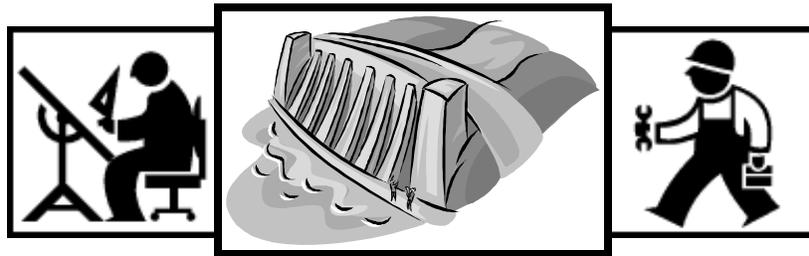




Design Requirements & Construction Standards for Water Storage Reservoirs



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WESTERN MUNICIPAL WATER DISTRICT

DESIGN REQUIREMENTS & CONSTRUCTION STANDARDS

FOR

WATER STORAGE RESERVOIRS

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RESERVOIR SPECIFICATIONS REVISIONS

DATE	SECTION	PAGE #
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RESERVOIR SPECIFICATIONS REVISIONS

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INTRODUCTION

This manual sets forth basic design concepts for reservoir sites, technical specifications for welded steel water storage reservoirs, technical specifications for coating and painting welded steel water storage reservoirs, and standard drawings for water storage reservoirs.

Reservoir sites shall be designed in accordance with the reservoir site design criteria. Said criteria includes site drainage, reservoir site access road, site and access road paving, geotechnical investigation, cut and fill slopes, site fencing, landscaping, site piping, and site power.

The Welded Steel Water Storage Reservoir Specifications addresses the reservoir foundation, reservoir submittals, reservoir design criteria (seismic, wind, roof, and columns), reservoir configuration and minimum thicknesses (roof, rafters, shell plates, columns, and floor), reservoir materials, reservoir welds, weld inspection and testing, and reservoir accessories.

The Welded Steel Water Storage Reservoir Coating and Painting Specifications addresses submittals, sequence of work, inspection, surface preparation, materials, paint and coating applications, shop priming, and coating and painting systems. Several coating and painting systems are included in the specifications; therefore, Western will specify the coating and painting system required for each project.

**SECTION I
DESIGN CRITERIA**

SECTION I DESIGN CRITERIA

A. GENERAL

Reservoir and reservoir site construction drawings shall be prepared by an Engineer licensed in the State of California experienced in the design of similar facilities. Drawings shall be clear, concise, and meet all Western standards contained herein.

Drawings shall be drawn in ink on D size Mylar sheets (24" x 36") with a Western approved title block.

The Drawings shall be professional quality drawings especially prepared as reservoir construction drawings. Work shall be of standard engineering practice and shall be legible and present the proposed construction without confusion.

The project construction specifications shall include Western's General Requirements, Welded Steel Water Storage Reservoir Specifications, Welded Steel Water Storage Reservoir Coating & Painting Specifications, and Standard Drawings.

B. RESERVOIR SITE DESIGN CRITERIA

The following design criteria shall be utilized in preparing construction drawings for the proposed reservoir site.

1. Site Design

The site shall be designed to accommodate one or more reservoirs as well as a booster pumping plant, (if specified by Western). In addition, the site shall be designed to accommodate the access road around the reservoir and the site landscaping.

The reservoir site shall be designed to convey storm flows away from the reservoir and along a concrete curb and gutter (see section 3d.) to an onsite corrugated steel (CS) drop inlet. A CS pipe shall be utilized to convey flows from the CS drop inlet to natural drainage courses. An energy dissipator shall be constructed at the CS pipe termination point.

2. Access Road to Reservoir Site

- a. Minimum Width: 20'
- b. Maximum Slope: 15%
- c. Minimum Cross Slope: 2%
- d. Maximum Cross Slope: 5%
- e. Minimum Radius: 100'

- f. The reservoir access road shall be paved with a minimum of 3" of asphalt concrete pavement over 6" of Class II base or as recommended in the geotechnical report. A 6" high asphalt concrete berm shall be constructed along both edges of the reservoir access road. A.C. pavement shall be furnished and installed in accordance with Western Standards, and The Standard Specifications for Public Works Construction.

If the reservoir access road is in fill, the top of the slope shall be a minimum of 2' from the asphalt concrete berm. If the reservoir access road is in cut, the toe of the slope shall be a minimum of 5' from the asphalt concrete berm and a swale shall be constructed between the asphalt concrete berm and the toe of the slope to prevent runoff from undermining the berm.

At approximately 200' intervals, openings shall be provided in the asphalt concrete berm to convey storm flows off of the access road. Concrete swales shall be constructed down the fill slopes to protect the slopes from erosion damage. Concrete swales shall terminate into flow energy dissipators.

At natural drainage course crossings, culverts with headwalls shall be constructed to convey storm flows under the access road.

3. Access Road Around Reservoir

- a. Minimum Width: 20' (Measured from face of ringwall)
- b. Minimum Cross Slope: 1%
- c. Maximum Cross Slope: 8%
- d. The access road around the reservoir shall be paved with a minimum of 3" of asphalt concrete pavement over 6" of Class II base or as recommended in the geotechnical report. A 6" concrete curb and gutter per County of Riverside Standard No. 200 shall be constructed along the edge of the access road.

The reinforced concrete ringwall shall project a minimum of 6" and a maximum of 15" above the asphalt concrete pavement.

4. Site Grading

- a. Developer shall have a geotechnical report prepared by a Geotechnical Engineer licensed in the State of California. Report shall address, as a minimum, recommendations for site preparation, site grading, over-excavation, compaction, foundation design, seismic design, and structural section for the asphalt concrete pavement around the reservoir and for the access road. All site grading and surface preparation shall be performed in accordance with said report.
- b. Maximum cut and fill slopes shall be 2:1 unless stated otherwise in the geotechnical report.

- c. Concrete swales shall be provided at tops of slopes to collect and convey storm flows to natural drainage courses. Said swales shall have a minimum width of 4', a minimum slope of 1%, a minimum thickness of 6", and shall be reinforced with #4 bars at 24" O.C.

5. Site Fencing

- a. Reservoir site shall be completely enclosed by a chain link fence. Site fencing shall be along reservoir site property lines unless otherwise approved by Western. Where the fence is located near a toe of slope, fence shall be a minimum of 3' from said toe.
- b. Site fencing shall be 6' chain link with three strands of barbed wire in accordance with Western's Standard Drawing No. W-1590.
- c. Fence shall include a 20' wide double swinging gate in accordance with Western's Standard Drawing W-1591 located across the access road.

6. Landscaping

Construction drawings shall include planting and irrigation plans prepared by a licensed Landscape Architect. Landscaping shall consist of native materials, which conceal the new reservoir. Reservoir shall be concealed utilizing native trees and foliage. All cut and fill slopes shall be hydro seeded.

7. Site Piping

- a. The common inlet/outlet pipeline to the reservoir site shall be split on-site into a separate reservoir inlet and a separate reservoir outlet as set forth on Western's Drawing No. R-4. Reservoir inlet and outlet lines shall be a minimum of 16" in diameter. Both the inlet and outlet pipelines shall enter the reservoir with a side inlet in accordance with Western's Drawing No. R-4. The inlet and outlet pipelines shall terminate inside the reservoir in accordance with Western's Drawing No. R-10.
- b. The reservoir bottom drain and overflow shall be in accordance with Western's Drawing No. R-7. The reservoir drain line shall be a minimum of 12" in diameter. Reservoir overflow shall be designed to convey water at a rate equal to or greater than the maximum reservoir fill rate and shall be minimum of 16" in diameter.

Both the reservoir bottom drain and overflow shall enter the reservoir with a side inlet in accordance with Western's Drawing No. R-7.

8. Site Power

Construction Drawings shall include electrical plans indicating conductor, conduit, and meter requirements. SCE 120V service shall be provided at all sites. Documents shall require contractor to coordinate with SCE and establish all services.

C. FEE TITLE PARCELS

Developer shall provide Western with a fee title parcel for the reservoir site and the reservoir access road. The limits for the reservoir site shall include the site, slopes, and drainage facilities, all as determined by Western. The limits for the reservoir access road shall be from existing public right-of-way to the reservoir site and shall include the reservoir access road as well as the associated slopes for it.

Legal documentation for Fee Title Parcels shall be on Western forms and shall consist of the Grant Deed form, legal description, and plat. The legal description shall be designated as Exhibit "A" and if appropriate shall have the assessor's parcel numbers indicated on the upper right corner of the exhibit. The plat shall be designated as Exhibit "B". The legal description and plat shall be prepared by a California Registered Civil Engineer or Land Surveyor and shall be signed and stamped by said engineer or land surveyor.

D. WELDED STEEL RESERVOIR DESIGN CRITERIA

Design and construction of the welded steel reservoir shall be performed in accordance with the Welded Steel Water Storage Reservoir Specifications with the following clarifications and/or modifications.

1. Diameter to height ratio shall not be less than 1.75 to 1.
2. Freeboard above the overflow level shall be as designed by the reservoir designer.
3. Appurtenance orientation shall be selected by Western. Western will mark locations on the first set of reservoir fabrication submittals.

E. WELDED STEEL RESERVOIR COATING AND PAINTING CRITERIA

Coating and painting of the welded steel reservoir shall be performed in accordance with the Welded Steel Water Storage Reservoir Coating and Painting Specifications.

