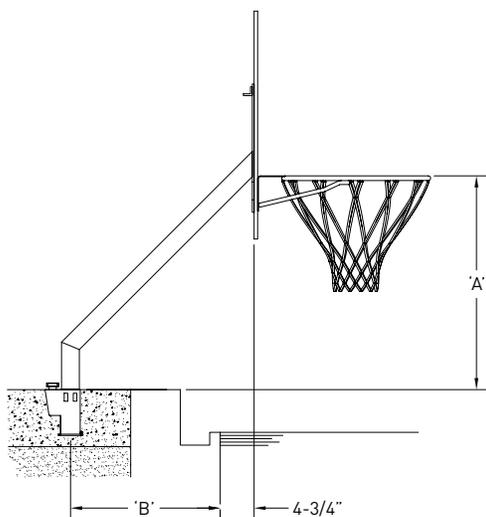
I.D. No. 36202

## BASKETBALL HOOPS

Our basketball hoops have a regulation-size, stainless steel frame designed to fit into Paragon's Competitor or Quickset anchors. The unit can be installed using new Dual-Wedge Anchors, included with the purchase of the hoop, or it can be ordered less anchors to be used in existing starting platform anchors. Easily removed from anchors without tools for storage or location change.

The backboard is constructed of 1/2" thick clear acrylic which helps eliminate blind spots in the pool. The hardware attaching the spring loaded, powder-coated rim and backboard to the frame is made from T304 stainless steel. Comes in 6 standard sizes or have it custom built to fit your pool configuration.

Order one of our 12 standard sizes or if you require a special configuration, provide the 'A' and 'B' dimensions to have one custom-built to fit your existing anchors and pool profile.



### QUICKSET® BASKETBALL HOOP

Stainless steel frame that fits into old and new style Quickset® anchors. Net is included. Order with or without anchors.

I.D. No. 27001-27006

(see chart below)

[Spec Sheet WBH 20.71](#)



### COMPETITOR BASKETBALL HOOP

Stainless steel frame that fits into old and new style 6" and 10" competitor anchors. Net is included. Order with or without anchors.

I.D. No. 27007-27012

(see chart below)

[Spec Sheet WBH 20.72](#)

QUICKSET STYLE			COMPETITOR STYLE		
'A'	'B'	I.D. No.	'A'	'B'	I.D. No.
30"	21"	27001	30"	18"	27007
36"	21"	27002	36"	18"	27008
42"	26"	27003	42"	24"	27009
48"	26"	27004	48"	24"	27010
54"	34-1/2"	27005	54"	36"	27011
60"	34-1/2"	27006	60"	36"	27012
**	**	27014	**	**	27015



## POOL ACCESSORIES

### HOSE REEL

The ideal solution for storing unsightly and cumbersome pool vacuum hose. Unique solid stainless steel construction ensures years of trouble-free use with minimal maintenance. Reels hold up to 100 feet of 2" diameter hose. Units are portable and designed to fit through a standard door. Vacuum hose stores conveniently.

I.D. No. 75151  
Spec Sheet PA 40.03



### LANE STORAGE REEL

Lightweight yet rugged stainless steel construction with zinc plated individual, double lock casters. Holds up to 650 feet of 4" lane lines and requires little maintenance. Ideal for commercial and institutional pools.

Standard Model holds up to 540 feet (164M) of 4" diameter lanes or 300 feet (91M) of 6" diameter lanes  
I.D. No. 75101

Standard Model with stainless steel casters  
I.D. No. 75101SS  
Spec Sheet PA 40.01

Large Capacity Model holds up to 720 feet (220M) of 4" diameter lanes or 400 feet (122M) of 6" diameter lanes  
I.D. No. 75111

Large Capacity Model with stainless steel casters  
I.D. No. 75111SS  
Spec Sheet PA 40.02

Replacement stainless steel casters  
I.D. No. 75103SS

Replacement zinc plated casters  
I.D. No. 75103



### LANE STORAGE REEL COVER

Heavy-duty construction in blue 16 oz. textured vinyl. All seams are double stitched with white polyester thread.

Standard Lane Reel Cover 48" x 67"  
I.D. No. 75133

Spec Sheet PA 40.04

### LARGE LANE REEL COVER 53" X 73"

I.D. No. 75133XL  
Spec Sheet PA 40.04L



### COMPETITOR® ANTI-TURBULENT RACING LANES

Lanes are required for competitive swimming to separate racing lanes and to dampen turbulence. Continuous 4" diameter flow-through design discs of alternating colors are strung on a vinyl-covered stainless cable. Complete with end hooks and tensioning devices. Standard colors are red, yellow, blue, green, orange, purple, white, maroon, and black.

Lane Length	I.D. No.
60 feet	76101-1
25 yard	76102-1
25 meter	76103-1
50 meter	76104-1
25 meter (w/disconnect)*	76105-1
50 meter (w/disconnect)**	76106-1

Spec Sheet AA 20.75

Storage Reel	76107-1
Take-up Reel	76118-1
Ratchet Wrench	76119-1

Spec Sheet AA 20.75



\* 7' disconnect yields 25 yard lane.

\*\* Yields 2 equal 25 meter or 25 yard lanes.



## POOL ACCESSORIES

Backstroke Line



Finish Line



### PENNANT LINES

Triangular pennants of alternating colors spaced according to regulations. Pennants and line are of synthetic materials. Specify pool width when ordering. 20' extra will be provided at each end to reach to stanchions. Also specify colors desired. Standard colors are navy blue, Dartmouth green (finish line only), royal blue, orange, yellow, red, medium blue, kelly green, maroon, purple, black, and white. Custom lettering is available upon request.

### FINISH LINE 18" X 30" PENNANTS

I.D. No. 40101

### BACKSTROKE LINE 12" X 18" PENNANTS

I.D. No. 40102

Spec Sheet AA 20.69

## STANCHIONS

For supporting backstroke lines, finish lines, recall lines and splash curtains. They are made of stainless steel tube, capped at one end with a T304 stainless steel closure plate and U-hook. A sliding collar with eye bolt is optional and can include one or two eye bolts per collar.

### SLIDING COLLAR WITH EYE BOLT

I.D. No. 38301

Spec Sheet AA 20.89

Material	Stanchion Height	Stanchion Height
1.90" O.D.	4'-6" I.D. No.	8'-0" I.D. No.
.065" wall	38101	38102
.109" wall	38103	38104
.145" wall	38105	38106

Spec Sheet AA 20.89

Spec Sheet AA 20.89



### SQUARE STANCHION

Heavy duty square stanchion constructed from 2-1/2" square, .125 wall T304 material with welded end cap and 1.90" x .145 base. Use with 1.90" Round Anchor. 70% less deflection than standard stanchion. 40% less costly than Tagline Stanchion/Anchor.

NEW



### 8'0" SQUARE STANCHION POST

I.D. No. 38115

Spec No. AA 20.95

### 4'6" SQUARE STANCHION POST

I.D. No. 38116

Spec No. AA 20.67

### SQUARE SLIDING COLLAR WITH EYEBOLT

I.D. No. 38302

### TAGLINE STANCHION POST

Heavy duty tripod stanchion for supporting tag and pennant lines, curtains and any other heavy loads requiring extra support. Constructed from 1.90" x .145 T304 Stainless steel with a welded U-hook. The 3 legs will be easily mounted into a pre-fitted factory welded anchor.

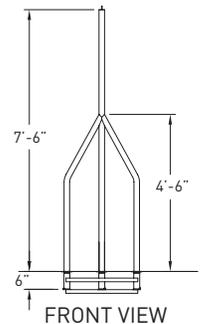
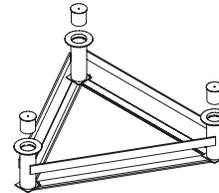
I.D. No. 38111

Spec No. AA 20.76

### TAGLINE STANCHION SOCKET

I.D. No. 38211

Spec No. AA 20.88



### STANCHION SOCKETS

For stanchions and water polo goals. Three styles are available. Cast bronze with threaded cap or tamper-proof cap, and cast 316 stainless steel with slip-fit cap.

### STANCHION SOCKET, BRONZE

(Threaded Cap)

I.D. No. 38201-TC

Spec Sheet AA 20.86

### KEY FOR BRONZE THREADED CAP

I.D. No. 38202



### STANCHION SOCKET, CAST T316 STAINLESS STEEL

(Cap and body are electro-polished)

I.D. No. 38210

Spec Sheet AA 20.87

### KEY FOR SLIP FIT CAP

I.D. No. 23303

### TAMPER PROOF STANCHION SOCKET, BRONZE

New version replaces slip-fit cap Stanchion Socket. Requires a screwdriver to install and remove cap, eliminating keys and key replacements.

I.D. No. 38201

Spec Sheet AA 20.85



NEW



## MATERIALS USED IN THE MANUFACTURE OF PARAGON DECK EQUIPMENT

Our products are made of the finest materials. Our selection is based upon the best value without sacrificing quality. Our standard stainless steel is dual certified T304/T304L polished and buffed to a 320 grit finish, and all welds are electro-chemically passivated for maximum corrosion resistance. Passivation is in compliance with ASTM 967-99.

We also offer T316L stainless steel, as an upgrade, as well as electro-polished and powder coated finishes upon request. However, each has their advantages and disadvantages and none will eliminate the need for proper care and maintenance.

We have and will continue to accommodate our industry's requirements by offering products in all grades and sizes. The Americans with Disabilities Act (ADA) Guidelines for handrail diameters have been finalized to include outside diameters ranging from 1-1/4" to 2". This variety is offered because no one size is best for all applications.

We manufacture rail goods from 1.90" x .065 O.D., 1.90" x .109 O.D., 1.90" x .145 and 1.50" x .120 stainless steel tubing, and can accommodate the various ranges and requirements. Rectangular and square tubing is available upon request.

We are always available to provide you with complete and reliable information to make the right choice for your specific project.





## HOW TO KEEP YOUR STAINLESS STAIN-LESS

Your Paragon Commercial Deck Equipment has been fabricated of T304/T304L stainless steel and polished and buffed to a 320 grit finish and manufactured with a goal of high quality and longevity.

Stainless steel is produced to give many years of trouble-free service under normal use. This is the result of years of product development and improvement by the stainless mills. Although there are various publications available on the properties and care of stainless steel, consideration of the following points may help you attain the service life you expect.

Stainless steel is a corrosion resistant alloy, but it is not rustproof. The naturally occurring chromium oxide layer on the surface of the stainless steel provides the corrosion resistance. Proper care needs to be taken to maintain and preserve this layer. Under certain conditions this protective layer can be breached and may cause rust unless a program of preventative maintenance is instituted. Swimming pools, especially natatoriums, are an unfriendly environment for many materials. The halogen salts normally used for pool sterilization, chiefly chlorine and bromine are the most active agents that attack the chromium oxide layer on the stainless steel. The heat and humidity add to the activity of these attacking compounds.

Stainless steel, as the name implies, "stains" less than other steels but may show corrosion depending on the degree of surface oxidation in a particular environment. The prevention of contaminants from interfering with the chromium oxide layer formed on the surface of a stainless product will add to the in-service life of that product. Keep the stainless surface clean, and allow the layer of protective oxides to remain intact.

The simplest way to care for a stainless product is to rinse it with fresh water on a regular basis. However, we do recommend the Operating and Cleaning Instructions, which follow, to ensure many years of product life for your Stainless Steel equipment.

### WHAT NOT TO DO:

- Do not use coarse abrasives, like sandpaper or steel wool, on stainless. These may actually cause rusting.
- Do not clean with chlorine cleansers such as bleach.
- Do not leave stainless in contact with iron, steel, or other metals which cause contamination leading to rust or corrosion.
- Do not store stainless steel equipment in the near vicinity of chlorine.



Rusted Rail

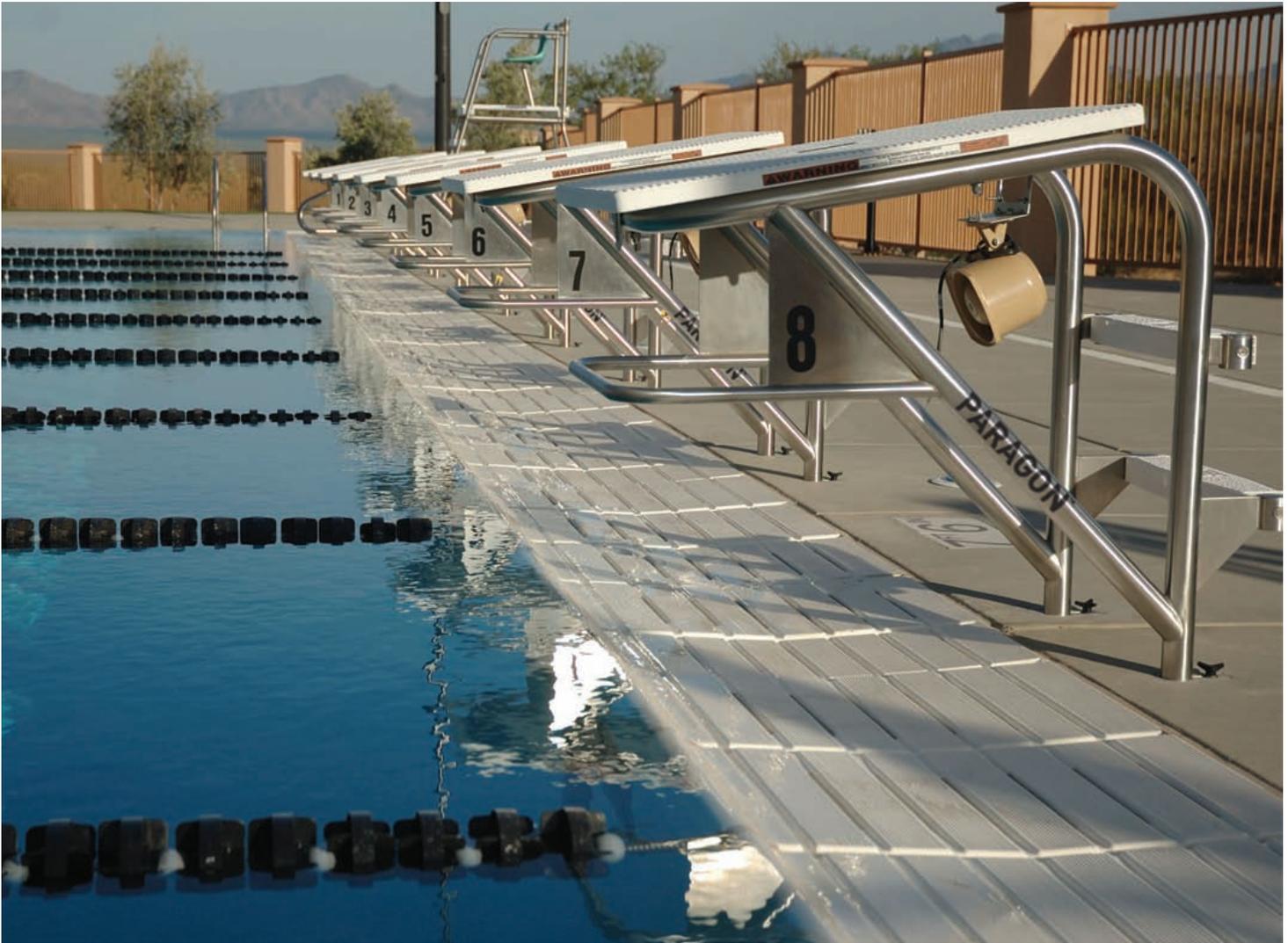


Same rail after cleaning and finishing with car wax.

### WHAT TO DO:

- Clean stainless frequently with soap and fresh water (not pool water) and wipe dry with a clean cloth. Any cleaner safe for glass is usually safe for stainless.
- When rubbing is necessary to remove difficult stains, care should be taken to follow the polish lines. Rinse thoroughly after cleaning.
- Remove rust spots as soon as possible with a brass, silver, or chrome cleaner. Irreversible pitting will develop under rust that remains on stainless.
- We have found using a citrus based product such as Citrisurf 77 Plus or Citrisurf 2310 will eliminate rust.
- If stainless has become scratched or pitted due to corrosion, mechanical polishing will be necessary, we find 3M Scotchbrite works well.
- Prevent corrosion from recurring by using a soft, paste car wax. Each application should last up to six months.
- Routinely inspect equipment for signs of discoloration. Clean or replace contaminated parts.

# INNOVATIVE SOLUTIONS IN COMMERCIAL AND RECREATIONAL SWIMMING POOL DECK EQUIPMENT



## PERFORMANCE • LONGEVITY • INNOVATION • COLLABORATION

THANK YOU! We wouldn't be one of the industry leaders in competitive and recreational swimming pool equipment without you and we appreciate your business. We feel great pride in knowing that our quality products and service keep bringing you back.