SECTION II
TECHNICAL SPECIFICATIONS

WELDED STEEL WATER STORAGE RESERVOIR COATING AND PAINTING SPECIFICATIONS

1. Scope

This specification applies to both existing and proposed reservoirs. Areas to be coated shall consist of all interior surfaces, including but not limited to shell, roof plates, framing, columns, reinforcing, ladder, floor, piping, and access manholes. Areas to be painted shall consist of all exterior surfaces, including but not limited to shell, roof, roof hatch, and reservoir vent.

2. Specifications and Standards

All surface preparation and material application shall comply with American Water Works Association Standard D-102, latest edition, Steel Structures Painting Council Specifications, and manufacturer's recommendations.

3. Submittals

Prior to scheduling any work, Contractor shall submit the following to Western:

- A. Construction schedule showing order, in which Contractor proposes to carry out work, dates of anticipated commencement and completion of work and salient components thereof, and estimated percentage of work to be completed at any time during construction period.
- B. Manufacturer's data sheets for each coating, painting and caulking material to be used.
- C. Manufacturer's recommendations for height profile for each coating and painting material to be used.
- D. For exterior paint finish coat only, color sample (4 inch x 4 inch minimum on metal panel).

Western shall approve the above work prior to Contractor beginning any work.

4. Sequence of Work

All coating work shall be performed at job site except as stated in Section 9 herein.

Unless specified otherwise, reservoir coating and painting shall be performed in the following sequence:

- A. Reservoir interior surfaces (other than floor).
- B. Reservoir floor surfaces.
- C. Belowground exterior surfaces.
- D. Aboveground exterior surfaces.

After the reservoir interior surface (other than floor) coating has been completed, Western will inspect it for specified dry film thickness and holidays. Said inspection will require approximately seven working days. Contractor shall temporarily terminate work until said inspection is completed. Contractor shall repair all defects in reservoir interior surface (other than floor) coating prior to beginning reservoir floor coating work. All repairs shall be performed as directed by Western at no cost to Western. If repair work is required, Western will inspect it and additional time will be required therefore. Contractor shall temporarily terminate work until said inspection is completed.

After the reservoir floor coating has been completed, Contractor shall perform holiday detection on it. Contractor shall repair all defects in reservoir floor coating at no cost to Western until all holidays are eliminated. Lower shell course shall be re-inspected for damage caused to coating by floor sandblasting operations. All holidays shall be repaired by Contractor. Reservoir floor shall be completed, inspected, repaired, and approved by Western prior to starting reservoir exterior work.

Repair work performed by Contractor will not justify adjustment of Contract Completion Date(s). Said work will subject Contractor to liquidated damages if work extends beyond Contract Completion Date(s).

5. Inspection

Unless specified otherwise, Western will inspect the work as follows:

A. Equipment

At the first on site inspection, Contractor shall provide Western with written information concerning all equipment to be utilized. Said information shall include type, model, serial number, and year manufactured. Contractor shall provide any additional information requested. All equipment shall be clean and in good working order with all appropriate safety devices. Equipment that leaks, routinely malfunctions, creates a safety hazard, creates an environmental hazard, or fails to meet Western or manufacturer requirements shall be removed from the site.

B. Surface Preparation

To facilitate inspection, Contractor shall on the first day of sandblasting operations, sandblast metal panels furnished by Western to the degree specified herein. After Western determines that specific panels meet the requirements of the specification, they shall be coated with a clear, non-yellowing finish (provided by Contractor). Panels shall be prepared for each type of sandblasting specified and shall be maintained and utilized by Western for all Contract work.

After each section of the reservoir has been sandblasted, it shall be inspected and approved by Western prior to the application of any coating or paint. Western will inspect for specified height profile by the use of a profile meter. To allow Western the opportunity to inspect each sandblasted area, Contractor shall clean said surfaces with a fine bristle broom and air and furnish scaffolding and lighting (including moving of same) to permit inspection as requested by Western.

C. Material Preparation

Western shall approve all onsite paint or coating material preparation including unsealing and opening of all material containers, material mixing, mixing equipment, addition of thinners, and temperature of all material prior to application.

D. Coating

Western shall approve each coat for specified cleaning before subsequent coats are applied. All areas coated or painted without said approval shall be sandblasted to remove all coatings and recoated after the specified inspection.

E. Hot-Applied Coal Tar Enamel

Western shall approve the equipment and application temperature of the hot-applied coal tar enamel prior to application of it.

F. Holiday Detection and Dry Film Thickness Verification

Western will perform dry film thickness measurements and holiday detection. All areas will be measured for specified dry film thickness utilizing Electronic Mil Gauge. All interior areas will be holiday tested with special emphasis on bolts, welds, and edges. All areas not meeting the specified dry film thickness and all areas with holidays shall be recoated and repaired by Contractor as directed by Western. All repairs shall be performed at no cost to Western.

G. Holiday Detection for Hot Applied Coal Tar Enamel

Contractor shall perform floor holiday detection and shall provide all equipment for it. Western will observe all holiday detection performed by Contractor on the interior floor coating and belowground exterior surfaces. Holiday detection devices shall be Tinker-Rasor Models AP and AP-W, or approved equal.

H. Illumination and Scaffolding

Whenever and wherever required by Inspector, Contractor shall furnish illumination (level of illumination as determined by Western) and scaffolding (level of scaffolding as determined by Western) to permit inspection prior to acceptance of work. Contractor shall move lights and scaffolding as directed by Inspector to enable him to inspect all surfaces, inside and out.

I. Anniversary Inspection

An inspection of the protective coatings of the steel reservoir shall be conducted during the eleventh (11th) month following completion of all coating and painting work. Representatives of the Western, Contractor, and Coating Supplier shall attend this inspection. All work found to be defective at this time shall be repaired or replaced in accordance with the original specifications and to the satisfaction of the Western. All equipment, materials, and labor required to repair any defects in the steel reservoir coating shall be provided by the Contractor at no additional cost to the Western. The

Contractor shall disinfect the reservoir after repairs to the interior are completed, at no extra charge. The Contractor will be charged for all inspections required for remedial work. If the eleventh (11th) month inspection should occur at a time of high water usage, repair work may be postponed until a period of low usage at the Western's discretion. Postponement shall not extend beyond the sixteenth (16th) month following completion of all coating and painting work. The Contractor shall be notified of the eleventh month inspection, repairs required, and the date when the repair work may be performed.

J. Payment for Inspection

Western will provide one free inspection for each sandblasting, coating, and painting application. Contractor will be charged for all additional inspections of sandblasting, coating, and painting applications. Western will also provide one free final inspection consisting of dry film thickness measurements and holiday detection. If work does not meet WELDED STEEL WATER STORAGE RESERVOIR COATING AND PAINTING SPECIFICATIONS, Contractor will be charged for all subsequent inspections required to insure compliance with said Specifications.

6. Surface Preparation

All surfaces shall be sandblasted by the dry sandblasting method. Sand used in the sandblasting operation shall be washed and graded. It shall be free of contaminants that could interfere with adhesion of coating or paint to be applied. Maximum particle size of abrasive particles shall produce a height profile in accordance with the recommendations of the coating or paint manufacturer. At all times during the blast cleaning operations, means shall be employed to insure that existing paint or coating shall not be exposed to abrasion from blast cleaning operations. All surfaces must be clean, dry, and free of any dirt, dust, grease, oil, salt, and other deleterious materials before any protective coatings or paints are applied.

A. Interior Surfaces

Preparation of all interior surfaces to receive protective coatings shall be blast cleaned to "near-white" metal in conformance with Steel Structures Painting Council Surface Preparation Specification SSPC-SP10 (95% of each square inch shall be free from all visible residues). For existing reservoirs, all existing coating shall be completely removed.

Wooden wedges shall be placed between roof plates and rafters. Wedges shall be positioned to provide a 1" minimum gap between roof plates and rafters. Roof plates shall not be bent or deformed while inserting wedges. Wedges shall be repositioned during blasting operations to ensure that all areas are blasted.

B. Belowground Exterior Surfaces

Preparation of all exterior surfaces to receive protective coatings shall be blast cleaned to "near-white" metal in conformance with Steel Structures Painting Council Surface Preparation Specification SSPC-SP10 (95% of each square inch shall be free from all visible residues).

C. Aboveground Exterior Surfaces

Unless specified otherwise, preparation of all exterior surfaces to receive protective paints shall be "commercial blast cleaned" metal in conformance with Steel Structures Painting Council Surface Preparation Specification SSPC-SP6 (67% of each square inch shall be free from all visible residues). For existing reservoirs, washing and rinsing exterior surfaces may be permitted if specified. Surfaces shall be thoroughly scrubbed and washed with a detergent cleanser and rinsed with water until all surfaces are free from chalking paint, dirt, grease, oil, graffiti, and other materials. Western shall approve cleaned surfaces prior to the application of any paint. All areas where existing paint or primer has been removed or steel is exposed shall be sandblasted to "commercial blast cleaned" metal.

D. Bottom of Floor Plates

Bottom of floor plates shall be thoroughly cleaned of rust, rust dust, filings, blisters, loose mills scale, dirt, oil, grease, and other foreign matter.

7. Materials

Protective coatings shall be "AMERCOAT" series as manufactured by Ameron Corporation of Brea, California, "CARBOLINE" series as manufactured by Carboline Company, of St. Louis, Missouri, "DEVOE" series as manufactured by ICI Devoe Coatings, of Louisville, Kentucky, or "TNEMEC" series as manufactured by Tnemec Company, Incorporated of Compton, California. Materials for interior coating shall not contain Tetrachloroethylene (PCE). All materials including thinners shall be delivered to jobsite in original unopened containers bearing manufacturer's name, brand, and batch number. They shall not be opened or used until Inspector has physically inspected the contents and obtained necessary data from information printed on containers or labels. All materials opened or not approved shall be removed from the work site before any work shall begin. A request for material substitutions must be made and approved by Western in writing prior to submission of bids.

Only full, previously unopened containers of coating material shall be utilized during each coating session unless the Contractor receives Western approval to do otherwise prior to opening the containers. Any mixed unused material shall be discarded. Partial amounts of dual component material shall be measured utilizing Western approved measuring containers prior to mixing.

All thinners must be approved and measured prior to placement in the coating material. Any amount of thinner added to the coating material without the Western's approval may result in the rejection of that material for use.

8. Application

A. First Coat

The application of the prime coat shall immediately follow surface preparation; it shall be completed within the period of an 8-hour working day. Contractor shall use a fine bristle broom and air to clean surfaces after sandblasting and prior to application of prime coat. Any such cleaned areas not receiving prime coat within said 8-hour period shall be re-

blasted prior to application of prime coat. Western shall approve all sandblasted areas prior to application of the coating or paint. Any areas coated without Western's approval shall be re-sandblasted to remove all coating, inspected, and then recoated.

B. Additional Coats

Contractor shall allow previous coat to thoroughly dry as specified herein before cleaning it. Contractor shall use a fine bristle broom and air to remove dust and other matter from each coat prior to application of any additional coats. All areas to receive additional coats shall be approved by Western prior to application of said additional coats. Any areas receiving additional coats without Western's approval shall be re-sandblasted to remove all coating, inspected, and then recoated.

C. Special Coats

1) Inaccessible Areas

Prior to erection, all interior surfaces (except bottom floor plates) that will be made inaccessible after erection shall be sandblasted as specified herein and shall receive the complete coating system as specified herein. Such surfaces shall include but shall not be limited to the top flanges of rafters, the top flanges of girders, column caps, column bearing plates, and earthquake bars.

Contractor shall coordinate work in inaccessible areas with separate Reservoir Contractor. Contractor shall develop coating work schedule based on Reservoir Contractor's work schedule. He shall coordinate, organize, and perform his work sufficiently in advance of Reservoir Contractor's work so that Reservoir Contractor can accommodate Coating Contractor.

Wooden wedges shall be placed between roof plates and rafters. Wedges shall be positioned to provide a 1" minimum gap between the roof plates and rafters. Roof plates shall not be bent or deformed while inserting wedges. Wedges shall be repositioned during coating operations to ensure that all areas are coated. All wooden wedge material adhering to the coating shall be removed and the coating repaired to the Western's approval.

2) Brush Applied Coat

All sharp edges, nuts, bolts, welds, joints, connections, and similar surfaces shall receive a brush-applied coat of the specified coating prior to application of each complete coat.

3) Caulking

Contractor shall fully seal with continuous caulking all areas specified in the Special Requirements. Contractor shall apply caulking a minimum of 72 hours following the application of the final coat of epoxy, and at least 72 hours prior to holiday detection of adjacent coated surfaces. The caulking shall be a two component, polyurethane-based sealant, meeting ASTM-C-920 and NSF standard for potable water contact. The coating shall be Sikaflex-2c, NS or Western approved equivalent and shall be applied per manufacturers instructions.

Contractor shall thoroughly clean all epoxy coated surface areas with clean white rags prior to application of the caulking.

D. Ventilation

Ventilating fans shall be attached to all reservoir shell manholes to provide air exhaust near bottom of reservoir. All reservoir roof openings shall be left open to provide air supply. Fans shall be located as necessary to provide proper air movement throughout the entire reservoir.

- 1) During coating application, Contractor shall ventilate tank coating with ventilating fans with a capacity of at least 300 cfm per gallon of coating applied per hour.
- 2) At the end of each work day, Contractor shall force ventilate reservoir interior until the next work day with a minimum of one complete air change each hour. Contractor shall force ventilate reservoir interior over weekends and holidays with one complete air change each hour. Ventilation fans shall operate 24 hours each day. Without restricting proper ventilation, Contractor shall prevent sand, dust or other material from adhering to the coating by the use of barriers, screen or other Western approved methods. Damaged surfaces shall be repaired to the Western's satisfaction.
- 3) After each reservoir interior coat has been completed, Contractor shall force ventilate reservoir interior for a minimum of 72 hours with one complete air change each hour. Ventilation fans shall operate 24 hours each day.
- 4) Following the application of each epoxy floor coating and as directed by Western, additional fans shall be located inside the reservoir to facilitate proper air movement throughout the lower portion of the reservoir. Combined capacity of additional fans shall equal one complete air change per hour. Floor surface area per fan shall not exceed 2,500 square feet. Placement of fans shall occur after coating has cured sufficiently to prevent damage to the floor coating. Additional fans shall operate a minimum of 48 continuous hours prior to placement of the next floor coating. Existing coatings shall be protected when placing fans and any damaged areas shall be repaired under Western's supervision and holiday tested at the Contractor's expense.

Following acceptance of the floor coating by Western, said fans shall remain in continuous operation during the 14 day forced ventilation of the reservoir interior.

- 5) After reservoir interior coating has been completed, inspected, and accepted by Western, Contractor shall force ventilate reservoir interior for a minimum of 14 days with one complete air change each hour. Ventilation fans shall operate 24 hours each day.
- 6) Contractor shall furnish all required equipment and labor to ventilate reservoir interior including fans, generators, fuel, vandal proof protective barriers, wind barriers, and manpower to insure adherence to the ventilation requirements.

E. Safety

During sandblasting operations and coating and painting applications, Contractor shall use head protection, fire protection, and respiratory devices in accordance with AWWA D-102, latest edition. Use of these devices shall be mandatory and strictly enforced by the Contractor as his total responsibility. Western's representatives will not be continuously present and shall not be responsible or liable for enforcing Contractor's adherence to these and other lawfully mandatory safety practices.

F. Skilled Craftsmen

All work shall be performed by skilled craftsmen who are qualified to perform the required work in a manner compatible with the best standards of practice found in the trade.

G. Restrictions

- 1) Material shall not be applied when the surrounding air temperature or temperature of the surface to be coated is below 40°F. Material shall not be applied to wet or damp surfaces, in rain, fog, or when the temperature is less than 5°F above the dew point. Material shall not be applied when it is expected the air temperature will drop below 40°F or less than 5°F above the dew point within 8 hours after application of material.
- 2) Material shall not be applied when the surrounding air temperature or temperature of the surface to be coated exceeds 110° F. Material shall not be applied when the relative humidity exceeds 70 percent. Material shall not be applied when it is expected the air temperature or temperature of the surface will exceed 110° F within 2 hours following application of material.
- 3) Material shall not be applied when wind conditions may cause overspray, dust, sand or other material to adhere to the coated surface. Damaged surfaces shall be repaired to the Western's satisfaction.

H. Curing of Reservoir Coating

Contractor shall provide all equipment and manpower necessary to provide continuous supplemental heat and dehumidification of the reservoir interior as required to maintain proper curing conditions as recommended by the coating manufacturer. Said requirement shall apply throughout coating and curing operations, including overnight, over holidays, over weekends, between coats, and during the fourteen (14) day curing period.

During weekends and during the fourteen (14) day curing period, Contractor shall monitor heating, dehumidifying, and ventilating equipment and shall provide fuel as required to keep equipment operating continuously. Contractor shall furnish fuel supply tanks with a minimum capacity for seventy-two (72) hours of continuous heating. During weekends, holidays, and the fourteen (14) day curing period, Contractor shall provide all maintenance required to make immediate repair in the event of equipment failure.

9. Shop Priming

Shop priming of reservoir surfaces will be required when so stated in the Contract Special Requirements or on the Construction Drawings. Otherwise, reservoir will be field primed, unless shop priming is requested in writing by the Contractor and approved by Western.

Contractor shall coordinate plant work such that all blast cleaning and priming operations may be observed by Western's representative. Costs for trips, including all expenses directly related to the plant inspection (such as transportation, lodging, subsistence, travel time, inspection time, and down time), shall be paid by Contractor. Contractor shall pay for a minimum of 8 hours of inspection for each day Western's representative is present at the shop-priming site. If inspection exceeds 12 continuous hours per day, an additional Western's representative will be required.

When shop priming of the reservoir is required or allowed, Contractor shall shop prime reservoir exterior surfaces, reservoir roof interior, and roof supporting structure (rafters, girders, rafter clips, column caps, and earthquake bars) as follows:

A. Surface Preparation

All exterior surfaces shall be cleaned to "commercial", all in accordance with the Contract Documents.

All interior surfaces shall be cleaned to "near-white", all in accordance with the Contract Documents.

B. Application

Application of prime coat shall immediately follow surface preparation; it shall be completed within the period of 8 hours. Any such cleaned areas not receiving prime coat within said 8-hour period shall be re-cleaned prior to application of prime coat. Western shall approve all cleaned areas prior to application of any coating or paint. Any areas coated without Western's approval shall be re-cleaned to remove all coating, inspected, and then recoated.

Upon completion of cleaning and priming, all coated or painted components shall be cured for a minimum of two hours at 60° F prior to stacking or handling components.

C. Materials

- 1) Reservoir exterior surfaces shall be coated in accordance with Section 16 or 17 of the Basic Welded Storage Reservoir Coating and Painting Specifications, as specified.
- 2) Reservoir roof interior and roof supporting structure shall be primed with Tnemec 90-97 Organic Zinc Primer, or approved equal to a minimum dry film thickness of two and one half (2.5) mils.

D. Transportation

- 1) In transit, spacers shall be used to separate all plates and components. In addition, all shop-primed steel shall be completely covered to protect the steel and prevent deposition of road salts, fuel residue, and contaminants.
- 2) Loaded steel shall be bound with padded chains or ribbon binders.