"No problem" is what you will hear from our team whenever you call with a special request. We specialize in custom work and our highly qualified engineers, fabricators, and other

specialists will do whatever it takes to provide you with the equipment that you need for your facility. No job is too big or too small!

Total system solutions is what you can expect from Pentair Aquatic Systems.

The Paragon Awards are presented annually in association with the International Swimming Hall of Fame. They are bestowed upon those individuals who have demonstrated exceptional

efforts, dedication, motivation and discipline in each of the following categories:

- Competitive Swimming
- Competitive Diving
- Water Polo
- Synchronized Swimming
- Aquatic Safety
- Recreational



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# THS SERIES<sup>®</sup>

## HIGH PERFORMANCE HORIZONTAL SAND FILTERS

For commercial swimming pools and other water applications and filters up to 27 sq. ft. of filtration area. Various sizes and configurations to fit almost any body of water.

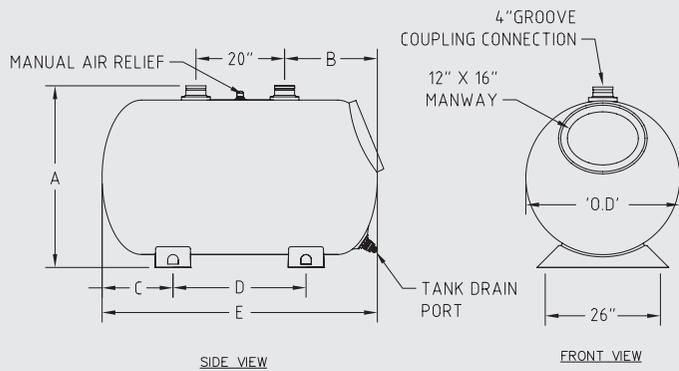
Pentair has a state-of-the-art horizontal sand filter unlike any other on the market. The THS Series filter is an NSF-approved 50 psi rated tank with flow rates up to 535 gpm in a single tank. The filter shell is manufactured from a long-lasting composite laminate that makes winding unnecessary. A special coating gives the THS Series filter a smooth and attractive finish. An interior coating protects wet surfaces.

### STANDARD FEATURES

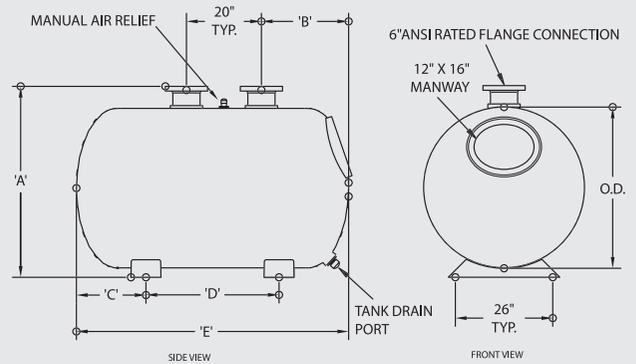
- Manway in front for easy access and smaller footprint.
- 34" diameter tanks will fit through standard doorway.
- Optional manual, semi-automatic, or fully automatic backwash systems.
- Accessible drain.
- Influent manifold distribution to help prevent clogging.
- Single-bolt saddles for easy leveling.
- NSF Listed.



## THS SERIES HIGH PERFORMANCE HORIZONTAL SAND FILTERS



THS 3461 Only



THS 3484, THS 4272, THS 4284, THS 4296

## MATERIALS AND DESIGN

### Tanks

- Construction
  - Multi-layer engineered fiberglass crafted of chopped glass and directional roving in an isophthalic polyester matrix.
- Operating Pressure
  - Capable of withstanding 50 PSI internal pressure.

### Internals

- Headers
  - One influent header is fitted with sufficient distributors to properly distribute incoming flow evenly across the sand bed surface. An additional effluent header is supplied with sufficient laterals equally distributed not less than 12 inches below the filtering sand bed.
  - Laterals are 2 3/8" x 10" with 2" NPT connections and constructed of ABS plastic with molded 'V'-groove slots.

### Tank Base

- Support Bases
  - Tanks feature ABS saddle style support bases for filter body, capable of rotation for leveling purposes.

### Operation / Performance

- Flow Rate
  - NSF Listed for 5 to 20 GPM per square foot of filter area.
- Maximum Limits
  - Working pressure 50 PSI max. Continuous water temperature 125° F.
- Sand Media
  - #20 white quartz silica sand. Effective size 0.45-0.55 mm.
- Safety provisions
  - Each tank features an automatic and manual air release system fabricated of non-corrosive materials.

### Controllers - Must Be Used With Diaphragm Valve Kits

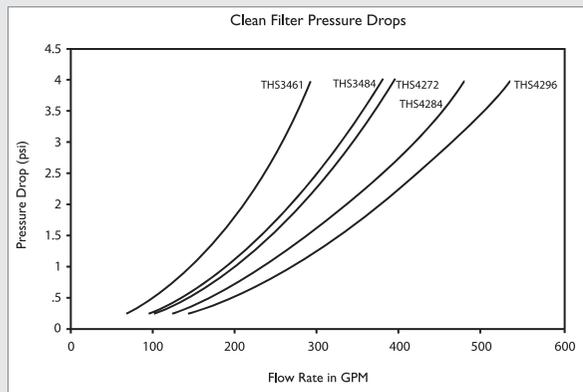
156850	Single THS CA100 Auto-backwash controller for single tank system
156800	Dual THS CA100 Auto-backwash controller
156400	Single THS CM200 Semiautomatic controller 6 in. FP
156450	Dual THS CM200 Semiautomatic controller 6 in. FP
CS400-01	CS400 backwash controller for single tank system
CS400-02	CS400 backwash controller for dual tank system

## FILTER ORDERING INFORMATION

Product	Model	Description
143461	THS3461	THS 34 in. x 61 in.
143484	THS3484	THS 34 in. x 84 in.
144272	THS4272	THS 42 in. x 72 in.
144284	THS4284	THS 42 in. x 84 in.
144296	THS4296	THS 42 in. x 96 in.



## FILTER PERFORMANCE



### Filter Accessories Information

155700	THS Single Tank Manifold Kit w/ Butterfly Valves	156150	Flowmaster Saddle Kit
155720	THS Dual Tank Manifold Kit w/ Butterfly Valves	156100	Temperature Probe Kit
155701	THS Single Tank 6 in. FP Kit w/ Diaphragm Valves	155702	THS3461 Single Tank Manifold Kit w/ Butterfly Valves
155721	THS Dual 34 in. dia. 6 in. FP Kit w/ Diaphragm Valves	155703	THS3461 Single Tank Manifold Kit w/ Diaphragm Valves
155730	THS Dual 42 in. dia. FP Kit w/ Diaphragm Valves	155722	THS3461 Dual Tank Manifold w/ Butterfly Valves
155800	WA-KIT Wedge Anchor Kit	155723	THS3461 Dual Tank Manifold w/ Diaphragm Valves
155850	BVA-KIT 1/2 in. Ball Valve Adapter Kit for manual air relief	140325	Adder Kit for Third THS Filter

### Tank dimensions/media requirements

Model	Maximum Flow Rates				Media Requirements		
	Filter Area (ft <sup>2</sup> )	Flow Rate@ 10 GPM/ft <sup>2</sup> (GPM)	Flow Rate@ 15 GPM/ft <sup>2</sup> (GPM)	Flow Rate@ 20 GPM/ft <sup>2</sup> (GPM)	Sand Media (cu. ft.)	Gravel Media (cu. ft.)	Total Media (cu. ft.)
THS3461	13.5	135	203	270	12.5 (1,250 lbs.)	3.0 (300 lbs.)	15.5 (1,550 lbs.)
THS3484	19.0	190	285	380	13.5 (1,350 lbs.)	6.0 (600 lbs.)	19.5 (1,950 lbs.)
THS4272	19.7	197	296	394	21.0 (2,100 lbs.)	5.0 (500 lbs.)	26.0 (2,600 lbs.)
THS4284	23.2	232	348	464	24.0 (2,400 lbs.)	6.0 (600 lbs.)	30.0 (3,000 lbs.)
THS4296	26.7	267	401	534	28.0 (2,800 lbs.)	7.0 (700 lbs.)	35.0 (3,500 lbs.)

Model	Media Requirements					Tank Dimensions					
	Feeboard Height (in.)	Sand Bed Depth (in.)	Gravel Depth (in.)	Operating Weight (lbs.)	Shipping Weight (lbs.)	A (in.)	B (in.)	C (in.)	D (in.)	E (in.)	O.D. (in.)
THS3461	7½	9	8⅝	3,500	530	39½	21	16	30	62	35
THS3484	7½	9	8⅝	4,600	630	45	21¼	24⅝	35¼	85	35
THS4272	9½	15	7½	5,700	700	52¼	23¼	18⅞	35¼	73	43
THS4284	9½	15	7½	6,700	780	52¼	23¼	24⅞	35¼	85	43
THS4296	9½	15	7½	7,700	870	52¼	23¼	30⅞	35¼	97	43



# THS SERIES®

## HIGH PERFORMANCE HORIZONTAL SAND FILTERS

### ENGINEERING SPECIFICATIONS

The filter system shall be a model \_\_\_\_\_ as manufactured by Pentair, and shall be approved by the National Sanitation Foundation (NSF).

The system shall contain \_\_\_\_\_ high rate type filter tanks, with each tank containing \_\_\_\_\_ square feet of filter area totaling \_\_\_\_\_ square feet of effective filtration area. The system shall have the capacity of filtering \_\_\_\_\_ gpm when filtered at \_\_\_\_\_ gpm per square foot. Each tank shall be of the horizontal type, \_\_\_\_\_ inch inside diameter and \_\_\_\_\_ inches long.

The vessel(s) shall be constructed of multi-layer fiber glass. Layers shall consist of a combination of chopped glass and woven roving in an isophthalic-polyester matrix. The vessel shall be assembled from one side shell and two domed ends which shall be joined with an adhesive and reinforced with FRP layup. The vessel(s) shall be capable of with standing 50 psi internal pressure. Alternate construction methods shall not be acceptable.

Vessels shall be provided with ABS saddle style support bases with a means of rotating the saddle for leveling purposes. The use of adhesive to hold the saddle to the vessel is not acceptable.

The wetted surface shall be a modified polyester gel coat (GC). The gel coat shall be a modified polyester gel coat equivalent to a Cook gel coat 943-AN-023 with a thickness of no less than 10 mils.

The external surface shall be smooth in appearance and be free of cracks or other defects. The exterior surface shall be supplied with an all weather coating. Coating shall be urethane based with UV inhibitors. The surface coating shall be almond colored.

Each tank shall have one influent header fitted with sufficient distributors to properly distribute incoming flow evenly across the sand bed surface and one effluent header with sufficient laterals equally distributed not less than 12 inches below the filtering sand bed with a total effective slot area such that the average velocity through the slots will not exceed 6 feet per second at the design flow rate. Both headers shall be fabricated of schedule 80 PVC and all distributors and laterals shall be threaded and replaceable. The laterals shall be 2 3/8 inch diameter by 10 inches long with 2" NPT connections and constructed of ABS plastic with molded 'V'-groove slots. Laterals with machined or cut slots shall not be accepted. Laterals shall be threaded at right angles into the header pipe.

Exterior influent and effluent pipe connections shall be 6" VanStone-style flanges

Each tank shall have a 12 inch by 16 inch access manhole with yokes, molded cover, o-ring, and T316 stainless steel hardware.

The system shall be designed for installation against a back or side wall with all servicing accessible without moving tank(s). When the system is off, the tank(s) must remain full of water and not allow water to gravity drain back to the source in order to prevent disturbance of the sand bed. Each tank shall have an automatic and manual air release system and shall be of non-corrosive materials. A sufficient quantity of #20 U.S. grade clean crystal silica sand to cover filter elements with a minimum 12 inch sand bed shall be furnished and installed into each tank and shall be free of limestone or clay. The following is an acceptable gradation for this media:

#### #20 SILICA SAND

Effective size: 0.45 mm (0.018 in.) to 0.55mm (0.022 in.)

Uniformity coefficient: less than 1.5

Grain Sphericity: GRTR 0.7

The filter vessel shall carry a ten (10) year limited warranty covering defects in material and workmanship, the first three years of which shall not be pro-rated.

#### For Single Tank System Diaphragm Valve Face Piping Kits

- The system, including external piping, shall be fully solvent-welded. System shall be supplied with media dump port and anchor setting template.
- The backwash procedure must be accomplished by backwashing using water from the pool in reverse flow through the filter to the waste line.
- The influent, effluent and waste manifolds shall be constructed of schedule 80 PVC piping and fittings. The system shall include (2) three-way hydraulically operated diaphragm valves to direct the flow during the backwash cycle.

#### For Two Tank System Diaphragm Valve Face Piping Kits

- The system, including external piping, shall be fully solvent-welded. System shall be supplied with media dump ports and anchor setting templates.
- Each tank in system shall be capable of being backwashed individually using filtered water from the remaining tanks. The common method of backwashing by using raw source water in a reverse flow through the filter or filters will not be acceptable.
- The influent, effluent and waste manifolds shall be constructed of schedule 80 PVC piping and fittings. The system shall include (1) three-way hydraulically operated diaphragm valve per tank to direct the flow during the backwash cycle. And one two-way hydraulically operated diaphragm valve as a priority valve.

#### Semi-Automatic Controls for Diaphragm Valve Face Piping Kits

- Valve actuation to initiate the backwash cycle shall be a single-knob control using a multi-port control valve to distribute water to hydraulically operated multi-port control valve, and influent, effluent, and multi-port pressure gages shall be mounted on a common panel.

#### Automatic Controls for Diaphragm Valve Face Piping Kits

##### CS 400 Commercial Backwash Controller

This controller is programmable and controls every aspect of the backwash cycle once initiated. Backwash can be initiated three ways: by an operator with the touch of a button, by a signal from a master controller (such as the AK600), or by a signal from an optional differential pressure switch (CS400-DP). Stored backwash data and history, alarms and calculated backwash cycle times are also features of the CS400 controller, as are relays for communication with the heater, pump and Acu Drive™ XS Variable Frequency Drive.

##### CA 100 Fully Automatic Backwash Controller

This is the most comprehensive backwash controller and can be readily reprogrammed to initiate backwash automatically based on differential pressure (integral pressure transducers are standard), time (internal seven-day clock with battery back-up is standard), flow (with optional flow sensor), or any combination of the above. The controller has real-time display of operation mode, filter flow rate, and water temperature (with optional temperature probe). Also, includes Energy Saver Mode for simple On/Off pump scheduling and various interlocks and relays to communicate with other equipment (pump, heater, Acu Drive controller).

#### Certifications

The THS Series filter shall be tested and certified by a nationally recognized testing laboratory to conform to NSF (National Sanitation Foundation) Standard 50.



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# ETi<sup>®</sup> 400

## HIGH-EFFICIENCY HEATER



### MORE OUTPUT, LESS INPUT

When you want quality, strength, and durability, you want the corrosion resistance of titanium. The ETi 400 High-Efficiency Heater is the world's first pool heater equipped with the exclusive TitanTough™ direct-fire titanium heat exchanger for long-lasting performance with exceptional thermal-efficiency, even in the most challenging operating conditions. Not only is it ultra-quiet to operate and easy to install both indoors and out, the ETi 400 heater has the highest efficiency in its class and offers the longest lasting heat exchanger ever built, with ASME certified construction and a 3-year warranty.