E. Field Application

- 1) If damage to primer in a specific area exceeds 50% of the total surface of that specific area as determined by Western, Contractor shall blast clean entire said area and reapply the primer in accordance with these Specifications.
- 2) Primed surfaces, which have been exposed to excessive sunlight or have exceeded the manufacturer's recommended recoat time shall be scarified and a second coating of paint shall be applied. Procedures for surface preparation shall be as determined by the Western.
- 3) Upon completion of tank erection all surfaces shall be thoroughly scrubbed and washed with a detergent cleanser and rinsed with high-pressure water until all surfaces are free from dirt, grease, oil, and all other surface contaminants.
- 4) After surfaces are clean and prior to application of intermediate coat, surfaces shall be inspected and approved by Western. Any areas not approved by Western shall be repaired as follows:

a. Reservoir Exterior Surfaces

All areas damaged during shipping, erection, and exposure shall be spot blast cleaned to "commercial" in accordance with the Contract Documents. All blast cleaned areas shall be approved by Western and then receive a prime coat. Thereafter, all exterior surfaces shall receive the second and third coat in accordance with these Specifications.

b. Reservoir Roof Interior and Roof Supporting Structure

All areas damaged during shipping, erection, and exposure shall be spot blast cleaned to "near-white" in accordance with these Specifications.

All said blast cleaned areas shall be approved by Western and then receive a prime coat. Said prime coat shall be an epoxy coating in accordance with the Contract Documents. Thereafter, the roof interior and roof supporting structure shall receive a three-coat 15-mil epoxy coating in accordance with these Specifications.

- 5) Field repair shall extend beyond the heat-affected zone of the welds.
- 6) After blast cleaning of defective or damaged areas, edges shall be feathered to provide a smooth transition between shop-primed and field primed surfaces.

10. Coating for Interior Surface of Floor and Bottom One-Half Foot of Shell and Appurtenances (AWWA Inside Paint System No. 5 - As Modified Herein); HOT APPLIED COAL TAR ENAMEL

A. Prime Coat

Prime coat shall be Reilly's Enamel Primer, or approved equal, applied to a minimum dry film thickness of one and one-half (1.5) mils. The work on the floor shall proceed in such a manner to avoid traffic over freshly primed surface.

B. Finish Coat

Finish coat shall be a hot-applied type coal tar enamel such as Reilly's AWWA Type I Enamel, or approved equal, applied to a minimum finished thickness of 3/32 inch.

C. Application Requirements

The floor and bottom one-half foot of shell and appurtenances including but not limited to columns, base plates, and angles shall be coated with the hot-applied coal tar system. After all areas have been coated, inspected, and approved, Contractor shall apply a coat of cold-applied coal tar coating over interface between the two coating systems.

Contractor may, if approved by Western, complete surface preparation for the entire floor surface and bottom one-half foot of shell prior to cleaning same for approval of surface preparation. Any areas not meeting the surface preparation specifications shall be re-blasted and approved by Western.

Contractor shall clean the floor plates for inspection of surface preparation by first sweeping and removing as much sand as possible. Contractor shall then use air and a fine bristle broom to remove the remainder of the sand. Each area of the floor and appurtenances shall be cleaned with air until approved by Western. Contractor shall clean each area with air just prior to applying primer.

Primer shall be dry and hard before application of the coal tar enamel. Coal tar enamel shall not be applied over primer which has dried for less than 1 hour or more than 14 days. If the maximum drying time is exceeded, a second coat of interior primer shall be applied. No surfaces shall, in any case, receive more than two coats of primer, or a dry film thickness of primer greater than four (4) mils.

Enameling buckets shall be filled from heating kettles equipped with spigots; they shall not be dipped for filling. Buckets shall be kept clean and free of excess chilled enamel and dirt at all times. They shall not be set directly on the ground or on enameled surfaces but on suitable pads or blocks. Enamel shall be applied at a temperature of 450° F to 490° F.

D. Dry Film Thickness Verification

Western will measure the thickness of the coating to insure the specified thickness has been obtained 24 hours after application of the finish coat.

E. Drying Time

A minimum of 24 hours shall elapse between application of the finish coat and filling the tank with water for testing or chlorination.

11. **Coating for Interior Surface of Floor and Bottom One-Half Foot of Shell and Appurtenances (AWWA Inside Paint System No. 1 - As Modified Herein); EPOXY, 15 MILS**

A. Prime Coat

Prime coat shall be Carboline Super Hi-Gard 891 Epoxy, Tnemec Pota-Pox 20 Epoxy, Devoe Bar Rust 233H Epoxy, or approved equal; it shall consist of one coat applied to a minimum dry film thickness of five (5) mils.

B. Finish Coat

Finish coat shall be Carboline Super Hi-Gard 891 Epoxy, Tnemec Pota-Pox 20 Epoxy, Devoe Bar Rust 233H Epoxy, or approved equal; it shall consist of two or more coats applied to a minimum dry film thickness of ten (10) mils.

C. Total Thickness

The total dry thickness shall be a minimum of fifteen (15) mils.

D. Application Requirements

At least 72 hours shall elapse between coats. Materials shall be stirred thoroughly with a slow speed power mixer until a smooth uniform consistency is obtained. Compound shall be mixed in exact proportions specified by manufacturer. The material shall not be thinned except possibly in cold weather, and then only in strict accordance with the manufacturer's written recommendations. Coatings shall not be applied when the surface temperature of the area to be coated is below 60°F or above 100°F.

E. Dry Film Thickness Verification

Western will measure the thickness of each coating to insure that the specified dry film thickness has been obtained and shall take final measurements 7 days after application of the finish coat.

F. Drying Time

A minimum of 14 days shall elapse between application of the finish coat and filling the tank with water for disinfection, filling, testing, and sampling.

G. Color

Each coat shall be a different color than the preceding coat. The final coat shall be white and NSF Standard 61 approved.

12. Coating for Interior Surface of Floor and Bottom One-Half Foot of Shell and Appurtenances (AWWA Inside Paint System No. 1 - As Modified Herein), 100% SOLIDS EPOXY

A. Prime Coat

Prime coat shall be Carboline Sentry 140, Devoe Devran 133 Epoxy, or approved equal; it shall consist of one coat applied to a minimum dry film thickness of fifteen (15) on all horizontal surfaces and ten (10) mils on all other surfaces.

B. Finish Coat

Finish coat shall be Carboline Sentry 140, Devoe Devran 133 Epoxy, or approved equal; it shall consists of one coat applied to a minimum dry film thickness of fifteen (15) mils on all horizontal surfaces and ten (10) mils on all other surfaces.

C. Total Thickness

The total dry thickness shall be a minimum of thirty-mils (30) on all horizontal surfaces and twenty-mils (20) on all other surfaces.

D. Application Requirements

At least 72 hours shall elapse between coats. Materials shall be stirred thoroughly with a slow speed power mixer until a smooth uniform consistency is obtained. Compound shall be mixed in exact proportions specified by manufacturer. The material shall not be thinned except possibly in cold weather, and then only in strict accordance with the manufacturer's written recommendations. Coatings shall not be applied when the surface temperature of the area to be coated is below 60°F or above 100°F.

E. Dry Film Thickness Verification

Western will measure the thickness of each coating to insure that the specified dry film thickness has been obtained and shall take final measurements 7 days after application of the finish coat.

F. Drying Time

A minimum of 14 days shall elapse between application of the finish coat and filling the tank with water for disinfection, filling, testing, and sampling.

G. Color

Each coat shall be a different color than the preceding coat. The final coat shall be white and NSF Standard 61 approved.

13. Coating for Interior Surface Other Than Floor and Bottom One-Half Foot of Shell (AWWA Inside Paint System No. 6 - As Modified Herein); BITUMASTIC, 20 MILS

A. Prime Coat

Prime coat shall be Carboline Bitumastic Super Service Black, Tnemec C46-465 Hi-Build Tank Coating, or approved equal; it shall consist of one coat applied to a minimum dry film thickness of six (6) mils.

B. Finish Coat

Finish coat shall be Carboline Bitumastic Super Service Black, Tnemec C46-465, or approved equal; it shall consist of two or more coats applied to a minimum dry film thickness of fourteen (14) mils.

C. Total Thickness

The total dry film thickness shall be a minimum of twenty (20) mils.

D. Application Requirements

At least 72 hours shall elapse between coats. Cold-applied coal tar base coatings shall be stirred thoroughly with a slow speed power mixer until a smooth consistency is obtained. The material shall not be thinned except possibly in cold weather, and then only in strict accordance with the manufacturer's written recommendations.

E. Dry Film Thickness Verification

Western will measure the thickness of the coating to insure that the specified dry film thickness has been obtained 7 days after application of the finish coat.

F. Drying Time

A minimum of 14 days shall elapse between application of the finish coat and filling the tank with water for disinfection, filling, testing, and sampling.

14. Coating for Interior Surface Other than Floor and Bottom One-Half Foot of Shell (AWWA Inside Paint System No. 1 - As Modified Herein); EPOXY, 15 MILS

A. Prime Coat

Prime coat shall be Carboline Super Hi-Gard 891 Epoxy, Tnemec Pota-Pox 20 Epoxy, Devoe Bar Rust 233H Epoxy, or approved equal; it shall consist of one coat applied to a minimum dry film thickness of five (5) mils.

B. Finish Coat

Finish coat shall be Carboline Super Hi-Gard 891 Epoxy, Tnemec Pota-Pox 20 Epoxy, Devoe Bar Rust 233H Epoxy, or approved equal; it shall consist of two or more coats applied to a minimum dry film thickness of ten (10) mils.

C. Total Thickness

The total dry film thickness shall be a minimum of fifteen (15) mils.

D. Application Requirements

At least 72 hours shall elapse between coats. Materials shall be stirred thoroughly with a slow speed power mixer until a smooth uniform consistency is obtained. Compound shall be mixed in exact proportions specified by manufacturer. The material shall not be thinned except possibly in cold weather, and then only in strict accordance with the manufacturer's written recommendations. Coatings shall not be applied when the surface temperature of the area to be coated is below 60° F or above 100° F.

E. Dry Film Thickness Verification

Western will measure the thickness of each coating to insure that the specified dry film thickness has been obtained and shall take final measurements 7 days after application of the finish coat.

F. Drying Time

A minimum of 14 days shall elapse between application of the finish coat and filling the tank with water for disinfection, filling, testing, and sampling.

G. Color

Each coat shall be a different color than the preceding coat. The final coat shall be white and NSF Standard 61 approved.

15. Coating of Belowground Exterior Surfaces, HOT APPLIED COAL TAR ENAMEL

A. Prime Coat

Prime coat shall be Reilly's Enamel, or approved equal, applied to a minimum dry film thickness of one and one-half (1.5) mils.

B. Finish Coat

Finish coat shall be hot-applied type coal tar enamel such as Reilly's AWWA Type I Enamel, or approved equal, applied to a minimum finished thickness of 3/32 inch.

C. Protective Coating

Contractor shall furnish and install 1/2-inch fiberboard over enamel and cover with hot mopped roofing tar. Install tar with 3-inch overlap over the hot-applied coal tar coating. The fiberboard shall extend to within 6 inches of finish grade.

D. Application Requirements

Primer shall be thoroughly dry and hard before application of the coat tar enamel. Coal tar enamel shall not be applied over primer which has dried for less than 1 hour or more than 14 days. If the maximum drying time is exceeded, a second coat of primer shall be applied. No surfaces shall in any case receive more than two coats of primer or a dry film thickness of primer greater than four (4) mils.

Enameling buckets shall be filled from heating kettles equipped with spigots; they shall not be dipped for filling. Buckets shall be kept clean and free of excess chilled enamel and dirt at all times. They shall not be set directly on the ground or on enameled surfaces but on suitable pads or blocks. Enamel shall be applied at a temperature of 450°F to 490°F.

E. Dry Film Thickness Verification

Western will measure the thickness of the coating to insure that the specified thickness has been obtained 24 hours after application of the finish coat.

F. Drying Time

A minimum of 24 hours shall elapse between application of the finish coat and backfilling around the reservoir.

16. Coating of Aboveground Exterior Surfaces (AWWA Outside Paint System No. 1 - As Modified Herein), ALKYD, 6 MILS

A. Prime Coat

Prime coat shall be Amercoat 25 Primer, Carboline Multibond 150 Primer, Tnemec 4-55 Versare Primer, or approved equal; it shall consist of one or more coats applied to a minimum dry film thickness of two (2) mils. Prime coat shall not be required for existing reservoirs where the steel is not exposed.

B. Finish Coat

Finish coat shall be Amercoat 52, Carboline Rustarmor 139, Tnemec Series 23, or approved equal; it shall consist of two or more coats applied to a minimum dry film thickness of four (4) mils.

C. Total Thickness

The total dry film thickness shall be six (6) mils minimum.

D. Application Requirements

At least 48 hours shall elapse between applications of all coats.

E. Dry Film Thickness Verification

Inspector will measure the thickness of each coat to insure the specified dry film thickness has been obtained and shall take final measurements 5 days after application of finish coat.

F. Color

Each coat shall be of a different color than the preceding coat. Intermediate coat shall be similar but lighter in color than finish coat.

Western shall approve all colors prior to painting. Contractor shall submit a current chart of the manufacturer's available colors to Western well in advance of painting operations. If the color or colors applied do not conform to those approved by Western, applicator shall change the color or colors to Western's satisfaction.

17. **Coating of Aboveground Exterior Surfaces (System 2), EPOXY, POLYURETHANE, 8 MILS**

A. Prime Coat

Prime coat shall be Tnemec 90-97, Tnemec-Zinc, or Series 20 Pota-Pox, or approved equal; it shall consist of one coat applied to a minimum dry film thickness of two and one half (2.5) mils. Prime coat shall not be required for existing reservoirs where the steel is not exposed.

B. Intermediate Coat

Intermediate coat shall be Tnemec Series 20 Pota-Pox or approved equal; it shall consist of one coat applied to a minimum dry film thickness of two and one half (2.5) mils.

C. Finish Coat

Finish coat shall be Tnemec Series 74, 75, or 175 Endura-Shield (as specified by Western), or approved equal; it shall consist of one coat applied to a minimum dry film thickness of three (3) mils.

D. Total Thickness

The total dry film thickness shall be eight (8) mils minimum.

E. Application Requirements

At least 48 hours shall elapse between applications of all coats.

F. Dry Film Thickness Verification

Inspector will measure the thickness of each coating to insure the specified dry film thickness has been obtained and shall take final measurements 5 days after application of finish coat.

G. Color

Each coat shall be of a different color than the preceding coat. Intermediate coat shall be similar to but slightly lighter in color than the finish coat.

Western shall approve all colors prior to painting. Contractor shall submit a current chart of the manufacturer's available colors to Western well in advance of painting operations. If the color or colors applied do not conform to those approved by Western, applicator shall change the color or colors to Western's satisfaction.

18. Disinfection, Filling, Testing, and Sampling

Before filling, Western may establish survey points on the reservoir for vertical control to monitor settlement of the reservoir on filling. Thereafter Contractor, in the presence of the Inspector, shall clean and disinfect the reservoir as follows:

- A. Contractor shall notify Western when interior coating has cured, 14 days minimum, or longer as determined by Contractor.
- B. Contractor shall pressure spray-flush all interior surfaces including top of dollar plate and interior of vents 2 times using construction water. If necessary, Contractor shall use a combination of brushing and pressure spray flushing to clean interior of the reservoir. Capacity of pressure spray pump shall be such that sufficient volume, as approved by Western, is able to extend a minimum of 5 feet beyond the highest surface required to be cleaned. After the reservoir is clean, Contractor shall drain construction water and clean reservoir floor of all remaining silt and debris.
- C. Western will place approximately 6 inches of potable or chlorinated water in the bottom of reservoir and Contractor shall add sufficient chlorine to produce a chlorine concentration of 100 ppm. Contractor shall then pressure spray-flush all interior surfaces 4 times using the chlorinated water. Contractor shall maintain the chlorinated water inside the reservoir at 50-ppm chlorine residual for 24 hours minimum. Contractor shall thereafter drain the reservoir after verification of chlorine residual. If the 50-ppm minimum chlorine residual is not maintained, Contractor shall repeat the disinfection procedure.
- D. Contractor shall replace all manhole gaskets with new Western approved gaskets.
- E. Western will fill the reservoir to not more than half capacity and check settlement. Thereafter, Western will fill reservoir to full capacity and leave it full for 5 days minimum. Western will inspect reservoir during said week for apparent leaks.
- F. After reservoir has been filled for 24 hours, Western will take water samples for bacteriological analysis. After reservoir has been filled for 5 days, Western will take water samples for volatile organic analyses. Results from said analyses will be sent to the Department of Health Services for their review and approval. If the results are not approved, Contractor shall drain the reservoir and Contractor shall continue to force ventilate it in accordance with Section 8.D of these Specifications until he again determines the coating to be cured. Contractor will be charged for all subsequent water to re-chlorinate and refill reservoir and for all subsequent bacteriological and

volatile organic analyses until the results of said analyses are approved by the Department of Health Services.

- G. Western will provide a reasonable quantity of water at no charge to Contractor for construction, pressure flushing, chlorination, and filling reservoir; however, water for pressure flushing, chlorination, and filling will be limited to one event each. Western will charge for any additional events.

19. Requirements Regarding Worksite and Vicinity

- A. Contractor shall not perform work outside work site limits and shall not leave said work site except to enter or leave the area via the access road.
- B. Contractor is obligated to keep visual impact of the Work site to a minimum, and to prevent damage to all existing structures, private property, and residences in vicinity of Work site. Contractor shall restore all areas altered by construction to pre-job conditions and shall meet the requirements of Western. Such areas shall include, but shall not be limited to, areas used for travel, parking, and storage of vehicles, equipment and materials.
- C. Contractor shall utilize existing roads in such a manner as to not damage existing roads or adjacent properties. Any damage to it shall be repaired by Contractor to the satisfaction of the Western and to any agency having jurisdiction over roadway.
- D. Work shall be performed to prevent fires and air pollution in accordance with the General Requirements. Said prevention shall apply to travel on access roads as well as on the work sites. All equipment shall be provided with spark arrestors and readily accessible fire extinguishers shall be kept on site.
- E. Contractor shall limit construction noise to a maximum continuous level of 65-dBA, as measured at the reservoir site's property line between the hours of 7:00 AM to 5:00 PM, Monday through Friday. This maximum continuous level shall decrease to 55-dBA on holidays and all other times, if work during those times is approved by Western. Contractor shall be able to demonstrate compliance with noise limits by taking and recording noise measurements when requested to do so by the Western.

Contractor may use any Western approved method to limit construction noise including the placement of acoustic skirts or curtains around the equipment and/or work area, placement of a barrier wall around the site, and/or providing high performance mufflers for the equipment engines.