### PRODUCT FEATURES

#### Efficient

- 96% Thermal Efficiency—highest in its class
- High efficiency equals large energy savings over standard heaters and faster heat-up times

#### Easy to Install, Easier to Service

- 180° rotating control panel for left or right plumbing connection
- Large removable panels make accessing the heater internals quick and easy
- 180° rotating gas valve for front and rear gas connections
- Parts commonality with MasterTemp heaters ensures part availability and familiarity
- 3-year parts and labor warranty

#### Durable

- Corrosion resistant with Titan-Tough™ Titanium heat exchanger
- No welds, crimps, or joints to reduce corrosion resistance.
- Titanium heat exchanger stands up to harsh water chemistry and keep



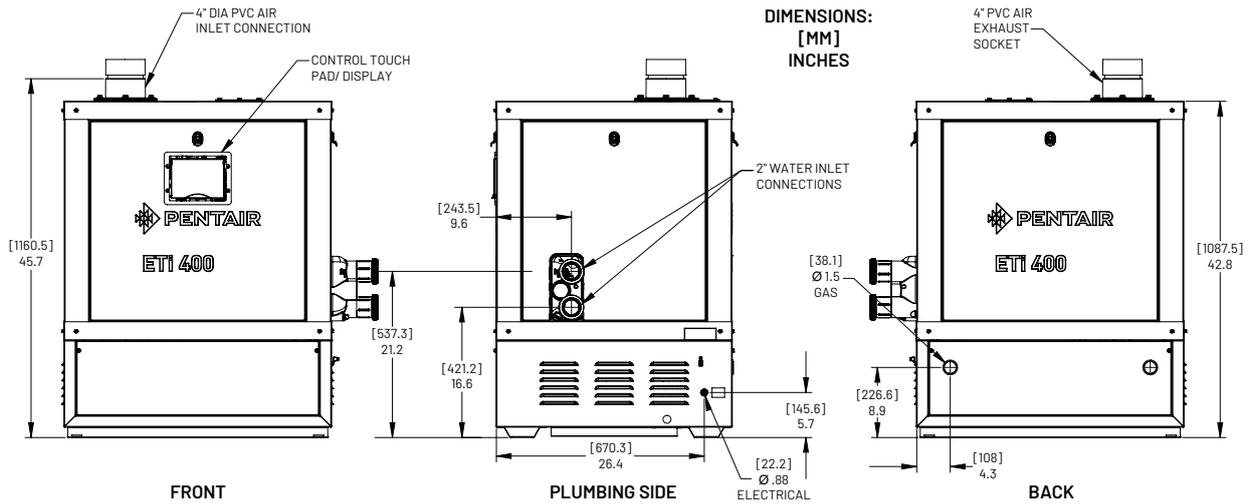
#### Easy to vent

- PVC Venting: Category IV venting and air intake: up to 120' with 4" PVC and up to 300' with 6" PVC pipe
- PVC venting makes installing indoors more easier and more economical

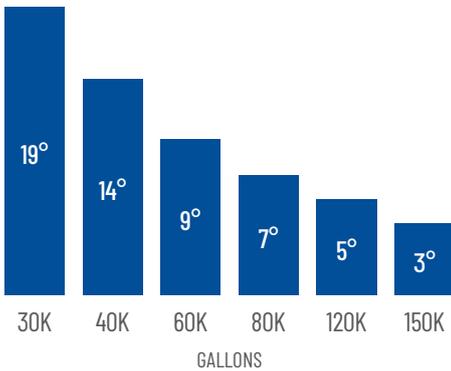


# ETi<sup>®</sup> 400

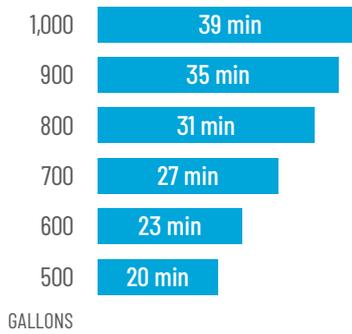
## HIGH-EFFICIENCY HEATER



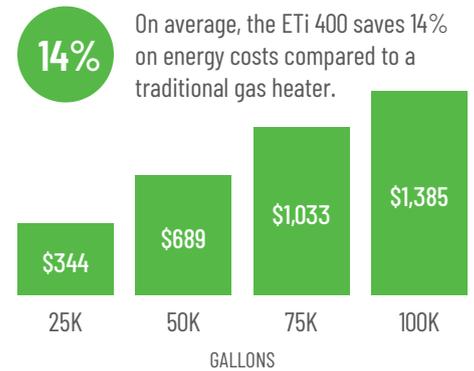
### TEMPERATURE RISE IN 12 HOURS (°F)\*



### TIME TO RAISE WATER TEMPERATURE 30°F\*



### AVERAGE ANNUAL COST SAVINGS\*



\*All calculations are estimates. Actual results may vary due to a range of factors including, but not limited to: environmental conditions, pool type/construction/materials/configuration, geographical location, installation details and various operational parameters. Cost savings estimates are based on 65°F air temperature and 82°F water target temp for an uncovered pool operating 180 days under moderate wind conditions and the cost of natural gas is \$1.22 per 100,000 BTU and comparing energy use to a gas heater that is 82% efficient. For assistance with sizing and selecting a pool heating product, please consult a swimming pool professional.

## PRODUCTS

SKU	DESCRIPTION	GAS TYPE	BTUs	DIMENSIONS IN (L x W x H)	WEIGHT (LBS)	VOLTAGE (V/Hz/PHASE)	BREAKER SIZE (AMP)
461113	ETi 400	Natural	400,000	40 x 30 x 46	379	120 or 240/60Hz/1	15
476072	Natural Gas to Propane Conversion Kit						
475612	Condensate Neutralizer Replacement Kit						
475971	Indoor Direct Air Intake Kit						



For more specification information and sizing assistance, contact your local Pentair Sales Representative or visit [pentair.com](http://pentair.com).

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## PS SERIES™ IN-LINE STRAINER FOR COMMERCIAL PUMPS

PROVEN PERFORMANCE UNDER DEMANDING CONDITIONS



PS Series strainers from Pentair Commercial Aquatics™ are designed for ease of installation and hydraulic efficiencies in commercial aquatics applications. In three standard sizes and with the addition of eccentric reducers, PS Series strainers

fit with almost any plumbing configuration. The design of the PS Series strainers accommodates the high-flow performance in a variety of applications. ANSI Rated flange bolt pattern allows for ease of installation and peace of mind.

### STANDARD FEATURES

- Superior design for hydraulic performance.
- Clear lid with easy access allows for simple visibility of debris.
- Extra-large stainless steel strainer basket.
- 50 psi rating.
- NSF listed.

### ENGINEERING SPECIFICATIONS

- The strainer shall consist of a nonmetallic fiberglass-reinforced plastic body, a clear cover that extends over the entire top, an O-ring seal, manually capable (no tools required) stainless steel/plastic screw fasteners, and a stainless steel basket.
- The strainer body shall be able to be fitted with PVC plastic piping connections. These connections shall be capable of accommodating Van Stone Flanges, concentric reducers, and non-concentric reducers. The strainer shall have a removable drain for winterizing and a pressure relief valve set at 50 psi.
- The strainer pipe sizes and basket characteristics shall meet and be listed to NSF/ANSI Rated Standard 50.

# PS SERIES™ IN-LINE STRAINER FOR COMMERCIAL PUMPS

## NECESSARY HARDWARE

Model Designation		Connection Size (inlet x outlet)	Inlet		Outlet	
			Bolt Size	Number	Bolt Size	Number
<b>PS6:</b>		6 in. pipe x 6 in. pipe	no bolts		no bolts	
PS6X6	Plastic Flanged	6 in. ANSI x 6 in. ANSI	3/4 in.	8	3/4 in.	8
PS6X5E	Plastic Flanged Eccentric	6 in. ANSI x 5 in. ANSI	3/4 in.	8	3/4 in.	8
PS6X4E	Plastic Flanged Eccentric	6 in. ANSI x 4 in. ANSI	3/4 in.	8	5/8 in.	8
PS6X3E	Plastic Flanged Eccentric	6 in. ANSI x 3 in. ANSI	3/4 in.	8	5/8 in.	4
PS#X#E	Plastic Flanged Eccentric	Various Standard Reducers	various		various	
<b>PS8:</b>		8 in. pipe x 8 in. pipe	no bolts		no bolts	
PS8X8	Plastic Flanged	8 in. ANSI x 8 in. ANSI	3/4 in.	8	3/4 in.	8
PS8X6E	Plastic Flanged Eccentric	8 in. ANSI x 6 in. ANSI	3/4 in.	8	3/4 in.	8
PS8X5E	Plastic Flanged Eccentric	8 in. ANSI x 5 in. ANSI	3/4 in.	8	3/4 in.	8
PS8X4E	Plastic Flanged Eccentric	8 in. ANSI x 4 in. ANSI	3/4 in.	8	3/4 in.	8
PS#X#E	Plastic Flanged Eccentric	Various Standard Reducers	various		various	
<b>PS10:</b>		10 in. pipe x 10 in. pipe	no bolts		no bolts	
PS10X10	Plastic Flanged	10 in. ANSI x 10 in. ANSI	7/8 in.	12	7/8 in.	12
PS10X8E	Plastic Flanged Eccentric	10 in. ANSI x 8 in. ANSI	7/8 in.	12	3/4 in.	8
PS10X6E	Plastic Flanged Eccentric	10 in. ANSI x 6 in. ANSI	7/8 in.	12	3/4 in.	8
PS10X5E	Plastic Flanged Eccentric	10 in. ANSI x 5 in. ANSI	7/8 in.	12	3/4 in.	8
PS#X#E	Plastic Flanged Eccentric	Various Standard Reducers	various		various	

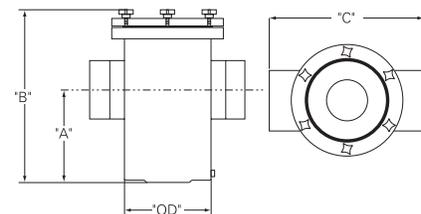
NOTE: # designation indicates optional available reducers.  
 Suffix E denotes Eccentric reducers, Suffix C denotes Concentric reducers.  
 Suffix E will be replaced with C if Concentric reducer is used.

## ENGINEERING SPECIFICATIONS

Model	PS6	PS8	PS10
Inlet Pipe Size	6 in. (DIN 150)	8 in. (DIN 200)	10in. (DIN 250)
Maximum Pressure	50 psi (345 kPa)	50 psi (345 kPa)	50 psi (345 kPa)
Maximum Temperature	125° F (50° C)	125° F (50° C)	125° F (50° C)
Maximum Flow Rate	540 GPM (2040 LPM)	930 GPM (3520 LPM)	1470 GPM (5560 LPM)
Basket Open Area	224 sq. in. (1445 sq. cm)	224 sq. in. (1445 sq. cm)	335 sq. in. (2161 sq. cm)
Cover Material	Clear Acrylic	Clear Acrylic	Clear Acrylic
Basket Material	Stainless Steel	Stainless Steel	Stainless Steel
Body Material	Engineered Fiberglass	Engineered Fiberglass	Engineered Fiberglass

## DIMENSIONAL DATA

Strainer Size	"OD"	"A"	"B"	"C"
6	12.8	13.6	25.5	22.8
8	12.8	13.6	25.5	22.8
10	12.8	20.6	32.5	22.8



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# SPCS FD



Energy Saving Solutions



## For Pool and Fountain Circulation Pumps



Offering the most common required and specified features for circulation pump applications in commercial and educational swimming pools as well as fountains, splash pads and water features; the **SPCS BC** is ideally suited for applications involving:

- Swimming Pool Circulation Pumps
- Splash Pad Circulation Pumps
- Water Slide Pumps
- Decorative Fountains
- Spas
- Filtration
- Pressure Boosting

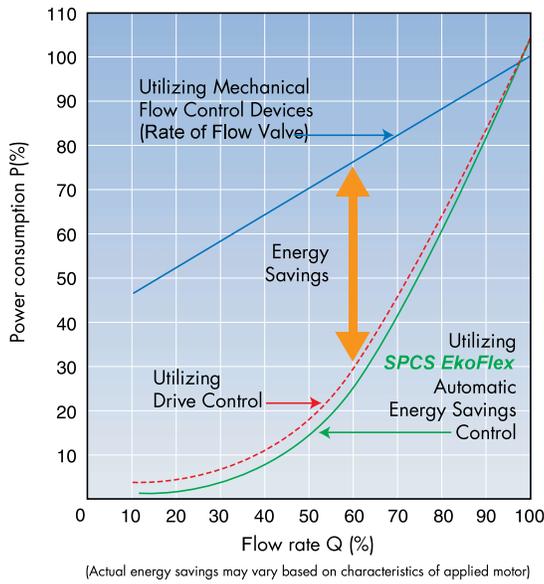
## SPCS BC Features

- NEMA 3R Steel Enclosure
- 2 Contactor Full ByPass
- Control Transformer with CB Protection
- Integrated Motor Branch Circuit Protection, up to 100kA Short Circuit Current Rated Packages
- 3% Line Reactor for Reducing Harmonics
- Soft-Switching PWM Drive Output
- Catch-a-spinning Motor Functionality
- Enhanced Automatic Energy Savings, Reduces Power Consumption of Both the Motor and Drive
- Simple Construction Leads to Ease of Maintenance
- Touch screen interface for monitoring and control
- 110v Motor Running Output
- Power Monitoring from the Drive's Keypad or Software
- Built-in E-Stop Protection
- Communication Protocols: Modbus RTU, Metasys® N2, & APOGEE® FLN are built-in the Drive
- PC Software for Drive Set-Up & Monitoring





## Lower Energy Bills & CO<sub>2</sub> Emissions



Energy savings is achieved by matching the pump performance to the filter load as it dynamically changes during the filter cycle. By applying the Affinity Laws for centrifugal loads, we can calculate the cost of operation of a conventional starting method and operation with an **SPCS BC**

### Energy Savings Example:

Replacing a valve controlled pump system with an across the line motor starter to an **SPCS BC** system with maintaining the Health Department mandated flow rate for 8,736 hrs/yr, and operated by a 25Hp motor.

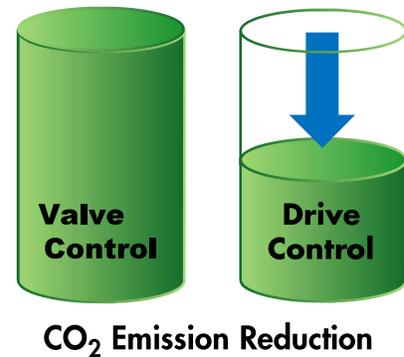
Energy required by using valve control: 168,287kWh/yr  
 Energy required by using drive control: 100,396kWh/yr  
 Energy Savings by using the **SPCS BC**: 67,890kWh/yr

Energy savings achieved by using drives can correlate to reducing the amount of carbon dioxide (CO<sub>2</sub>) emitted into the environment from power generation plants.

### CO<sub>2</sub> Emission Reduction Example:

Using the Energy Savings previously calculated at 67,890kWh/yr and a CO<sub>2</sub> Emission factor of 1.36lbs/kWh<sup>(1)</sup>

Estimated reduction of CO<sub>2</sub> emissions: 92,330lbs/yr



## Reduce Maintenance Cost & Ambient Noise

Drives inherently soft-start the motor, reducing wear and tear on the attached mechanical components, resulting in reduced maintenance.

Pool circulation pumps controlled by valves can produce undesirable ambient noise. A reduction in ambient noise can be accomplished by applying the **SPCS BC** drive system.



(1) Source: U.S. Environmental Protection Agency Office of Atmospheric Programs Climate Protection Partnerships Division The Emissions & Generation Resource Integrated Database For 2006 (eGRID2006), April 2007





# SPCS

## Smart Pump Control System®

H2O-TECHNOLOGIES.COM

<b>SPCS FD</b>	
<b>Ratings</b>	
Horsepower & Voltage	2 - 60Hp, 208/230V 2 - 100Hp, 460V
NEMA Type 3R Enclosure	S
Ambient Temperature	-10° to 40° C
<b>Features</b>	
Input Disconnect & Branch Circuit Protection	Standard Circuit Breaker
Electronically & Mechanically Interlocked Drive and ByPass Conactors	S
Motor Overload Realy	Class 20
DC Link	Standard
3% Line Reactor	S
5% Line Reactor	O
Control Power Transformer with Mini Circuit Breaker Protection	S
Power On Indication	via Touchscreen
Drive Run Indication	via Touchscreen
Energy Efficient Mode Indication	via Touchscreen
Fault Indication	via Touchscreen
ByPass Run Indication	via Touchscreen
Drive-Off-Bypass Selector Switch	S
BecSys- Off - Bypass Selector Switch	S
Voltage Fault Indication	O
110v Pump Running Powered Interlock Output	S
Automatic Run Command Input	S
E-Stop	S
Two Pump Manual Alternating	O
Two Pump Simultaneous Operation	O
Under Voltage Automatic Bypass Protection	O
Access Drive via Internet	O
Early Pump Wear Detiction	S
<b>Communication Protocols</b>	
Modbus RTU	S
Metasys® N2	S
APOGEE® FLN (P1)	O
LonWorks®	O
BACnet	O
Profibus DP	O
DeviceNet	O
Ethernet	O
<b>Codes &amp; Standards</b>	
UL 508 & cUL	S
Applicable NEMA & NFPA Standards	S

S = Provided As Standard

O = Optional

APOGEE is a registered trademark of Siemens Building Technologies, Inc.

LonWorks is a registered trademark of Echelon Corporation.

Metasys is a registered trademark of Johnson Controls, Inc.

**H2O Technologies**  
**4501 Sandburg Way, Irvine, CA 92612**  
**[562] 260-3141**  
[www.h2o-technologies.com](http://www.h2o-technologies.com)



# STARK™ FILTRATION

PENTAIR COMMERCIAL AQUATICS • 1.800.831.7133

## MODULAR BY DESIGN

Standard and custom styles allow for influent and effluent placement to meet any and all design requirements. There are single or multiple units, side-by-side, end-to-end, or stacked. Manway locations are provided for every need.