- F. Contractor shall prevent all dust or sand from blowing off the reservoir site. Contractor may use any Western approved method to prevent said dust or sand from blowing offsite including the placement of temporary shield, screens, or covers, proper containment, and the use of self contained sand blasting equipment.
- G. Contractor shall prevent overspray from blowing off the reservoir site during coating operation. Contractor may use any Western approved overspray protection or shall limit coating the reservoir to periods when wind speeds are minimal.

- H. The Western has the right at any time to analyze noise, blowing dust, overspray, or any other applicable condition, and require preventive measures to be implemented by the Contractor prior to proceeding.

If a complaint is received, the Contractor shall cease operations immediately, inform the Western of the complaint, take corrective actions, and receive permission from the Western in order to proceed. All corrective actions shall be provided by the Contractor at no additional cost to the Western. The Contractor shall immediately repair any damages resulting from said complaint at no cost to the Western. Any costs incurred by the Western for said complaints shall be reimbursed by the Contractor.

20. Sandblast Sand and Removed Coating

All sandblast sand, removed coating, and any other residual debris shall be collected, removed from the site, and disposed of at an approved legal disposal site. Said material shall be collected and directly moved from site. Said materials shall not be stockpiled outside the reservoir prior to removal and disposal.

21. Cleanup

During all coating operations, site shall be kept clean and free of all empty buckets, paint cans, trash, and any other material, which gives the site an untidy appearance. Contractor shall provide a trash dumpster, shall clean site daily, and place all said materials in dumpster. Said dumpster shall be emptied a minimum of once a week. Upon completion of the work, all staging, scaffolding, containers, chunks of hot-applied enamel, rags, pieces of enamel, and all materials and equipment used in the performance of the work shall be removed from the site. All damage to surfaces resulting from the work shall be cleaned, repaired, or refinished to the complete satisfaction of Western.

22. Additional Material to Western

Following completion of work, Contractor shall supply Western with a minimum of one gallon of each finish coat utilized in coating the reservoir interior and exterior. Life span of material delivered to the Western shall be a minimum of one year at the time of delivery and color of material shall be identical to that utilized in coating the reservoirs.

WELDED STEEL WATER STORAGE RESERVOIR SPECIFICATIONS

1. Scope

Contractor shall furnish all labor, materials, and equipment and perform all operations necessary for construction of a reservoir, a foundation if specified, and all other necessary work at a site or location as directed by Western.

2. Reservoir Foundation

A. General

Reservoir foundation shall consist of an asphalt-sand pad on crushed aggregate base with a concrete ringwall. The reservoir foundation shall be placed on material compacted to 95% minimum relative compaction. All specified earthwork shall be performed in strict accordance with the Earthwork Specifications and the geotechnical investigation.

B. Asphalt-Sand Pad on Crushed Aggregate Base

1) Standards

The asphalt-sand pad and crushed aggregate base shall comply with applicable sections of the Standard Specifications for Public Works Construction (SSPWC), latest edition, and shall have the characteristics specified herein.

2) Asphalt-Sand Pad

The asphalt-sand mixture shall be plant mixed and shall consist of sand base per Section 200 and liquid asphalt (SC 800, 7% \pm 1% by weight) per Section 203, SSPWC. Sand gradation shall be in accordance with Table 200-1.5.5 for Portland Cement Concrete. Asphalt-sand shall be hot-plant mixed, transported, and placed in accordance with all applicable provisions of these sections. The asphalt-sand mixture shall be compacted with a lightweight steel wheeled roller to a minimum relative compaction of 95%. Unless specified otherwise, the compacted thickness shall be 3 inches.

3) Crushed Aggregate Base

Crushed aggregate base shall be 3/4-inch maximum gradation and it shall comply with Table 200-2.2.2 of Section 200, SSPWC. Crushed aggregate base shall be compacted to 95% minimum relative compaction. Unless specified otherwise, the compacted thickness shall be 9 inches.

4) Tolerances

The top of the asphalt-sand pad shall not vary more than \pm 1/4 inch from the grade and slope specified. When completed, there shall be no freestanding liquid asphalt on the surface of the asphalt-sand mixture during reservoir construction.

C. Reinforced Concrete Ringwall

The reinforced concrete ringwall shall be constructed in accordance with Standard Drawing No. R-3 and the following:

1) Concrete

All concrete work shall comply with the Concrete Specifications. Reinforced concrete ringwall shall be constructed of structural concrete placed against soil or rock below sub-grade and against forms above sub-grade. It shall be of the size specified on the Construction Drawings. Top surface finish shall be smooth troweled free from blemishes, ripples, and trowel marks. Sidewall above sub-grade shall have a smooth sacked finish. Top edges of ringwall shall be chamfered 1 inch.

2) Anchor Bolts

Anchor bolts, when required, shall be placed prior to placing the ringwall. Anchor bolt positions are critical and must be set in the exact locations called for to avoid interfering with the tank shell or bottom plate. Contractor shall verify anchor bolt locations before and immediately after placing the ringwall.

3) Impregnated Expansion Joint Material

Impregnated expansion joint material shall be 1/2 inch thick conforming to the requirements of ASTM Standard D1751, applied to top of ringwall from the inside edge to the outside of the bottom plate. Contractor shall apply a mastic adhesive compatible with the expansion joint material to top of concrete ringwall and thereafter apply expansion joint material. Said adhesive shall be applied only to interior 8 inches of the ringwall. Said material shall be applied around entire ringwall circumference and shall be trimmed flush with bearing plate exterior.

Contractor shall apply expansion joint material to ringwall during the week prior to reservoir construction (placement of bearing plate). Contractor shall not damage the expansion joint material during reservoir construction.

4) Tolerances

The center of the ringwall shall not vary more than $\pm 1/2$ inch from the radius specified. Variations in wall thickness shall not exceed $+1/2$ inch or -0 inch above sub-grade anywhere along circumferential length. Variations in wall thickness shall not exceed $+6$ inches or -0 inch below sub-grade. The top of the concrete ringwall shall be smooth and level and shall not vary more than $\pm 1/8$ inch in any circumferential length of thirty feet and the top surface shall not vary more than $\pm 1/4$ inch from the specified elevation.

3. Reservoir

A. General

Design, fabrication, erection, installation, inspection, and testing shall comply with the applicable requirements of the American Water Works Association Standard D-100, latest (AWWA D-100, latest) excluding Appendix "C" (unless specified otherwise) thereof and with the applicable requirements of the Uniform Building Code, latest (UBC, latest), except as otherwise specifically stated herein.

B. Submittal Documents

Prior to commencing reservoir construction, Contractor shall submit to Western two copies of the following for approval:

- 1) Complete detailed design calculations (signed by a Registered Civil Engineer licensed in the State of California) for all requirements specified herein including dead, live, and other loads.
- 2) Complete detailed fabrication drawings showing structural member details, connection details, appurtenance details, all dimensions, all thicknesses, and all other pertinent data necessary to adequately describe the work.

After all documents have been approved, Contractor shall submit to Western five complete copies of all approved submittal documents.

C. Design Criteria

The water storage reservoir shall be designed in accordance with AWWA D100 to meet or exceed the following requirements:

1) Design Loads

a. Earthquake Load

Amplified Horizontal Impulsive Acceleration (Ai):	Per Geotechnical Investigation and Seismic Response Spectra
Amplified Horizontal Convective Acceleration (Ac):	Per Geotechnical Investigation and Seismic Response Spectra
Amplified Vertical Acceleration:	0.67 x Ai
Percent Critical Damping:	5%
Simultaneous combination of vertical and horizontal acceleration:	Yes (no reduction)
Design basis of tank:	AWWA Standard D100-96
Hoop stress combination:	Root mean square
Seismic design of roof required:	Yes
Horizontal acceleration:	0.35g
Vertical acceleration:	0.23g
Column horizontal acceleration:	0.35g
Column lateral dynamic water load:	15 psf combined with horiz. Acc.

A_i shall replace $ZKCS$ in AWWA formulas. A_c shall replace ZKC_1S in AWWA formulas.

If a response spectra is not prepared or the AWWA seismic coefficients result in higher loads, they shall be utilized. Importance Factor I shall be taken as 1.25.

Flat bottom tanks shall be anchored to resist earthquake loads where analysis dictates. Reduction of hydrodynamic hoop stress based on ductility will not be allowed.

b. Wind Load

Wind load (horizontal and vertical) shall be based on wind velocity of 100 miles per hour.

c. Roof Live Load

Roof load shall equal 20 pounds per square foot of horizontal projection of reservoir roof. Roof load shall not be reduced.

d. Column Footings

Column footings consisting of column base and base plate shall be based upon allowable soil pressure of 3,000 pounds per square foot (unless specified otherwise), including the weight of water. Bottom plates shall not be considered in design of column footings.

2) Reservoir Configuration and Minimum Thickness

a. Roof Configuration

Roof shall be designed with a knuckle unless specified otherwise with a minimum radius of 3 feet and a maximum radius of 4 feet. Roof plate shall be minimum 3/16 inch thick. The roof shall slope 3/4 inch vertical to 12 inches horizontal and shall not vary more than ± 1 inch from specified slope at any point between center of reservoir and knuckle. Roof plate shall not vary circumferentially more than $\pm 1/2$ inch (1 inch between high point and low point) in a 6-foot span.

b. Rafter Spacing

Rafters shall be spaced so that in the outer ring their centers shall not be more than 2 pi feet (6.28 feet) apart, measured along the circumference of the reservoir. Spacing on inner rings shall not be greater than 5.5 feet. Tie rods, 3/4 inch diameter or equivalent, shall be placed between rafters in outer rings.

c. Shell Plates

Shell plate minimum thickness shall be as follows:

Lowest Course: 3/8 inch
Second Course: 5/16 inch
Remainder: 1/4 inch

d. Columns

Columns shall be sealed tubular sections.

e. Column Footings

Column bases (either box or plate) shall be confined to vertical movement by either angle or plate girder which shall be anchored to base plates. Base plates shall be fully (seal) welded to bottom plates.

f. Reservoir Bottom

Reservoir bottom plates shall be 5/16-inch thick minimum. An annular ring shall be provided and shall be a minimum 5/16-inch thick.

D. Reservoir Materials

All materials shall comply with AWWA D-100, latest, Section 2. All materials shall be new, previously unused, and in first class condition. Materials shall be shop fabricated to proper dimensions to eliminate field modifications.

1) Floor Plates

Floor plates shall be fabricated to the dimensions shown on the approved fabrication drawings. Floor plates shall be shop fabricated to match annular ring (field cutting will not be permitted).

2) Shell Plates

Shell plates shall be fabricated to the dimensions shown on the approved fabrication drawings. Shell plates shall be shop fabricated to match adjoining plates. Field cutting along horizontal plate edges where abutted to adjoining plates will not be permitted. Only one cut per shell course along vertical plate edges where abutted to adjoining plates will be permitted.

3) Roof Plates

Roof plates shall be minimum 3/16 inch thick. Plates shall be fabricated from minimum 96 inches wide flat plate. Roof plates shall not be fabricated from D-coil stock.

4) Rafters

Rafters shall be straight and true. Rafters shall not vary from centerline more than 1/8 inch in 20 feet or 1/4 inch overall. Top and bottom flanges shall be flat and undamaged. Rafters not straight or with bent or warped flanges shall be replaced prior to erection.

E. Reservoir Welds

All welds shall comply with AWWA D-100, latest, except as otherwise specifically stated herein. All welds for vertical and circumferential joints in the shell shall be complete joint penetration, double butt welds.

All welding shall be performed using the electric shielded arc process. Welders shall be qualified in accordance with the American Welding Society's Standard Qualification Procedure. Welding shall be in accordance with the "American Welding Society Specifications".

F. Weld Inspection and Testing

All welds will be visually inspected by Western's representative. All pinholes, gouges, undercutting, and other defects will be marked. Contractor shall repair all said defects and Western's representatives will visually verify repairs prior to Western accepting reservoir. Contractor shall provide scaffolding and lighting for visual inspections.

Reservoir bottom shall be tested by the vacuum method as described herein. Reservoir shell shall be tested by radiographic methods as described herein. Roof plates and joints between bottom plates and tank shell need not be tested.

1) Reservoir Bottom

Upon completion of bottom, Contractor shall test all welds in their entirety in accordance with AWWA D-100, latest, by the vacuum method utilizing a partial vacuum of at least 2 psi. All tests shall be performed in the presence of the Inspector. Reservoir bottom shall be entirely watertight.

2) Reservoir Shell

Radiographic tests shall be performed in accordance with AWWA D-100, latest, as modified herein. Radiographic tests (spot inspections) shall be conducted in accordance with the following at locations designated by Inspector:

- a. Vertical joints of the same type and thickness shall be spot inspected in the first 10 feet of completed joint welded by each welder or welding operator.
- b. Circumferential joints of the same type and thickness shall be spot inspected in the first 10 feet of completed joint welded by each welder or welding operator.

- c. One out of every two vertical joints in the lowest course shall be spot inspected.
- d. One out of every four vertical joints in each remaining course shall be spot inspected.
- e. Three junctions of vertical and circumferential welds shall be spot inspected.
- f. Each 200 feet and any remaining fraction thereof of circumferential welds shall be spot inspected with a minimum of one spot inspected for each circumferential weld.

3) Failed Radiographic Tests

For every failed radiographic test, Contractor shall perform tests at 2 additional locations on similar type welds (vertical, horizontal, or junctions) at locations chosen by Inspector. These tests are in addition to the tracers required by AWWA D-100 and the test required by Section 3.e.2 above.

G. Reservoir Accessories

1) Accessories

The following accessories shall be appurtenant to the reservoir unless specified otherwise.

a. Inlet

One standard weight steel pipe inlet with a side inlet extending beyond reservoir shell with a flanged end in accordance with Drawing R-4. The inlet shall terminate inside the reservoir in accordance with Drawing R-10. The vertical inlet pipe shall be standard weight steel pipe and shall be attached to support brackets by "U" bolts. It shall not be welded to the brackets. The portion of the inlet inside the reservoir shall be cement mortar lined and outside coated to match the reservoir interior coating system. Diameter of the inlet shall be as specified on the Construction Drawings.

b. Outlet

One standard weight steel pipe outlet with a side outlet extending beyond the reservoir shell with a flanged end in accordance with Drawing R-4. The portion of the steel pipe inside the reservoir shall be cement mortar lined and outside coated to match the reservoir interior coating system. Diameter of the outlet shall be as specified on the Construction Drawings.

c. Overflow Pipe

One standard weight steel pipe inside overflow with a side outlet extending beyond the reservoir shell as shown on Drawing R-7. Overflow pipe shall be attached to support brackets by "U" bolts. It shall not be directly welded to the brackets. The portion of the overflow pipe inside the reservoir shall be cement mortar lined and outside coated to match the reservoir interior coating system.

Overflow inlet shall consist of a dished head cap or flared inlet over vertical riser. Diameter and elevation of the overflow pipe and dished head shall be as specified on the Construction Drawings.

A 12" diameter overflow hatch in accordance with Standard Drawing No. R-5 shall be centered over the overflow pipe.

d. Bottom Drain

One standard-weight steel pipe bottom drain, with a side outlet, extending beyond the reservoir shell as shown on Drawing R-7.

e. Inside Ladder

The interior ladder shall conform to the requirements of the latest issue of the State of California Division of Industrial Safety, General Safety Orders, Title 8, Section 3277. Interior ladder shall be provided with a safety-climbing device.

Side rails shall be a minimum of 2-1/2 inches x 1/4 inch and spaced 18 inches apart. Rungs shall be a minimum of 3/4-inch diameter round bars spaced 12 inches on centers. Side rails, rungs, and other members constructed of pipe shall have all openings seal welded. The ladder shall extend from the floor of the tank to the roof hatch. Ladder shall be provided with a safety climb device. Provisions for extension of the safety climb device above the roof shall also be provided.

Interior ladder shall be type 304 stainless steel. The ladder shall be bolted into place after the interior coating of the reservoir is completed. Mounting bolts and nuts shall be stainless steel. Insulated washers and bushings shall be utilized to separate mild steel from stainless steel.

f. Safety Climb Device

A safety climb device shall be provided along the full length of the inside ladder. The safety climb device and fittings, bolts, nuts, and connections shall be type 304 stainless steel. The devices furnished shall be "SAF-T-CLIMB" as manufactured by Air Space Devices of Paramount, California, or approved equal.

Each safety climb shall be a complete "SAF-T-CLIMB" installation consisting of the required length of SAF-T-NOTCH RAIL, the appropriate type and quantity of SAF-T-CLIMB ATTACHING BRACKETS, two (2) SAF-T-LOK SLEEVES, two (2) SAF-T-BELTS, and one SAF-T-NOTCH RAIL REMOVABLE EXTENSION KIT.

g. Center Vent

One screened center aluminum roof vent in accordance with Standard Drawings R-1 and R-1A. Diameter of roof vent shall be as specified on the Construction Drawings.

h. Shell Manway

One 24-inch diameter shell manhole, one-bolt construction, complete with gasket. Each manhole shall be flanged (1/2 inch thick by 33 inch outside diameter and 28 bolt holes on 30-1/4 inch diameter bolt circle to straddle horizontal and vertical centerlines).

i. Roof Manway and Handrail Enclosure

One 36-inch by 42-inch aluminum roof manway with hinge and hasp and handrail enclosure in accordance with Drawing R-2.

j. Clean-out

One complete flush-type clean out in accordance with API 650.

k. Sampling Taps

Four (4) 3/4" diameter IPT standard steel couplings welded to shell at 18" above reservoir floor. Each coupling shall include a heavy-duty corp-stop and locking cover in accordance with Drawing No. R-11.

Each sampling tap shall include interior PVC pipe, PVC fittings, and brackets in accordance with Drawing No. R-9. Interior PVC pipe shall be arranged to allow sampling at 5 feet, 10 feet, 15 feet, and 20 feet above the reservoir floor.

l. Pressure Transmitter

One (1) 3/4" diameter IPT standard steel coupling welded to side of shell (1 foot above reservoir floor), pressure transmitter, and fabricated enclosure in accordance with Drawing No. R-6.

m. SCADA Conduits

Two (2) 2" diameter IPT standard steel couplings welded to reservoir roof and two (2) 2" diameter IPT standard steel couplings welded to reservoir shell including 2" PVC pipe and brackets in accordance with

Drawing No. R-8. Each of the 2" PVC pipes shall exhibit no leakage when air tested at 60 psi.

n. **Cathodic Protection Conduit**

One (1) 2" diameter cathodic protection conduit and one (1) 2" diameter IPT standard steel coupling welded to reservoir shell including 2" PVC pipe and brackets in accordance with Drawing No. R-8. The 2" PVC pipe shall exhibit no leakage when air tested at 60 psi.

2) **Orientation**

Orientation of appurtenances will be provided by Western on approved fabrication drawings.

4. Protective Coatings

A. **Scope**

Coating of all interior surfaces and painting of all exterior surfaces shall be performed in accordance with the Basic Welded Steel Reservoir Coating and Painting Specifications.