Architects and engineers favor the Stark™ Filtration System because it is designed to use as little as one-fourth the floor space of other filters. The self-supporting stackable structure eliminates the need for independent framework.

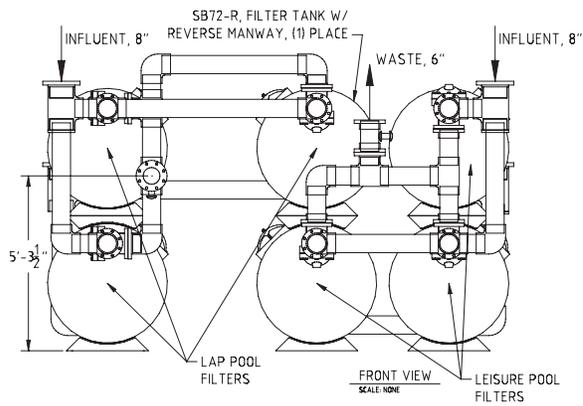
Engineered for a Lifetime of Performance Every Stark Fiberglass Filter is built to resist structural failures caused by fatigue, corrosion, and scaling. It is also protected by a proprietary all-weather coating with UV inhibitors.

## BACKWASH CONTROLS

All Stark systems are provided with all valves and fittings required for an efficient backwash cycle. Fully Automatic, Semi-Automatic and Manual Backwash Options are available.



Custom Face-Piping Kits for your Application.



## VESSEL CONSTRUCTION

Superior, corrosion-proof, fiberglass construction. All Stark vessels are made using a dual-construction method consisting of a multiple-layer fiberglass liner filament wound with continuous fiber strand. Computer-controlled, filament winding covers the entire vessel including the domes. Durable, all-weather coating with UV inhibitors.



## MANWAY VIEWPORT

Provides Visual Observation of the sand bed during Filtration and Backwash. Standard on all Stark vessels. Manway opening is 12" X 16" elliptical for easy access.



6" Backwash Valve



## VALVES

Cost-effective backwash control valves have manual or automatic options. 6" version (on most models) includes a transparent ABS valve housing and cover to display valve positioning and provide convenient maintenance inspections.



## BUTTERFLY VALVE

Linked Butterfly Valves also available.



## COMMERCIAL LATERAL

2" NPT injection molded ABS with "V" groove slots and reinforcing ribs for best performance and service life.



## Optional Pressure Booster System (PBS01)

Provides consistent valve-actuation where city-water pressure is unreliable.



PBS01

## FEATURED HIGHLIGHTS

- All vessel models are NSF 50 listed.
- End-manways provide easy access for service and maintenance.
- Schedule 80 Face Piping is fully assembled and in our factory for ease of installation.
- Clear backwash valve (most models) provides for intuitive operation and troubleshooting.
- Stark valves and several control options make backwashing simple.
- Unparalleled tank construction and exterior all-weather coating.



6" Backwash Valve



## STARK™ SS SERIES™ FILTERS HORIZONTAL SAND FILTRATION SYSTEMS

Stark SS Series Filter Systems are designed with ease of installation, maintenance and minimal floor space in mind. Vessels are side-by-side, with manway access on the ends and all piping above the vessel(s). All piping ships fully solvent-welded and pre-assembled to ensure fit. 100 psi vessel pressure rating.



Stark SS Series Sand Filter

### CAPACITY INFORMATION

# Tanks	System Number	Tank Size	Filtration Area (Sq. Ft.)	Flow (GPM) 12 gpm/sf	Flow (GPM) 15 gpm/sf	Backwash Valve Size/Type	Dimensions			Total Media (Cu. Ft.)	Operating Weight (lbs.)	Shipping Weight (lbs.)
							'W'	'L'	"Hs"			
1	RS1-60-04	36" x 60"	13.5	162	203	4" Gray	38"	63"	68"	15.5	4,600	845
	RS1-72-04	36" x 72"	17.2	206	258	4" Gray	38"	75"	68"	19.0	5,500	915
	SS1-48-04	42" x 48"	12.8	154	192	4" Gray	44"	51"	74"	16.5	4,900	805
	SS1-72-06	42" x 72"	20.0	240	300	6" Clear	44"	75"	86"	26.0	7,500	1,105
	SS1-96-06	42" x 96"	27.0	324	405	6" Clear	44"	99"	86"	36.0	9,800	1,240
2	RS2-60-06	36" x 60"	27.0	324	405	4" Gray	77"	63"	70"	31.0	9,400	1,650
	RS2-72-06	36" x 72"	34.4	413	516	4" Gray	77"	75"	70"	38.0	11,000	1,830
	SS2-48-06	42" x 48"	25.6	307	384	4" Gray	90"	51"	76"	33.0	10,000	1,650
	SS2-72-06	42" x 72"	40.0	480	600	6" Clear	90"	75"	87"	52.0	14,800	2,060
	SS2-96-06	42" x 96"	54.0	648	810	6" Clear	90"	99"	87"	72.0	19,400	2,380
3	RS3-60-06	36" x 60"	40.5	486	608	4" Gray	116"	63"	70"	46.5	14,200	2,420
	RS3-72-06	36" x 72"	51.6	619	774	4" Gray	116"	75"	70"	46.5	16,800	2,670
	SS3-48-06	42" x 48"	38.4	461	576	4" Gray	136"	51"	76"	49.5	14,900	2,420
	SS3-72-08	42" x 72"	60.0	720	900	6" Clear	136"	75"	88"	78.0	22,400	3,140
	SS3-96-08	42" x 96"	81.0	972	1215	6" Clear	136"	99"	88"	108.0	29,400	3,620
4	RS4-60-06	36" x 60"	54.0	648	810	4" Gray	155"	63"	70"	62.0	18,900	3,200
	RS4-72-08	36" x 72"	68.8	826	1032	4" Gray	155"	75"	76"	76.0	22,300	3,560
	SS4-48-06	42" x 48"	51.2	614	768	4" Gray	182"	51"	76"	66.0	19,900	3,200
	SS4-72-08	42" x 72"	80.0	960	1200	6" Clear	182"	75"	88"	104.0	30,200	4,470
	SS4-96-10	42" x 96"	108.0	1296	1620	6" Clear	182"	99"	88"	144.0	39,900	5,145
5	SS5-72-10	42" x 72"	100.0	1200	1500	6" Clear	229"	75"	88"	130.0	38,400	5,650
	SS5-96-10	42" x 96"	135.0	1620	2025	6" Clear	229"	99"	88"	180.0	49,900	6,450
6	SS6-72-10	42" x 72"	120.0	1440	1800	6" Clear	275"	75"	88"	156.0	46,000	6,800
	SS6-96-12	42" x 96"	162.0	1944	2430	6" Clear	275"	99"	97"	216.0	60,800	7,900

## SHELL AND WINDING

Robust Dual-Wall Construction for piece of mind and long service life. Entire vessel including domes is wound on a computer-controlled multi-axis machine.



### NOTES:

1. Standard header sizing shown is based on 10 fps max. at 15 gpm per sq. ft.
2. For more dimensional detail, consult the appropriate Cut Sheet in our Design Manual.
3. S-48 Vessels are not available in A Style. Dimensions above represent C Style.
4. For special requirements including non-standard header sizes/locations and systems consisting of more vessels than shown, please contact our Applications Engineering at: PoolApplicationRFQ@pentair.com

## STARK™ SS SERIES™ FILTERS (continued) HORIZONTAL SAND FILTRATION SYSTEMS

### SS SERIES SYSTEMS INCLUDE:

- Manway viewport standard on all Stark tanks
- Stark backwash valves (1 per tank)
- Pre-glued piping utilizing grooved couplings
- Stark diaphragm-style priority valve (on dual tank systems)

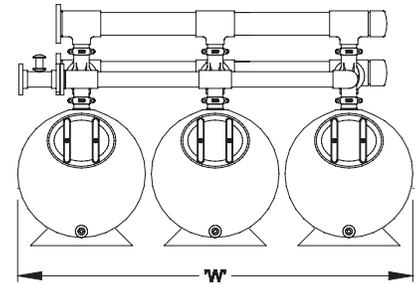
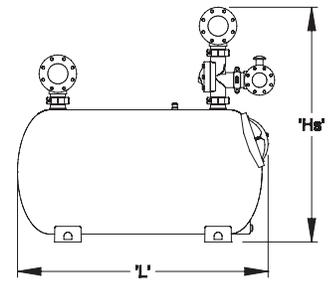
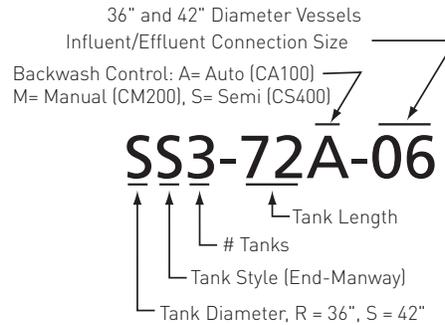
### WITH FULLY AUTOMATIC (CA100) CONTROL OPTION

- Effluent Flow Sensor/Saddle
- Temperature Probe

### ADDITIONAL ADDERS

- Pressure Booster System (PBS01)
- Manual or Motorized Butterfly backwash
- Throttling valve for 3+ tank systems
- Advanced backwash controls

### SS Series System Numbering



Custom Systems Available for your Application.



## FEATURED HIGHLIGHTS

- All vessel models are NSF listed
- Solid composite construction - does not employ a bladder.
- Vessels can be stacked to minimize foot print. Designed for Seismic Zone 4 loading with additional supports or braces.
- Vessels feature proprietary all-weather exterior coating with UV inhibitors.
- Several backwash control options available.
- Multiple influent and effluent pipe locations available - A, B and C style

### S SERIES SYSTEMS INCLUDE

Manway with Viewport standard on all Stark Tanks; Stark backwash valves (1 per tank); Stark diaphragm-style priority valve (on dual-tank systems).

### ADDITIONAL ADDERS

Pressure Booster System (PBS01); Manual or motorized butterfly backwash; Throttling valve for 3+ tank systems; Advanced backwash controls.

## STARK™ S SERIES™ FILTERS HORIZONTAL SAND FILTRATION SYSTEMS

For use in commercial pool, water park and many aquarium applications. Standard systems accommodate flows from 135 to 2,500 GPM – custom systems accommodate unlimited flows.

All Stark S Series vessels are corrosion-proof, composite vessels. Systems are available with 100 psi rated filament-wound vessels. All vessels are 42" diameter to offer the best combination of cost and effectiveness for recreational water. Stark diaphragm valves and controls are standard; butterfly-valve options (including linked valves) are also available.



### CAPACITY INFORMATION (INDEPENDENT OF STYLE/CONFIGURATION)

# Tanks	General System Number	Tank Size	Filtration Area (Sq. Ft.)	Flow (GPM) 12 gpm/sf	Flow (GPM) 15 gpm/sf	Backwash Valve Size/Type	Total Media (Cu. Ft.)	Operating Weight (lbs.)	Shipping Weight (lbs.)
1	S1-48	42" x 48"	12.8	154	192	4" Gray	16.5	5,280	870
	S1-72	42" x 72"	20.0	240	300	6" Clear	26.0	7,920	1,110
	S1-96	42" x 96"	27.0	324	405	6" Clear	36.0	10,560	1,350
	S1-120	42" x 120"	35.0	420	525	6" Clear	45.5	13,200	1,590
	S1-144	42" x 144"	41.0	492	615	6" Clear	55.5	15,840	1,830
2	S2-48	42" x 48"	25.6	307	384	4" Gray	33.0	10,560	1,740
	S2-72	42" x 72"	40.0	480	600	6" Clear	52.0	15,840	2,220
	S2-96	42" x 96"	54.0	648	810	6" Clear	72.0	21,120	2,700
	S2-120	42" x 120"	70.0	840	1050	6" Clear	91.0	26,400	3,180
	S2-144	42" x 144"	82.0	984	1230	6" Clear	111.0	31,680	3,660
3	S3-48	42" x 48"	38.4	461	576	4" Gray	49.5	15,840	2,610
	S3-72	42" x 72"	60.0	720	900	6" Clear	78.0	23,760	3,330
	S3-96	42" x 96"	81.0	972	1215	6" Clear	108.0	31,680	4,050
	S3-120	42" x 120"	105.0	1260	1575	6" Clear	136.5	39,600	4,770
	S3-144	42" x 144"	123.0	1476	1845	6" Clear	166.5	47,520	5,490
4	S4-48	42" x 48"	51.2	614	768	4" Gray	66.0	21,120	3,480
	S4-72	42" x 72"	80.0	960	1200	6" Clear	104.0	31,680	4,440
	S4-96	42" x 96"	108.0	1296	1620	6" Clear	144.0	42,240	5,400
	S4-120	42" x 120"	140.0	1680	2100	6" Clear	182.0	52,800	6,360
	S4-144	42" x 144"	164.0	1968	2460	6" Clear	222.0	63,360	7,320

### DIMENSIONS - SIDE-BY-SIDE

Descriptive System Number	Single-Tank and Side-by-Side Systems		
	'W'	'L'	'Hs'
*SC1-48-04	44"	82"	47"
*SA1-72-06	44"	107"	67"
*SA1-96-06	44"	122"	67"
SA1-120-06	44"	146"	67"
SA1-144-06	44"	170"	67"
*SC2-48-06	96"	80"	56"
*SA2-72-06	99"	92"	86"
*SA2-96-06	99"	116"	86"
SA2-120-08	110"	144"	91"
SA2-144-08	110"	168"	91"
*SC3-48-06	152"	80"	56"
*SA3-72-08	152"	94"	91"
*SA3-96-08	152"	117"	91"
SA3-120-10	152"	138"	96"
SA3-144-10	152"	162"	96"
*SC4-48-06	200"	80"	56"
*SA4-72-08	200"	94"	91"
*SA4-96-10	200"	118"	96"
SA4-120-10	200"	142"	96"
SA4-144-12	200"	168"	100"

\*For systems with an asterisk, SS Series systems may be used with a smaller footprint.



SB2-144M-08ST

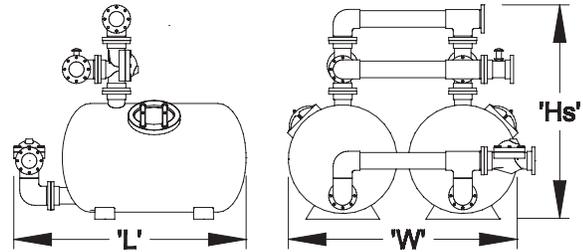
# STARK™ S SERIES™ FILTERS (continued)

## HORIZONTAL SAND FILTRATION SYSTEMS

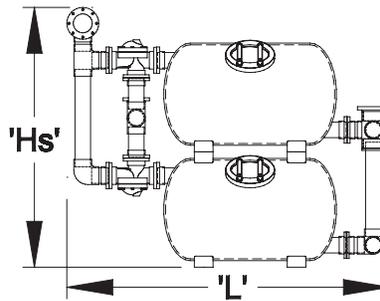
### DIMENSIONS AND PERFORMANCE

**NOTES:**

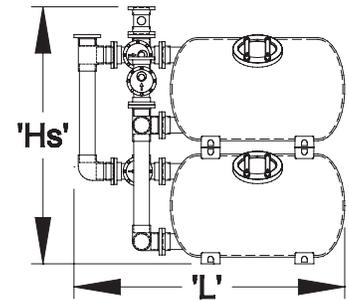
1. Standard header sizing shown is based on 10 fps max. at 15 gpm per sq. ft.
2. For more dimensional detail, consult the appropriate Cut Sheet in our Design Manual.
3. S-48 Vessels are not available in A Style. Dimensions represent C Style.
4. For special requirements including non-standard header sizes/locations and systems consisting of more vessels than shown, please contact our Applications Engineering at: PoolApplicationRFQ@pentair.com



A-Style Side-by-Side



B-Style Stacked

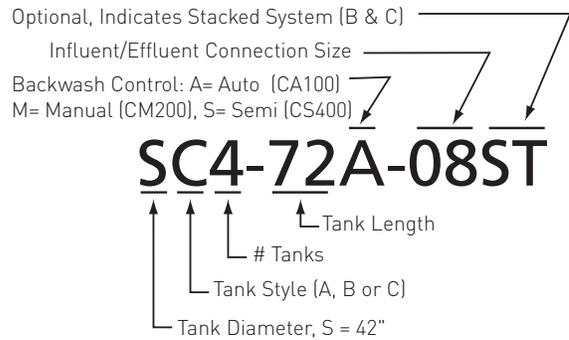


C-Style Stacked

S SERIES

DIMENSIONS - STACKED SYSTEMS						
Style	# Tanks	Descriptive System Number	Filtration Area (Sq. Ft.)	'W'	'L'	'Hs'
SB2-72-06ST	40.0	44"	135"	109"		
SB2-96-06ST	54.0	44"	159"	109"		
SB2-120-08ST	70.0	44"	191"	109"		
SB2-144-08ST	82.0	44"	215"	109"		
Stacked Systems - C-Style	4	SB4-48-06ST	51.2	92"	99"	108"
		SB4-72-08ST	80.0	92"	140"	111"
		SB4-96-10ST	108.0	100"	166"	119"
		SB4-120-10ST	140.0	100"	190"	119"
		SB4-144-12ST	164.0	104"	217"	122"
Stacked Systems - C-Style	2	SC2-48-06ST	25.6	50"	80"	107"
		SC2-72-06ST	40.0	50"	114"	109"
		SC2-96-06ST	54.0	50"	138"	109"
		SC2-120-08ST	70.0	53"	165"	109"
		SC2-144-08ST	82.0	53"	189"	109"
	4	SC4-48-06ST	51.2	92"	88"	108"
		SC4-72-08ST	80.0	92"	122"	111"
		SC4-96-10ST	108.0	100"	146"	119"
		SC4-120-10ST	140.0	100"	169"	119"
		SC4-144-12ST	164.0	104"	193"	122"

**S Series System Numbering**





## FEATURED HIGHLIGHTS

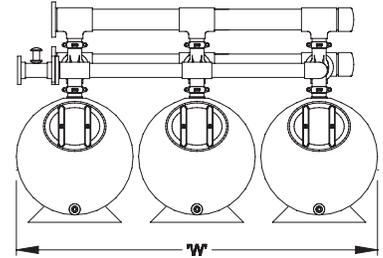
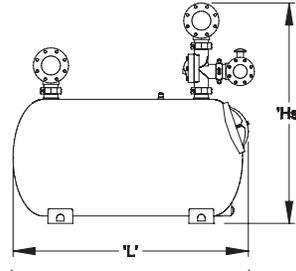
- All vessel models are NSF listed.
- Manway cover has integral viewport for Internal filter observation.
- Solid composite construction - does not employ a bladder.
- Schedule 80 Face Piping is fully assembled.
- Vessels feature proprietary all-weather exterior coating with UV inhibitors.
- Vessels greater than 40 SF utilize an innovative 8" air-actuated backwash valve.
- Several backwash control options available.
- Butterfly-valve options including linked tandem valves are also available.



## STARK™ 5S SERIES™ FILTERS HORIZONTAL SAND FILTRATION SYSTEMS

The 5S Series Filter Systems are designed as an extension to the industry-leading SS Series Filtration Systems, with many of the same features including fully-assembled Schedule 80 Face Piping, with the addition of new innovations. The 5S Series Filter Systems include the only 8" backwash valve in the industry, and air valve actuation for the smoothest, quickest valve movement.

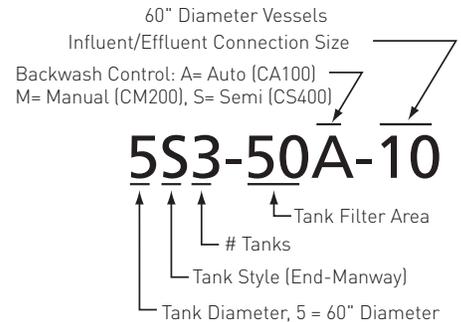
### DIMENSIONS AND PERFORMANCE



#### NOTES:

1. Standard header sizing shown is based on 10 fps max. at 15 gpm per sq. ft.
2. For more dimensional detail, consult the appropriate Cut Sheet in our Design Manual.
3. For special requirements including non-standard header sizes/locations and systems consisting of more vessels than shown, please contact our Applications Engineering at: PoolApplicationRFQ@pentair.com

#### 5S Series System Numbering



### CAPACITY INFORMATION

# Tanks	System Number	Tank Size	Filtration Area (Sq. Ft.)	Flow (GPM) 12 gpm/sf	Flow (GPM) 15 gpm/sf	Backwash Valve Size/Type	'W'	'L'	"Hs"	Total Media (Cu. Ft.)	Operating Weight (lbs.)	Shipping Weight (lbs.)
1	5S1-30-06	60" x 78"	30.0	360	450	6" Clear	62"	83"	106"	63.5	15,000	2,000
	5S1-35-06	60" x 90"	35.0	420	525	6" Clear	62"	95"	106"	74.3	17,000	2,300
	5S1-40-06	60" x 102"	40.0	480	600	6" Clear	62"	107"	106"	96.4	20,000	2,600
	5S1-45-08	60" x 114"	45.0	540	675	8" Gray	62"	119"	123"	26.4	23,000	2,900
	5S1-50-08	60" x 126"	50.0	600	750	8" Gray	62"	131"	123"	107.4	25,000	3,200
2	5S2-30-08	60" x 78"	60.0	720	900	6" Clear	128"	83"	111"	127.0	30,000	4,100
	5S2-35-08	60" x 90"	70.0	840	1050	6" Clear	128"	95"	111"	148.6	35,000	4,600
	5S2-40-08	60" x 102"	80.0	960	1200	6" Clear	128"	107"	111"	170.8	40,000	5,200
	5S2-45-08	60" x 114"	90.0	1080	1350	8" Gray	128"	119"	127"	192.8	45,000	5,700
	5S2-50-10	60" x 126"	100.0	1200	1500	8" Gray	128"	131"	133"	214.8	49,000	6,300
3	5S3-30-08	60" x 78"	90.0	1080	1350	6" Clear	194"	83"	111"	190.5	45,000	6,100
	5S3-35-10	60" x 90"	105.0	1260	1575	6" Clear	194"	95"	117"	222.9	53,000	6,900
	5S3-40-10	60" x 102"	120.0	1200	1800	6" Clear	194"	107"	117"	256.2	60,000	7,800
	5S3-45-10	60" x 114"	135.0	1620	2025	8" Gray	194"	119"	133"	289.2	68,000	8,600
	5S3-50-12	60" x 126"	150.0	1800	2250	8" Gray	194"	131"	135"	322.2	75,000	9,500
4	5S4-30-10	60" x 78"	120.0	1440	1800	6" Clear	260"	83"	117"	254.0	61,000	8,100
	5S4-35-10	60" x 90"	140.0	1680	2100	6" Clear	260"	95"	117"	297.2	70,000	9,200
	5S4-40-12	60" x 102"	160.0	1920	2400	6" Clear	260"	107"	119"	341.6	80,000	10,400
	5S4-45-12	60" x 114"	180.0	2160	2700	8" Gray	260"	119"	135"	385.6	92,000	11,500
	5S4-50-12	60" x 126"	200.0	2400	3000	8" Gray	260"	131"	135"	429.6	100,000	12,600

## FEATURED HIGHLIGHTS

Also available in complete systems using either our proprietary diaphragm valves or linked butterfly valves.

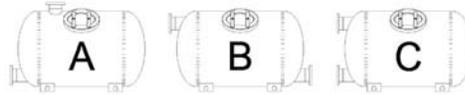


## STARK™ AQ SERIES™ FILTERS LARGE DIAMETER SYSTEMS & VESSELS

48" and 60" Diameter Stackable Horizontal Filters are available as complete filtration systems. The Stark AQ Series Filters are ideal for high-load or large flows of water, such as water parks and public aquariums. NSF-50 Listed. 75 psi pressure rating.



Stark AQ Series Sand Filter



### AQ SERIES VESSEL SIZING AND CAPACITY INFORMATION

Vessel Model Number	Available Styles*	Filtration Area (sq ft)	Internal Diameter (feet)	Internal Length (ft) (feet)	Standard Flange Size (ANSI)
4X6	A, B, C	22	4.0	6.0	6"
4X8	A, B, C	30	4.0	8.0	6"
4X10	A, B, C	38	4.0	10.0	6"
4X12	A, B, C	46	4.0	12.0	8"
4X14	A, B, C	54	4.0	14.0	8"
5X8	A, B, C	37	5.0	8.0	8"
5X10	A, B, C	47	5.0	10.0	8"
5X12	A, B, C	57	5.0	12.0	8"
5X14	A, B, C	67	5.0	14.0	8"
5X16	A, B, C	77	5.0	16.0	8"

\*Styles B and C are stackable. All are available with the manway on the other side (reverse manway).



Stark V Series Sand Filter

## STARK™ V SERIES™ FILTERS HIGH LOAD VERTICAL FILTERS

Deep-Bed Filters provide "plug-flow" for extreme load applications such as sea-water intake, mammal and marine mammal exhibits. They are also frequently used as carbon (GAC) filters.

### V SERIES VESSEL SIZING AND CAPACITY INFORMATION

Vessel Model Number	Styles	Filtration Area (sq ft)	Internal Diameter (feet)	Internal Height (ft) (feet)	Standard Flange Size (ANSI)
V3672	Vertical	7.1	3.0	6.0	3"
V4272	Vertical	9.6	3.5	6.0	3"
V4872	Vertical	12.6	4.0	6.0	4"
V6072	Vertical	19.6	5.0	6.0	6"
V72	Vertical	28.3	6.0	8.8	6"
V96	Vertical	50.3	8.0	9.5	6"

## TANK WINDING



## STARK™ TANKS ARE CORROSION PROOF

Stark fiberglass filters are designed to have a life span three-to-five-times longer than metal filters. Each Stark filter tank is manufactured under the strictest quality-control procedures. The integral composite fiberglass construction eliminates welds or seams that can leak, blow out, or rupture from vacuum damage.

All NSF-50 listed Stark Horizontal filters are designed for 75 or 100 psi working pressure, and 400 psi burst test, to meet multiple budgets and specs. Each tank is pressure tested prior to shipment. And the tank is completely impervious to corrosion.

Stark's 100 percent corrosion-resistant fiberglass filters provide the perfect solution: dependable performance with ease of operation.



VESSEL FEATURES

## OPTIONAL INTEGRAL INSULATION

Any Stark Filter can be manufactured with integral insulation between the shell and winding layers to last as long as the vessel. Used for both cold water and warm water life support applications when filters are installed where a high differential exists between water and ambient air temperature.

## STARK™ FILTRATION ADDITIONAL FEATURES AND OPTIONS

### COMMERCIAL LATERAL

2" NPT injection molded ABS with "V" groove slots and reinforcing ribs for best performance and service life.



### MANWAY VIEWPORT

Provides Visual Observation of the sand bed during Filtration and Backwash. Standard on all Stark vessels. Manway opening is 12" X 16" elliptical for easy access.



### VALVES

Cost-effective backwash control valve have manual or automatic options. 6" version (on most models) includes a transparent ABS valve housing and cover to display valve positioning and provide convenient maintenance inspections.



### OPTIONAL PRESSURE BOOSTER SYSTEM (PBS01)

Provides consistent valve-actuation where city-water pressure is unreliable.

# BACKWASH CONTROLS

## CM200 MANUAL BACKWASH CONTROLLER

(Backwash Option "M")

This is the simplest option. No electronics or programming required; simply turn the knob to backwash each tank in the system.

## CS 400 SEMI-AUTO BACKWASH CONTROLLER

(Backwash Option "S")

This controller is programmable and controls every aspect of the backwash cycle once initiated. Backwash can be initiated three ways: by an operator with the touch of a button, by a signal from a master controller (such as the AK600), or by a signal from an optional differential pressure switch (CS400-DP). Stored backwash data and history, alarms, and calculated backwash cycle times are also features of the CS400 controller, as are relays for communication with the heater, pump and Acu-drive.

## CA 100 AUTOMATIC BACKWASH CONTROLLER

(Backwash Option "A")

This is the most comprehensive backwash controller and can be readily reprogrammed to initiate backwash automatically based on differential pressure (integral pressure transducers are standard), time (internal seven-day clock with battery back-up is standard), flow (with optional flow sensor), or any combination of the above. The controller has real-time display of operation mode, filter flow rate, and water temperature (with optional temperature probe). Also, includes Energy Saver Mode for simple On/Off pump scheduling and various interlocks and relays to communicate with other equipment (pump, heater, Acu-Drive).

## BUTTERFLY VALVE SYSTEMS

Systems are also available with various, simple butterfly valve backwash options, including Single Lever Linkage (Backwash Option "SL"; Single-Tank Systems Only – tank is backwashed by the throw of a single lever); and Tandem Butterfly Valve Configurations (Backwash Option TM; Multiple Tank Systems - each Stark backwash valve is replaced by a linked pair of butterfly valves. Tanks are backwashed one-at-a-time with filtered water from adjacent tank(s)). Custom systems are also available using individual (non-linked) butterfly valves.



# WHISPERFLO®

## HIGH PERFORMANCE PUMP

The industry standard by every measure.

We call it the WhisperFlo Pump for good reason. This innovative hydraulic design moves water more efficiently and more quietly than competitive pumps. Under typical operating conditions, the WhisperFlo Pump offers the highest water flow of any high performance pump. And, it's designed to be a tireless workhorse. The pump's engineered thermoplastic housing withstands extreme heat and resists corrosion. The commercial-grade motor frame has a stainless-steel motor shaft and sealed bearings that never need lubrication. Engineered to provide optimum performance in any size pool or pool and spa combination, the WhisperFlo Pump is built to last a lifetime and, as a result, has been the industry's top seller for years.





## WHISPERFLO® HIGH PERFORMANCE PUMP

Quiet and durable.

The WhisperFlo Pump delivers maximum circulation and trouble-free life with minimal maintenance. Our legendary hydraulic design has been refined over 40 years for superior performance. No wonder more than 2 million Pentair Pumps have been selected by pool professionals.

### KEY FEATURES

#### Cam and Ramp™ Lid

The engineered-polymer, user-friendly, see-through lid remains clear and strong for years. It permits fast and easy inspection of the strainer basket and locks in place with a quarter-turn, making cleaning easy and quick.

#### Advanced FunnelFlo™ Diffuser and Impeller

Maximize water flow while minimizing turbulence and noise.

#### Oversized strainer basket

Extends time between cleanings.

#### TEFC/Super-Duty motor options

Provide superior performance and longevity.

#### Heavy-duty threading

For dependable, worry-free connections.

#### Specially engineered design

Assures whisper-quiet operation.

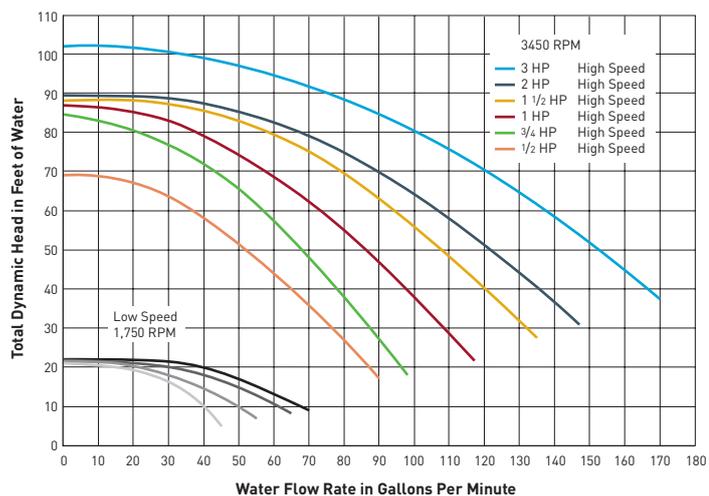
#### Versatile

Ideal for pool and spa combinations and for operating in-floor cleaning systems.

#### Durable

Commercial-grade frame, stainless-steel shaft and permanently lubricated, sealed bearings for long life.

### PERFORMANCE CURVES



*Pumps and replacement motors that are single speed and one (1) total HP or greater cannot be sold, offered for sale or installed in a residential pool for filtration use in California, Title 20 CCR sections 1601-1609.*

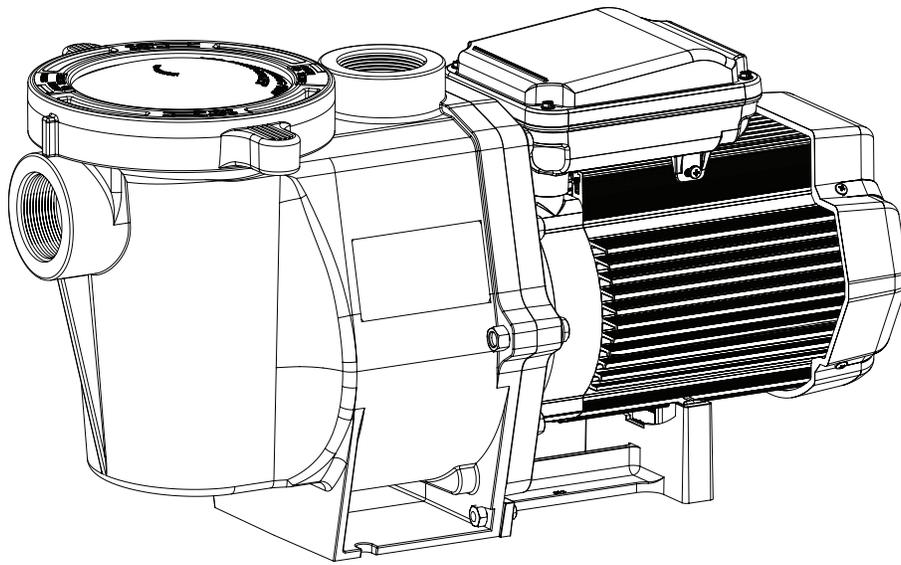


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# WHISPERFLO® HIGH PERFORMANCE PUMP



## INSTALLATION AND USER'S GUIDE

IMPORTANT SAFETY INSTRUCTIONS  
*READ AND FOLLOW ALL INSTRUCTIONS*  
SAVE THESE INSTRUCTIONS

ENGLISH 1

ESPAÑOL 10

## CUSTOMER SERVICE / TECHNICAL SUPPORT

If you have questions about ordering Pentair Aquatic Systems replacement parts, and pool products, please contact:

**Customer Service and Technical Support, USA**  
(8 A.M. to 4:30 P.M. — Eastern/Pacific Times)  
Phone: (800) 831-7133  
Fax: (800) 284-4151

**Web site**

Visit [www.pentairpool.com](http://www.pentairpool.com) or [www.staritepool.com](http://www.staritepool.com)

**Sanford, North Carolina** (8 A.M. to 4:30 P.M. ET)  
Phone: (919) 566-8000  
Fax: (919) 566-8920

**Moorpark, California** (8 A.M. to 4:30 P.M. PT)  
Phone: (805) 553-5000 (Ext. 5591)  
Fax: (805) 553-5515

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P/N 071109 Rev. L 6/28/18



# IMPORTANT PUMP WARNING AND SAFETY INSTRUCTIONS



## IMPORTANT NOTICE

This guide provides installation and operation instructions for this pump. Consult Pentair with any questions regarding this equipment.

**Attention Installer:** This guide contains important information about the installation, operation and safe use of this product. This information should be given to the owner and/or operator of this equipment after installation or left on or near the pump.

**Attention User:** This manual contains important information that will help you in operating and maintaining this product. Please retain it for future reference.

## READ AND FOLLOW ALL INSTRUCTIONS SAVE THESE INSTRUCTIONS



This is the safety alert symbol. When you see this symbol on your system or in this manual, look for one of the following signal words and be alert to the potential for personal injury.

### **DANGER**

Warns about hazards that can cause death, serious personal injury, or major property damage if ignored.

### **WARNING**

Warns about hazards that may cause death, serious personal injury, or major property damage if ignored.

### **CAUTION**

Warns about hazards that may or can cause minor personal injury or property damage if ignored.

### **NOTE**

Indicates special instructions not related to hazards.

Carefully read and follow all safety instructions in this manual and on equipment. Keep safety labels in good condition; replace if missing or damaged.

When installing and using this electrical equipment, basic safety precautions should always be followed, include the following:

**WARNING** Do not permit children to use this product.

**WARNING RISK OF ELECTRICAL SHOCK.** Connect only to a branch circuit protected by a ground-fault circuit-interrupter (GFCI). Contact a qualified electrician if you cannot verify that the circuit is protected by a GFCI.

**WARNING** This unit must be connected only to a supply circuit that is protected by a ground-fault circuit-interrupter (GFCI). Such a GFCI should be provided by the installer and should be tested on a routine basis. To test the GFCI, push the test button. The GFCI should interrupt power. Push the reset button. Power should be restored. If the GFCI fails to operate in this manner, the GFCI is defective. If the GFCI interrupts power to the pump without the test button being pushed, a ground current is flowing, indicating the possibility of an electric shock. Do not use this pump. Disconnect the pump and have the problem corrected by a qualified service representative before using.

**CAUTION** This pump is for use with permanent swimming pools and may also be used with hot tubs and spas if so marked. Do not use with storable pools. A permanently-installed pool is constructed in or on the ground or in a building such that it cannot be readily disassembled for storage. A storable pool is constructed so that it is capable of being readily disassembled for storage and reassembled to its original integrity.

## General Warnings

- Never open the inside of the drive motor enclosure. There is a capacitor bank that holds a 230 VAC charge even when there is no power to the unit.
- The pump is not submersible.
- The pump is capable of high flow rates; use caution when installing and programming to limit pumps performance potential with old or questionable equipment.
- Code requirements for electrical connection differ from country to country, state to state, as well as local municipalities. Install equipment in accordance with the National Electrical Code and all applicable local codes and ordinances.
- Before servicing the pump; switch OFF power to the pump by disconnecting the main circuit to the pump.
- This appliance is not intended for use by persons (including children) of reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning the use of the appliance by a person responsible for their safety.

**DANGER** FAILURE TO FOLLOW ALL INSTRUCTIONS AND WARNINGS CAN RESULT IN SERIOUS BODILY INJURY OR DEATH. **THIS PUMP SHOULD BE INSTALLED AND SERVICED ONLY BY A QUALIFIED POOL SERVICE PROFESSIONAL. INSTALLERS, POOL OPERATORS AND OWNERS MUST READ THESE WARNINGS AND ALL INSTRUCTIONS IN THE OWNER'S MANUAL BEFORE USING THIS PUMP. THESE WARNINGS AND THE OWNER'S MANUAL MUST BE LEFT WITH THE POOL OWNER.**

**DANGER** SUCTION ENTRAPMENT HAZARD: STAY OFF THE MAIN DRAIN AND AWAY FROM ALL SUCTION OUTLETS!



THIS PUMP PRODUCES HIGH LEVELS OF SUCTION AND CREATES A STRONG VACUUM AT THE MAIN DRAIN AT THE BOTTOM OF THE BODY OF WATER. THIS SUCTION IS SO STRONG THAT IT CAN TRAP ADULTS OR CHILDREN UNDER WATER IF THEY COME IN CLOSE PROXIMITY TO A DRAIN OR A LOOSE OR BROKEN DRAIN COVER OR GRATE.

THE USE OF UNAPPROVED COVERS OR ALLOWING USE OF THE POOL OR SPA WHEN COVERS ARE MISSING, CRACKED OR BROKEN CAN RESULT IN BODY OR LIMB ENTRAPMENT, HAIR ENTANGLEMENT, BODY ENTRAPMENT, EVisCERATION AND/OR DEATH.

The suction at a drain or outlet can cause:

**Limb Entrapment:** When a limb is sucked or inserted into an opening resulting in a mechanical bind or swelling. This hazard is present when a drain cover is missing, broken, loose, cracked or not properly secured.

**Hair Entanglement:** When the hair tangles or knots in the drain cover, trapping the swimmer underwater. This hazard is present when the flow rating of the cover is too small for the pump or pumps.

**Body Entrapment:** When a portion of the body is held against the drain cover trapping the swimmer underwater. This hazard is present when the drain cover is missing, broken or the cover flow rating is not high enough for the pump or pumps.

**Evisceration/Disembowelment:** When a person sits on an open pool (particularly a child wading pool) or spa outlet and suction is applied directly to the intestines, causing severe intestinal damage. This hazard is present when the drain cover is missing, loose, cracked, or not properly secured.

# IMPORTANT PUMP WARNING AND SAFETY INSTRUCTIONS

**Mechanical Entrapment:** When jewelry, swimsuit, hair decorations, finger, toe or knuckle is caught in an opening of an outlet or drain cover. This hazard is present when the drain cover is missing, broken, loose, cracked, or not properly secured.

**NOTE: ALL SUCTION PLUMBING MUST BE INSTALLED IN ACCORDANCE WITH THE LATEST NATIONAL AND LOCAL CODES, STANDARDS AND GUIDELINES.**

**WARNING** TO MINIMIZE THE RISK OF INJURY DUE TO SUCTION ENTRAPMENT HAZARD:

- A properly installed and secured ANSI/ASME A112.19.8 approved anti-entrapment suction cover must be used for each drain.
- Each suction cover must be installed at least three (3') feet apart, as measured from the nearest point to nearest point.
- Regularly inspect all covers for cracks, damage and advanced weathering.
- If a cover becomes loose, cracked, damaged, broken or is missing, replace with an appropriate certified cover.
- Replace drain covers as necessary. Drain covers deteriorate over time due to exposure to sunlight and weather.
- Avoid getting hair, limbs or body in close proximity to any suction cover, pool drain or outlet.
- Disable suction outlets or reconfigure into return inlets.

**WARNING** A clearly labeled emergency shut-off switch for the pump must be in an easily accessible, obvious place.

Make sure users know where it is and how to use it in case of emergency.

**The Virginia Graeme Baker (VGB) Pool and Spa Safety Act** creates new requirements for owners and operators of commercial swimming pools and spas.

Commercial pools or spas constructed on or after December 19, 2008, shall utilize:

(A) A multiple main drain system without isolation capability with suction outlet covers that meet ASME/ANSI A112.19.8a Suction Fittings for Use in Swimming Pools, Wading Pools, Spas, and Hot Tubs and either:

- (i) A safety vacuum release system (SVRS) meeting ASME/ANSI A112.19.17 Manufactured Safety Vacuum Release systems (SVRS) for Residential and Commercial Swimming Pool, Spa, Hot Tub, and Wading Pool Suction Systems and/or ASTM F2387 Standard Specification for Manufactured Safety Vacuum Release Systems (SVRS) for Swimming pools, Spas and Hot Tubs or
- (ii) A properly designed and tested suction-limiting vent system or
- (iii) An automatic pump shut-off system.

Commercial pools and spas constructed prior to December 19, 2008, with a single submerged suction outlet shall use a suction outlet cover that meets ASME/ANSI A112.19.8a and either:

- (A) A SVRS meeting ASME/ANSI A112.19.17 and/or ASTM F2387, or
- (B) A properly designed and tested suction-limiting vent system, or
- (C) An automatic pump shut-off system, or
- (D) Disabled submerged outlets, or
- (E) Suction outlets shall be reconfigured into return inlets.

**For Installation of Electrical Controls at Equipment Pad (ON/OFF Switches, Timers and Automation Load Center)**

**CAUTION**

Install all electrical controls at equipment pad, such as on/off switches, timers, and control systems, etc. to allow the operation (startup, shut-down, or servicing) of any pump or filter so the user does not place any portion of his/her body over or near the pump strainer lid, filter lid or valve closures. This installation should allow the user enough space to stand clear of the filter



and pump during system start-up, shut down or servicing of the system filter.

**DANGER**



**HAZARDOUS PRESSURE: STAND CLEAR OF PUMP AND FILTER DURING START UP**

Circulation systems operate under high pressure. When any part of the circulating system (i.e. locking ring, pump, filter, valves, etc.) is serviced, air can enter the system and become pressurized.

Pressurized air can cause the pump housing cover, filter lid, and valves to violently separate which can result in severe personal injury or death. Filter tank lid and strainer cover must be properly secured to prevent violent separation. Stand clear of all circulation system equipment when turning on or starting up pump.

Before servicing equipment, make note of the filter pressure. Be sure that all controls are set to ensure the system cannot inadvertently start during service. Turn off all power to the pump. **IMPORTANT: Place filter manual air relief valve in the open position and wait for all pressure in the system to be relieved.**

Before starting the system, fully open the manual air relief valve and place all system valves in the "open" position to allow water to flow freely from the tank and back to the tank. Stand clear of all equipment and start the pump.

**IMPORTANT: Do not close filter manual air relief valve until all pressure has been discharged from the valve and a steady stream of water appears.** Observe filter pressure gauge and be sure it is not higher than the pre-service condition.

**General Installation Information**

- All work must be performed by a qualified service professional, and must conform to all national, state, and local codes.
- Install to provide drainage of compartment for electrical components.
- These instructions contain information for a variety of pump models and therefore some instructions may not apply to a specific model. All models are intended for use in swimming pool applications. The pump will function correctly only if it is properly sized to the specific application and properly installed.

**WARNING**

Pumps improperly sized or installed or used in applications other than for which the pump was intended can result in severe personal injury or death. These risks may include but not be limited to electric shock, fire, flooding, suction entrapment or severe injury or property damage caused by a structural failure of the pump or other system component.

**WARNING**

The pump can produce high levels of suction within the suction side of the plumbing system. These high levels of suction can pose a risk if a person comes within the close proximity of the suction openings. A person can be seriously injured by this high level of vacuum or may become trapped and drown. It is absolutely critical that the suction plumbing be installed in accordance with the latest national and local codes for swimming pools.

**Pumps and replacement motors that are single speed and one (1) Total HP or greater cannot be sold, offered for sale, or installed in a residential pool for filtration use in California, Title 20 CCR sections 1601-1609.**

Warnings and safety instructions for Pentair Aquatic Systems pumps and other related products are available at:

<http://www.pentairpool.com/pool-owner/safety-warnings/> or call (800) 831-7133 for additional free copies of these instructions. Please refer to <http://www.pentairpool.com/pool-owner/safety-warnings/> for warning and safety instructions related to the this product.

# INSTALLATION

Only a qualified plumbing professional should install the WhisperFlo® High Performance Pump. Refer to “*Pump Warning And Safety Instructions*” on pages ii - iii for additional installation and safety information.

## Location

Be sure the pump location meets the following requirements:

**Note:** Do not install this pump within an outer enclosure or beneath the skirt of a hot tub or spa unless marked accordingly.

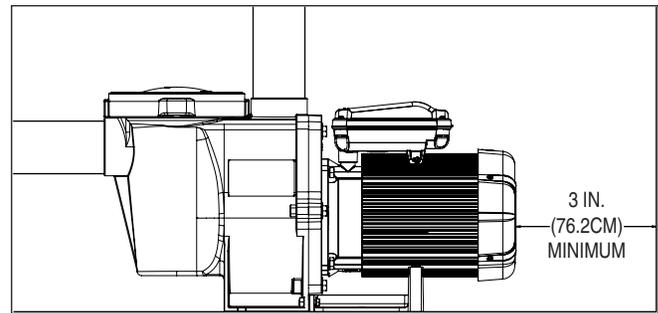
1. Install the pump as close to the pool or spa as possible. To reduce friction loss and improve efficiency, use short, direct suction piping returns.
2. Install a minimum of 5 feet (1.52 meters) from the inside wall of the pool and spa. Canadian installations require a minimum of 9.8 feet (3 meters) from pool water level.
3. Install the pump a minimum of 3 feet (.9 meters) from the heater outlet.
4. Do not install the pump more than 10 feet (3 meters) above the water level.
5. Install the pump in a well ventilated location protected from excessive moisture (i.e., rain gutter downspouts, sprinklers, etc.)
6. Install the pump with a rear clearance of at least 3 inches (76.2 mm) so that the motor can be removed easily for maintenance and repair.

## Piping

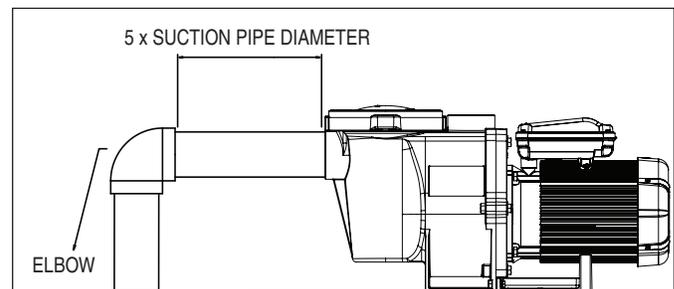
1. For improved pool plumbing, it is recommended to use a larger pipe size. When installing the inlet and outlet fittings (male adaptors), use thread sealant.
2. Piping on the suction side of the pump should be the same or larger than the return line diameter.
3. Plumbing on the suction side of the pump should be as short as possible.
4. For most installations Pentair recommends installing a valve on both the pump suction and return lines so that the pump can be isolated during routine maintenance. However, we also recommend that a valve, elbow or tee installed in the suction line should be no closer to the front of the pump than five (5) times the suction line diameter.

**Example:** A 2 inch pipe requires a 10 inch (25.4 cm) straight run in front of the suction inlet of the pump. This will help the pump prime faster and last longer.

**Note:** DO NOT install 90° elbows directly into the pump inlet or outlet.



Pump Rear Clearance



Recommended Piping

## Fittings and Valves

1. Do not install 90° elbows directly into pump inlet.
2. Flooded suction systems should have gate valves installed on suction and discharge pipes for maintenance, however, the suction gate valve should be no closer than five times the suction pipe diameter as described in this section.
3. Use a check valve in the discharge line when using this pump for any application where there is significant height to the plumbing after the pump.
4. Be sure to install check valves when plumbing in parallel with another pump. This helps prevent reverse rotation of the impeller and motor.

## Electrical Installation



**RISK OF ELECTRICAL SHOCK OR ELECTROCUTION.** This pump must be installed by a licensed or certified electrician or a qualified service professional in accordance with the National Electrical Code (NEC) and all other applicable national or local codes and ordinances. Improper installation will create an electrical hazard which could result in death or serious injury to users, installers, or others due to electrical shock, and may also cause damage to property.



**Always disconnect power to the pump at the circuit breaker before servicing the pump. Failure to do so could result in death or serious injury to service people, users or others due to electric shock.**

Read all servicing instructions before working on the pump.

### Wiring

1. Be sure all electrical breakers, switches and automatic controls are turned off before wiring motor.



**STORED CHARGE** - Wait at least sixty (60) seconds before servicing.

2. Become familiar with the wiring diagram, volts, hertz, amps and phase of your particular pump motor. All of this information is provided on the motor nameplate label found on the side of the motor.
3. Be sure that the supply voltage meets the requirements listed on the motor nameplate. If these requirements are not met, permanent motor damage may occur.
4. For wiring sizes and general guidelines for proper electrical installation, please follow the specifications defined in the National Electrical Code and all other applicable national or local codes.
5. 3-Phase motors require external overload protection. An initial inspection is needed to ensure proper rotation of the pump.

Once installed, momentarily cycle the power on and then off. Note the rotation of the motor fan or shaft as it comes to a stop. If wired correctly the motor shaft and/or fan will match the rotation arrow noted on the pump.

6. Use a strain relief and be sure all electrical connections are clean and tight.
7. Cut the wires to the appropriate length so they do not overlap or touch when connected.

### Grounding

1. Permanently ground the motor using the green ground screw, as shown below. Use the correct wire size and type specified by National Electrical Code. Be sure the ground wire is connected to an electrical service ground.
2. The pump should be permanently connected to either a circuit breaker, 2-pole timer or 2-pole relay.

**Note:** If AC power is supplied by a GFCI circuit breaker, the pump should be wired on its own independent circuit **unless the pump is operated in tandem with a Pentair salt chlorine generator.**

### Bonding

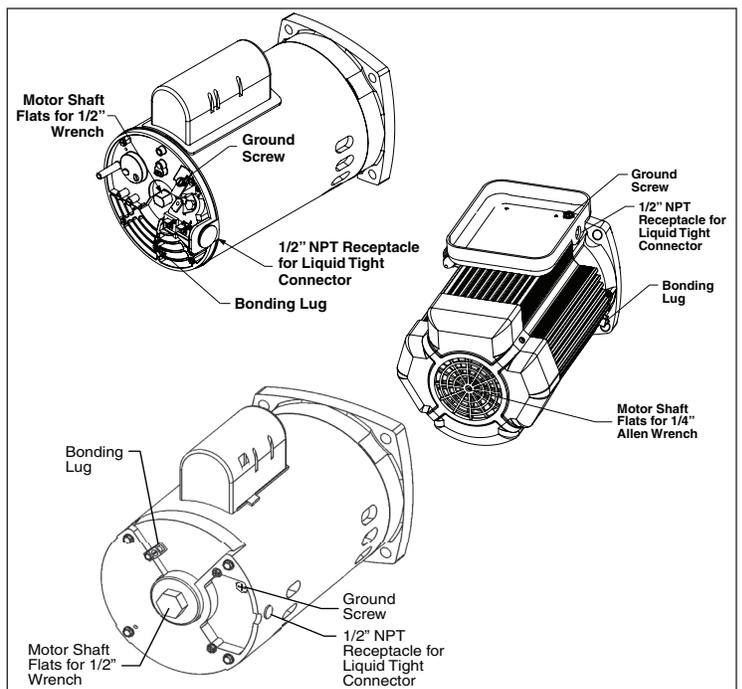
1. Bond the motor to the structure in accordance with the National Electrical Code and all other applicable national or local codes. Use a solid copper bonding conductor not smaller than 8 AWG. For Canadian installations, a 6 AWG or larger solid copper bonding conductor is required. Run a wire from the external bonding screw or lug to the bonding structure.
2. Connect the wire from the accessible bonding lug on the motor to all metal parts of the swimming pool, spa, or hot tub structure and to all electrical equipment, metal conduit, and metal piping within 5 feet (1.52 meters) of the inside walls of the swimming pool, spa, or hot tub. Run a wire from the external bonding screw or lug to the bonding structure.



Before establishing or restoring power to the pump, be sure all electrical connections are tight and all electrical and wiring compartment covers are properly installed.

**Note:** When the pump is started and stopped by removing power with a relay or timer, a two-pole device should be used to apply and remove power to both POWER LINE TERMINALS.

*Pentair offers GFCI breakers which offer appropriate personal protection while meeting 2008 to current NEC Standards for Pool Pumps. See Pentair product catalog for details.*



# MAINTENANCE

**WARNING** DO NOT open the strainer pot if pump fails to prime or if pump has been operating without water in the strainer pot. Pumps operated in these circumstances may experience a build up of vapor pressure and may contain scalding hot water. Opening the pump may cause serious personal injury. In order to avoid the possibility of personal injury, make sure the suction and discharge valves are open and strainer pot temperature is cool to touch, then open with extreme caution.

**CAUTION** To prevent damage to the pump and for proper operation of the system, clean pump strainer and skimmer baskets regularly.

## Pump Strainer Basket

The pump strainer basket (or 'strainer pot', 'hair and lint pot'), is located in front of the volute. Inside the chamber is the basket which must be kept clean of leaves and debris at all times. View basket through the 'See Through Lid' to inspect for leaves and debris.

Regardless of the length of time between filter cleaning, it is most important to visually inspect the basket at least once a week. A dirty basket will reduce the efficiency of the filter and heater and also put an abnormal stress on the pump motor which would result in a costly repair bill.

## Cleaning the Pump Strainer Basket

1. Turn off the pump at the circuit breaker.
2. Relieve pressure in the system by allowing the water to cool.
3. Gently tap the clamp in a counter-clockwise direction to remove the clamp and lid.
4. Remove debris and rinse out the basket. Replace the basket if it is cracked.
5. Put the basket back into the housing. Be sure to align the notch in the bottom of the basket with the rib in the bottom of the volute.
6. Fill the pump pot and volute up to the inlet port with water.
7. Clean the cover, O-ring, and sealing surface of the pump pot. **Note:** It is important to keep the lid O-ring clean and well lubricated.
8. Reinstall the lid by placing the lid on the pot. Be sure the lid O-ring is properly placed. Seat the clamp and lid on the pump then turn clockwise until the handles are horizontal.
9. Turn the power "ON" at the house circuit breaker. Reset the pool time clock to the correct time.
10. Open the High Flow manual air relief valve on top of the filter.
11. Stand clear of the filter. Start the pump.
12. Bleed air from the filter until a steady stream of water comes out. Close the High Flow™ Manual Air Relief Valve.

**WARNING** THIS SYSTEM OPERATES UNDER HIGH PRESSURE. When any part of the circulating system (e.g., Lock Ring, Pump, Filter, Valves, etc.) is serviced, air can enter the system and become pressurized. Pressurized air can cause the lid to separate which can result in serious injury, death, or property damage. To avoid this potential hazard, follow above instructions.



## Winterizing

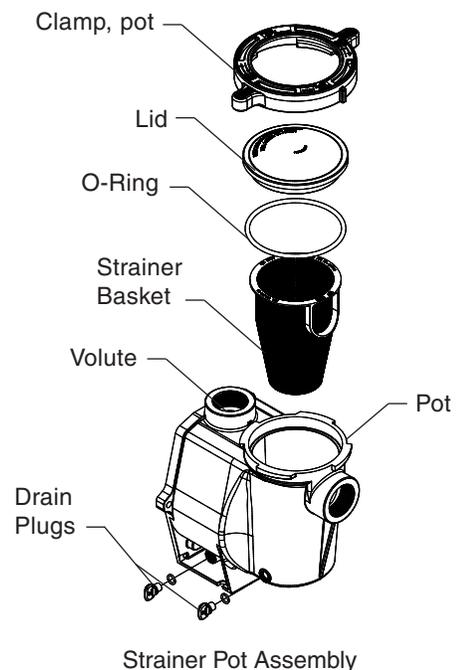
You are responsible for determining when freezing conditions may occur. If freezing conditions are expected, take the following steps to reduce the risk of freeze damage. **Freeze damage is not covered under warranty.**

To prevent freeze damage, follow the procedures below:

1. Shut off electrical power for the pump at the circuit breaker.
2. Drain the water out of the pump housing by removing the two thumb-twist drain plugs from the housing. Store the plugs in the pump basket.
3. Cover the motor to protect it from severe rain, snow and ice.

**Note:** Do not wrap motor with plastic or other air tight materials during winter storage. The motor may be covered during a storm, winter storage, etc., but never when operating or expecting operation.

In mild climate areas, when temporary freezing conditions may occur, run your filtering equipment all night to prevent freezing.



# SERVICING

**⚠ WARNING** Always disconnect power to the pump at the circuit breaker and disconnect the communication cable before servicing the pump. Failure to do so could result in death or serious injury to service people, users or others due to electric shock. Read all servicing instructions before working on the pump.

**⚠ WARNING** **DO NOT** open the strainer pot if pump fails to prime or if pump has been operating without water in the strainer pot. Pumps operated in these circumstances may experience a build up of vapor pressure and may contain scalding hot water. Opening the pump may cause serious personal injury. In order to avoid the possibility of personal injury, make sure the suction and discharge valves are open and strainer pot temperature is cool to touch, then open with extreme caution.

**⚠ CAUTION** Be sure not to scratch or mar the polished shaft seal faces; seal will leak if faces are damaged. The polished and lapped faces of the seal could be damaged if not handled with care.

## Motor Care

### Protect from heat

1. Shade the motor from the sun.
2. Any enclosure must be well ventilated to prevent overheating.
3. Provide ample cross ventilation.

### Protect against dirt

1. Protect from any foreign matter.
2. Do not store (or spill) chemicals on or near the motor.
3. Avoid sweeping or stirring up dust near the motor while it is operating.
4. If a motor has been damaged by dirt it voids the motor warranty.
5. Clean the lid and clamp, O-ring, and sealing surface of the pump pot.

### Protect against moisture

1. Protect from splashing or sprayed water.
2. Protect from extreme weather.
3. If a motor has become wet - let it dry before operating. Do not allow the pump to operate if it has been flooded.
4. If a motor has been damaged by water it voids the motor warranty.

**Note:** When replacing the motor, be certain that the motor support is correctly positioned to support the size of motor being installed.

## Shaft Seal Replacement

The Shaft Seal consists primarily of two parts, a rotating member and a ceramic seal.

The pump requires little or no service other than reasonable care, however, a Shaft Seal may occasionally become damaged and must be replaced.

**Note:** The polished and lapped faces of the seal could be damaged if not handled with care.

## Pump Disassembly

All moving parts are located in the rear sub-assembly of this pump.

Tools required:

- 3/32 inch Allen head wrench
- 1/2 inch open end wrench
- 9/16 inch open end wrench
- Flat blade screwdriver
- #2 Phillips screwdriver

To remove and repair the motor subassembly, follow the steps below:

1. Turn off the pump circuit breaker at the main panel.
2. Drain the pump by removing the drain plugs.
3. Remove the 6 bolts that hold the main pump body (strainer pot/volute) to the rear sub-assembly.
4. GENTLY pull the two pump halves apart, removing the rear sub-assembly.
5. Use a 3/32 inch Allen head wrench to loosen the two holding screws located on the diffuser.
6. Hold the impeller securely in place and remove the impeller lock screw by using a #2 Phillips screwdriver. The screw is a left-handed thread and loosens in a clockwise direction.
7. Remove the shaft cap located at the back of the motor and hold the shaft secure with a 1/2 inch open-end wrench.
8. To unscrew the impeller from the shaft, twist the impeller counterclockwise.
9. Remove the four bolts from the seal plate to the motor, using a 9/16 inch wrench.



**DO NOT run the pump dry.** If the pump is run dry, the mechanical seal will be damaged and the pump will start leaking. If this occurs, the damaged seal must be replaced. ALWAYS maintain proper water level. If the water level falls below the suction port, the pump will draw air through the suction port, losing the prime and causing the pump to run dry, resulting in a damaged seal. Continued operation in this manner could cause a loss of pressure, resulting in damage to the pump case, impeller and seal and may cause property damage and personal injury.

## Pump Reassembly

1. When installing the replacement shaft seal, use silicone sealant on the metal portion before pressing into the seal plate, being careful to keep off of the seal face. Ensure the seal is fully seated and allow 24 hours for sealant to cure. (Complete seal plate w/seal replacement kit available, P/N 350201/350101.)
2. Before installing the ceramic section of the seal into the impeller, be sure the impeller is clean. Use a light density soap and water to seal the seal. Press the seal into the impeller with your thumbs and wipe off the ceramic and carbon faces with a clean cloth.
3. Remount the seal plate to the motor by installing bolts in an X pattern and tightening to 70 in-lbs.
4. Clean the motor shaft thread and the impeller insert, then screw the impeller onto the motor shaft.
5. Screw in the impeller lock screw (counter-clockwise and tighten to 25 in-lbs. while holding the motor shaft with wrench).
6. Remount the diffuser onto the seal plate. Make sure the plastic pins and holding screw inserts are aligned.
7. Grease the diffuser O-ring and seal plate gasket.
8. Grease the bolt threads, assemble the motor sub-assembly to the strainer pot-pump body by using the two through bolts for proper alignment. Do not tighten the through bolts until all 6 bolts are in place and finger tightened. Torque in a cross pattern to 110 in-lbs.
9. Fill the pump with water.
10. Reinstall the pump lid and plastic clamp; see the next section, 'Restart Instructions'.
11. Reprime the system.

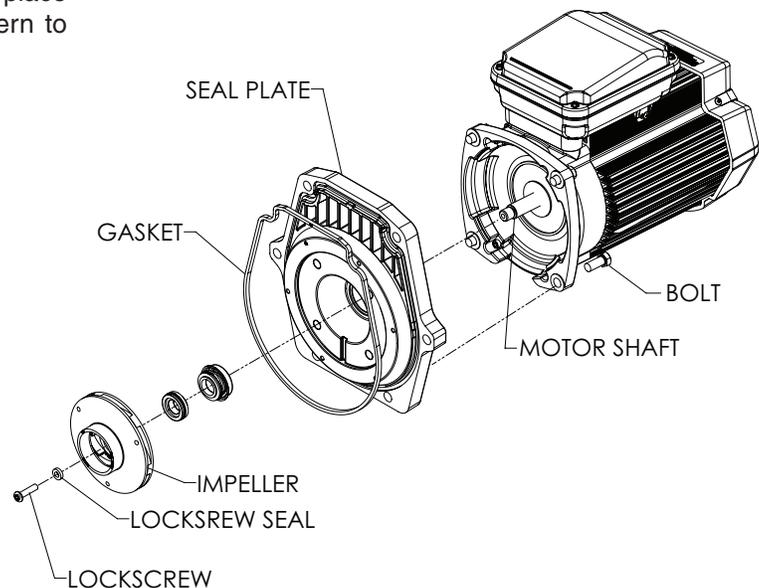
## Restart Instructions

If pump is installed below the water level of the pool, close return and suction lines prior to opening hair and lint pot on pump. Make sure to re-open valves prior to operating.

### Priming the Pump

The pump strainer pot must be filled with water before the pump is initially started. Follow these steps to prime the pump:

1. Remove the pump lid plastic clamp. Remove the pump lid.
2. Fill the pump strainer pot with water.
3. Reassemble the pump cover and plastic clamp onto the strainer pot. The pump is now ready to prime.
4. Open the air release valve on the filter, and stand clear of the filter.
5. Turn on the switch or time clock.
6. When water comes out of the air release valve, close the valve. The system should now be free of air and recirculating water to and from the pool.
7. For 2-speed pumps:
  - Pump should run on high-speed for priming.
  - The pump should not run longer than 8 minutes before priming is achieved.



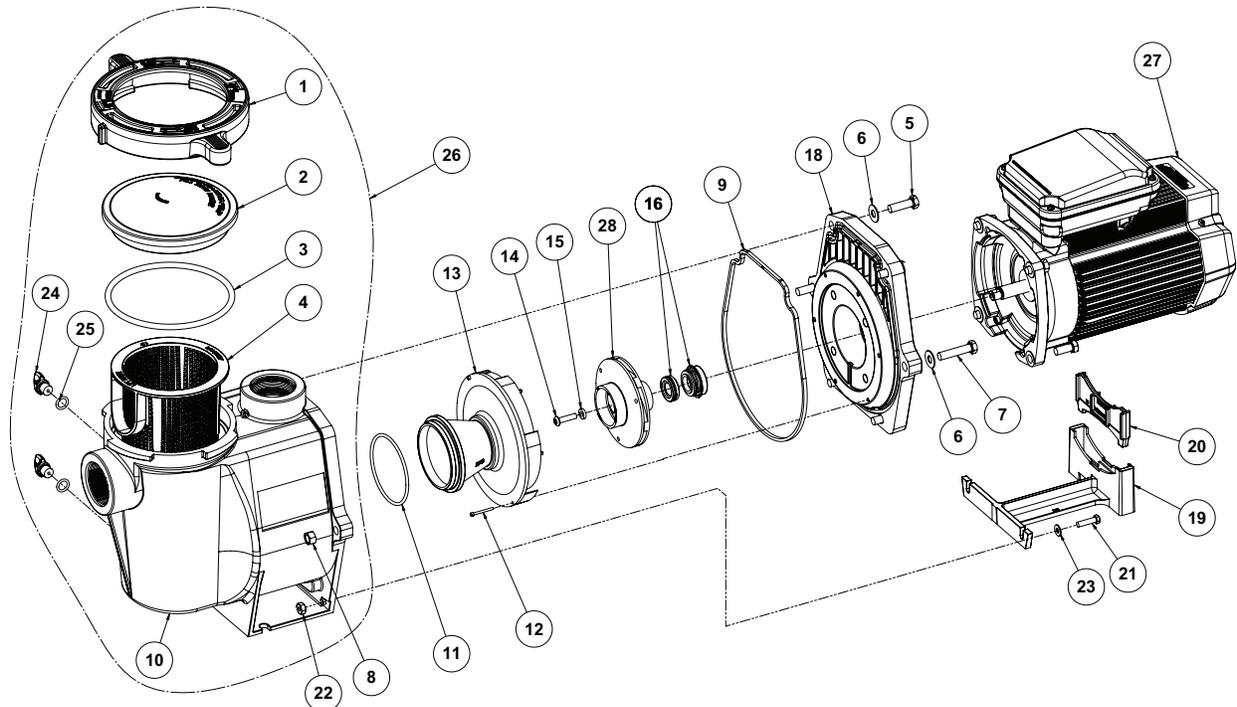
Motor Assembly

## TROUBLESHOOTING

Problem	Possible Cause	Corrective Action
<b>Pump failure.</b>	<p>Pump will not prime - Air leak, too much air.</p> <p>Pump will not prime - Not enough water.</p> <p>Pump stainer gasket is clogged.</p> <p>Pump strainer gasket is defective.</p>	<p>Check suction piping and valve glands on any suction gate valves. Secure lid on pump strainer pot and be sure lid gasket is in place. Check water level to be sure skimmer is not drawing air.</p> <p>Be sure the suction lines, pump, strainer, and pump volute are full of water. Be sure valve on suction line is working and open (some systems do not have valves). Check water level to make sure water is available through skimmer.</p> <p>Clean pump strainer pot.</p> <p>Replace gasket.</p>
<b>Reduced capacity and/or head.</b>	<p>Air pockets or leaks in suction line.</p> <p>Clogged impeller.</p> <p>Pump strainer clogged.</p>	<p>Check suction piping and valve glands on any suction gate valves. Secure lid on pump strainer pot and be sure lid gasket is in place. Check water level to be sure skimmer is not drawing air.</p> <p>Turn off electrical power to the pump. Disassemble (see page 4, 'Pump Disassembly')</p> <p>Clean debris from impeller. If debris cannot be removed, complete the following steps:</p> <ol style="list-style-type: none"> <li>1. Remove left hand thread anti-spin bolt and o-ring.</li> <li>2. Remove, clean, and reinstall impeller.</li> </ol> <p>Reassemble (see page 5, 'Pump Reassembly')</p> <p>Clean suction trap.</p>



# REPLACEMENT PARTS



Item No.	P/N	Description
1	357199	Clamp, Cam & Ramp, Almond
1	357150	Clamp, Cam & Ramp, Black
2	357151	Cover, Clear, WFE Pump
2	357156	Cover, chemical resistant Cam & Ramp
3	350013	O-Ring, WFE Cover
4	070387	Strainer Basket, WFE
5	070430	Bolt, 3/8 - 16 x 1.25 Hex Head. SS, 4 Req.
6	072184	Washer, 3/8 x 13/16 O.D. SS, 6 Req.
7	070431	Bolt, 3/8 - 16 x 1.75 Hex Head. SS, 2 Req.
8	071403	Nut, 3/8, 16 Hex Head, 2 Req.
9	357100	Black Gasket for Seal Plate
10	357149	Volute & Seal Plate, Almond Replacement Kit
10	350015	Volute, WFE Pump & Pot, Almond
10	357157	Volute, WFE Pump & Pot, Black ❶
11	355227	O-Ring Parker No. 2-238, WFE Pump
12	071660	Set Screw, 4-40 x 1-1/8 WFE, 2 Req.
13	072928	Diffuser assembly, WFE-12, 3 HP Only
13	072927	Diffuser assembly, WFE 2-8, 1/2 HP-2.5 HP
14	071652	Set Screw, 1/4 - 20 x 1 in. Phillips
15	075713	Rubber Washer, WFE Pump

Item No.	P/N	Description
16	071734S	Seal PA-7 w/ ceramic seat, PS1000
16	071728	Seal A7 w/ ceramic seat, PS201
17	070429	Bolt 3/8 - 16 x 7/8 SS Hex Head, 4 Req. ❶
18	350201	Seal Plate Kit WFE Almond (Includes Mechanical Seal installed) Items 9, 16 & 18
18	350101	Seal Plate Kit WFE Black (Includes Mechanical Seal installed) Items 16 & 18
19	070927	Foot, WFE Pump, Almond
19	357159	Foot, Black
20	070929	Foot Insert, WFE Pump, Almond ❶
20	357160	Foot Insert, WFE Pump, Black
21	071657	Screw 1/4 - 20 x 1 In. Hex Head, SS, 2 Req. ❶
22	071406	Nut, 1/4 - 20 Hex Head, SS, 2 Req.
23	072183	Washer, 1/4 x 5/8 OD, SS, 2 Req.
24	071131	Knob, Drain Plug, Almond, 2 Req.
24	357161	Knob, Drain Plug, Black, 2 Req.
25	192115	O-Ring, Drain Plug, 2 Req. ❶
26	357149	Volute/Seal Plate Replacement Kit, Almond (Incl. Items: 1-4, 9, 10, 16, 18, 24, and 25)
-	357923Z	Fan Guard Kit, TEFC/Super-Duty
27		See Motor Table on next page

Item No.	P/N	Description Motors
27	355008S	3/4 HP, 60 Hz, WFE-2, 3 & 24, 1 spd., almond, 31 lbs. ②
27	355010S	1 HP, 60 Hz, WFE-4 & 26, 1 spd., almond, 33 lbs. ②
27	355012S	1-1/2 HP, 60 Hz, WFE-6 & 28, 1 spd., almond, 39 lbs. ②
27	355014S	2 HP, 60 Hz, WFE-8 & 30, 1 spd., almond, 40 lbs. ②
27	355016S	3 HP, 60 Hz, WFE-12, 1 spd., almond, 40 lbs. ②
27	356630S	1 HP, WFDS-4 & 26, 2 spd., 34 lbs. ④
27	071320S	1-1/2 HP, WFDS-6 & 28, 2 spd., 36 lbs. ④
27	071321S	2 HP, WFDS-8 & 30, 2 spd., 45 lbs. ④
27	355018S	1/2 HP, WF-2 & 23, 1 spd., almond, 39 lbs. ③
27	355020S	3/4 HP, WF-3 & 24, 1 spd., almond, 26 lbs. ③
27	355022S	1 HP, WF-4 & 26, 1 spd., almond, 28 lbs. ③
27	355024S	1-1/2 HP, WF-6 & 28, 1 spd., 39 lbs. ③
27	355026S	2 HP, WF-8 & 30, 1 spd., 32 lbs. ③
27	355033S	3 HP, WF-12, 1 spd., almond, 40 lbs. ③
27	355203S	1 HP, WFK-4, 3 ph, 1 spd., black, 28 lbs.
27	355204S	1-1/2 HP, WFK-6, 3 ph, 1 spd., black, 30 lbs.
27	355205S	2 HP, WFK-8, 3 ph, 1 spd., black, 37 lbs.
27	355398S	3 HP, WFK-12, 3 ph, 1 spd., black, 35 lbs.
27	356626S	1 HP, WFK-4, 3 ph, 1 spd., almond, 28lbs.
27	356627S	1-1/2 HP, WFK-6, 3 ph, 1 spd., almond, 30lbs.
27	356628S	2 HP, WFK-8, 3 ph, 1 spd., almond, 37 lbs.
27	356629S	3 HP, WFK-12, 3 ph, 1 spd., almond, 35 lbs.
27	354805S	1 HP, WFK-4, Super-Duty, 3 ph, 1 spd., almond, 28 lbs.
27	354807S	1-1/2 HP, WFK-6, Super-Duty, 3 ph., 1 spd., almond, 30lbs.
27	354809S	2 HP, WFK-8, Super-Duty, 3 ph., 1 spd., almond, 36 lbs.
27	354811S	3 HP, WFK-12, Super-Duty, 3 ph., 1 spd., almond, 39 lbs.
27	354821S	1 HP, WFET-4, TEFC, 1 ph., 1 spd., almond, 29lbs.
27	354823S	1-1/2 HP, WFET-6, TEFC, 1 ph., 1 spd., almond, 31lbs.
27	354815S	2 HP, WFET-8, TEFC, 1 ph., 1 spd., almond, 37lbs.
27	354817S	3 HP, WFET-12, TEFC, 1 ph., 1 spd., almond, 41lbs.

### Not Shown

79129900	2-Speed Toggle Switch
350202	Seal Plate Kit: Seal plate (almond), Gasket (black), with installed Seal (Includes items: 9, 16, & 18)
350203	Seal Plate Kit: Seal plate (black), Gasket (black), with installed Seal (Includes items: 9, 16, & 18)
357244	Pot Assembly, Black NPT. (Includes items: 1-4, 10, 24 [qty. 2], 25 [qty. 2]).
357243	Pot Assembly, Almond NPT. (Includes items: 1-4, 10, 24 [qty. 2], 25 [qty. 2]).

### Power End Sub-assembly *Includes* Items: 12-18, 27-28

075136	WFE-2
075137	WFE-3, WFE-24
075138	WFE-4, WFE-26 ②
075139	WFE-6, WFE-28 ②
075140	WFE-8, WFE-30 ②
075141	WFE-12 ②
075145	WFDS-3, WFDS-24 ④
075142	WFDS-4, WFDS-26 ④
075143	WFDS-6, WFDS-28 ④
075144	WFDS-8, WFDS-30
075251	WF-2, WF-23 ③
075252	WF-3, WF-24 ③
075253	WF-4, WF-26 ③
075254	WF-6, WF-28 ③
075255	WF-8, WF-30 ③
075256	WF-12 ③

### Fluid Ends-All Parts, w/o Motor

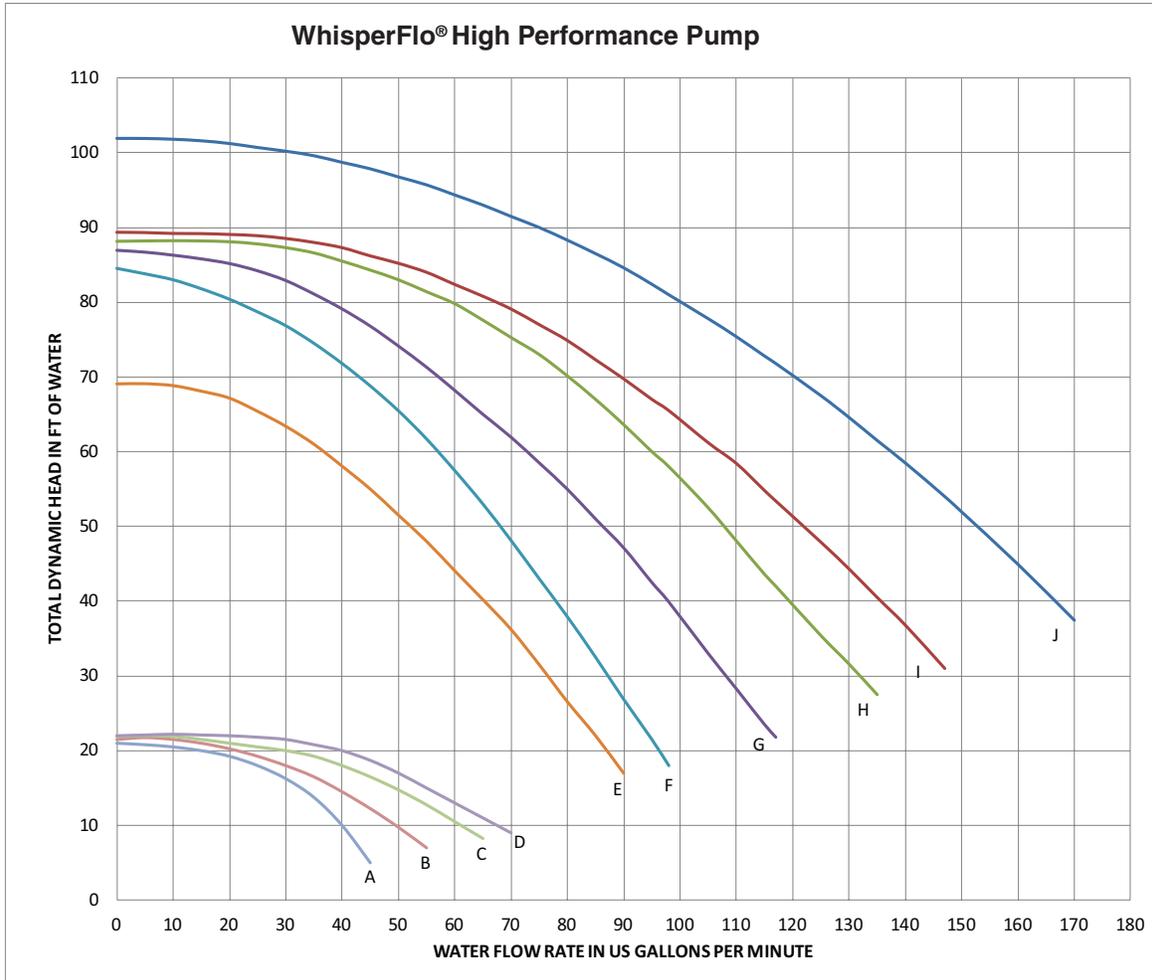
075451	WFE-2 fluid end, 1/2 HP
075452	WFE-3 fluid end, 3/4 HP
075453	WFE-4 fluid end, 1 HP
075454	WFE-6 fluid end, 1-1/2 HP
075455	WFE-8 fluid end, 2 HP
075456	WFE-12 fluid end, 3 HP

- |   |                                   |
|---|-----------------------------------|
| ① | CSA/CUL (only) for Canada         |
| ② | Energy efficient, single phase    |
| ③ | Standard efficiency, single phase |
| ④ | Two speed, single phase           |

### Impeller Chart

HP	PUMP MODEL	STD PART NO.
1/2	WFE-2, WF-2, WF-23, WFK-2	073126
3/4	WFE-3, WFE-24, WF-3, WF-24, WFK-3, WFDS-24	073127
1	WFE-4, WFE-26, WFET-4, WF-4, WF-26, WFK-4, WFDS-4, WFDS-26	073128
1½	WFE-6, WFE-28, WFET-6, WF-6, WF-28, WFK-6, WFDS-6, WFDS-28	073129
2	WFE-8, WFE-30, WFET-8, WF-8, WF-30, WFK-8, WFDS-8, WFDS-30	073130
3	WFE-12, WFET-12, WF-12, WFK-12	073131

## Pump Performance Curves



Curve	Model
A	WFDS-3, WFDS-24
B	WFDS-4, WFDS-26
C	WFDS-6, WFDS-28
D	WFDS-8, WFDS-30
E	WFE-2, WF-2, WF-23, WFK-2
F	WFE-3, WFE-24, WF-3, WF-24, WFK-3, WFDS-3, WFDS-24
G	WFE-4, WFE-26, WFET-4, WF-4, WF-26, WFK-4, WFDS-4, WFDS-26
H	WFE-6, WFE-28, WFET-6, WF-6, WF-28, WFK-6, WFDS-6, WFDS-28
I	WFE-8, WFE-30, WFET-8, WF-8, WF-30, WFK-8, WFDS-8, WFDS-30
J	WFE-12, WFET-12, WF-12, WFK-12

ENGLISH