B. **Inaccessible Areas**

Prior to erection, all interior surfaces (except bottom floor plates) that will be made inaccessible after erection shall be sandblasted and coated by coating contractor. Such surfaces shall include but shall not be limited to the top flanges of rafters, the top flanges of girders, column caps, column bearing plates, and earthquake bars.

Contractor shall coordinate work in inaccessible areas with coating contractor. Contractor shall provide coating contractor with his work schedule sufficiently in advance of the work to permit development of a compatible coating work schedule. Contractor shall set all components requiring a coating in an area that is accessible to coating contractor. All handling and moving of components shall be by Contractor. Components shall be available in time to allow separate coating contractor ample time to perform the work and for the coating to dry (3 days minimum or longer, if required).

C. **Preparation for Tank Coating and Painting**

Contractor shall round all sharp edges, remove all burrs and weld spatter from all tank components, and grind all rough welds smooth. Contractor shall seal weld all inaccessible areas except roof plate overlap, tops of beams and girders, column caps, and earthquake bars.

5. Disinfection, Filling, and Testing

Reservoir shall be disinfected after all coating work has been completed in accordance with the Welded Steel Reservoir Coating and Painting Specifications. Western will fill reservoir and inspect it for leaks. If leaks are observed, contractor shall immediately repair it.

6. Cleanup

Upon completion of the work, all staging, scaffolding, containers, steel scraps, welding, electrodes, rags, sacks, and all materials and equipment used in the performance of the work shall be removed from the site. All damage to surfaces resulting from the work shall be cleaned, repaired, or refinished to the complete satisfaction of the Western.

2" x 3/16" PL WELDED
TO BRACE
SEE SECTION "A-A"

BRACING SIZE & NUMBER
TO BE EQUALLY SPACED
AROUND VENT, SEE TABLE
ON SHEET NO. R-1A

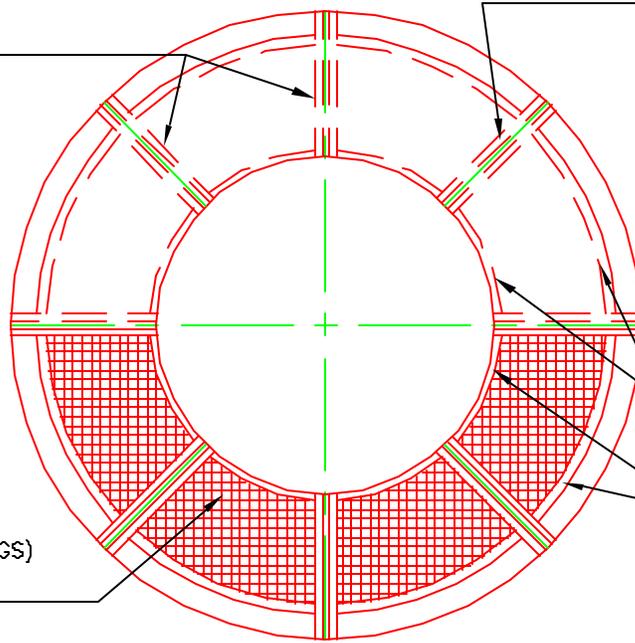
A

A

STAINLESS STEEL WIRE
CLOTH 8" x 8" MESH,
(8 OPENINGS/1 INCH)
23, GA. BACKED BY
2" X 2" (SQUARE OPENINGS)
WIRE MESH 10 GA. MIN.
(TYP. OF EACH SECTION.)

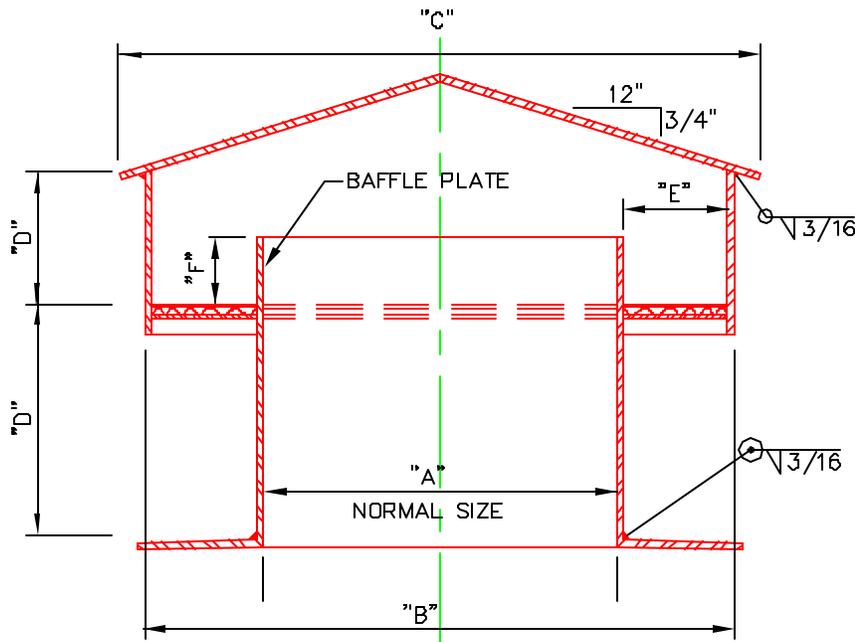
1/2" x 3/16" BAR
SEE SECTION "A-A"

1/8" 1/2-2



SECTIONAL PLAN

N.T.S.



SECTIONAL ELEVATION

N.T.S.

WESTERN MUNICIPAL WATER DISTRICT

SCALE: NONE
DATE: 8/15/03
APPROVED BY:
R.C.E. _____

TYPICAL RESERVOIR VENT DETAILS

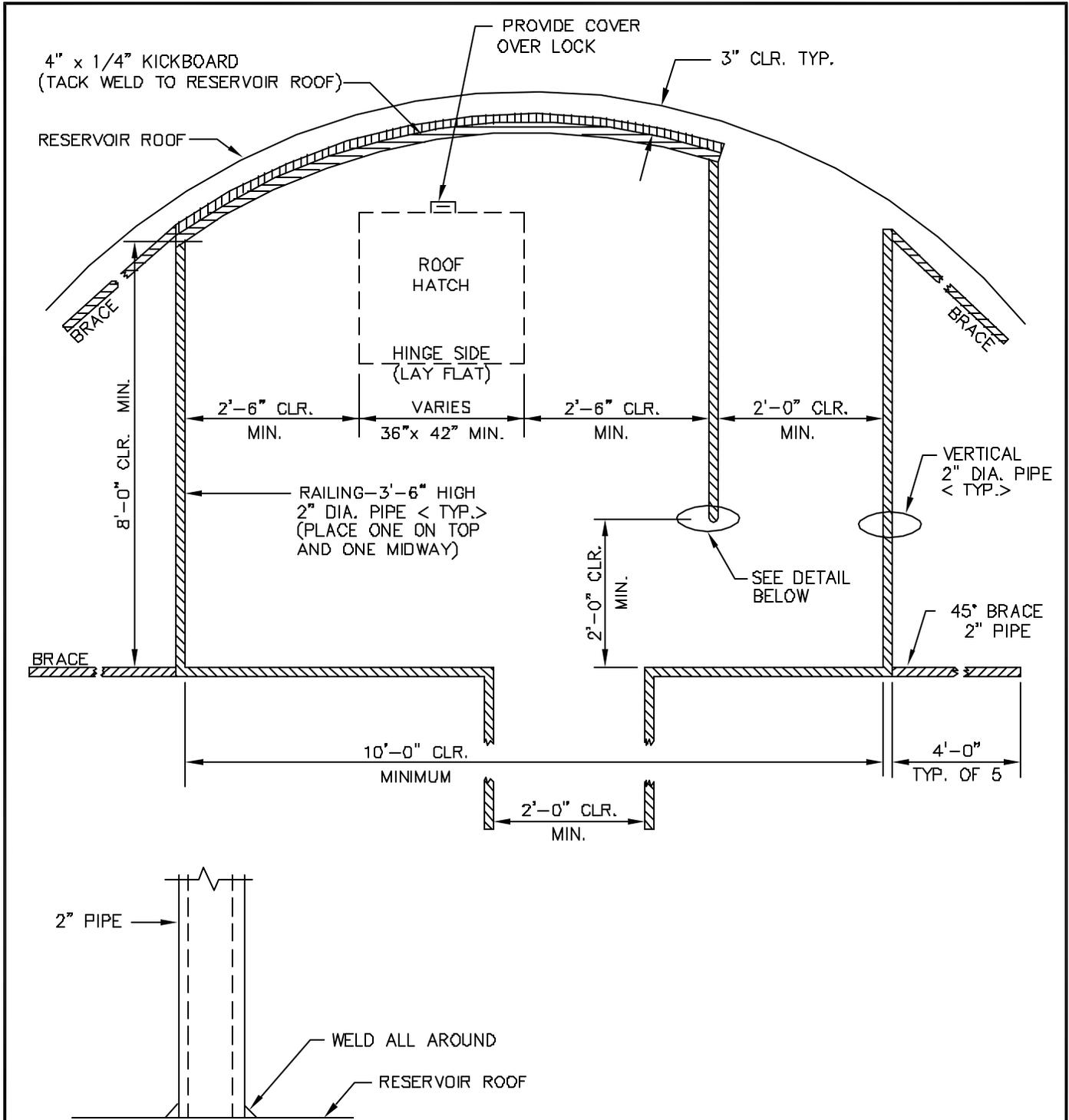
ALBERT A. WEBB ASSOCIATES
CONSULTING ENGINEERS
RIVERSIDE, CALIFORNIA

DRAWING NO.

R-1

SHT. 1 OF 2 SHT'S.

W.O. 01-0015

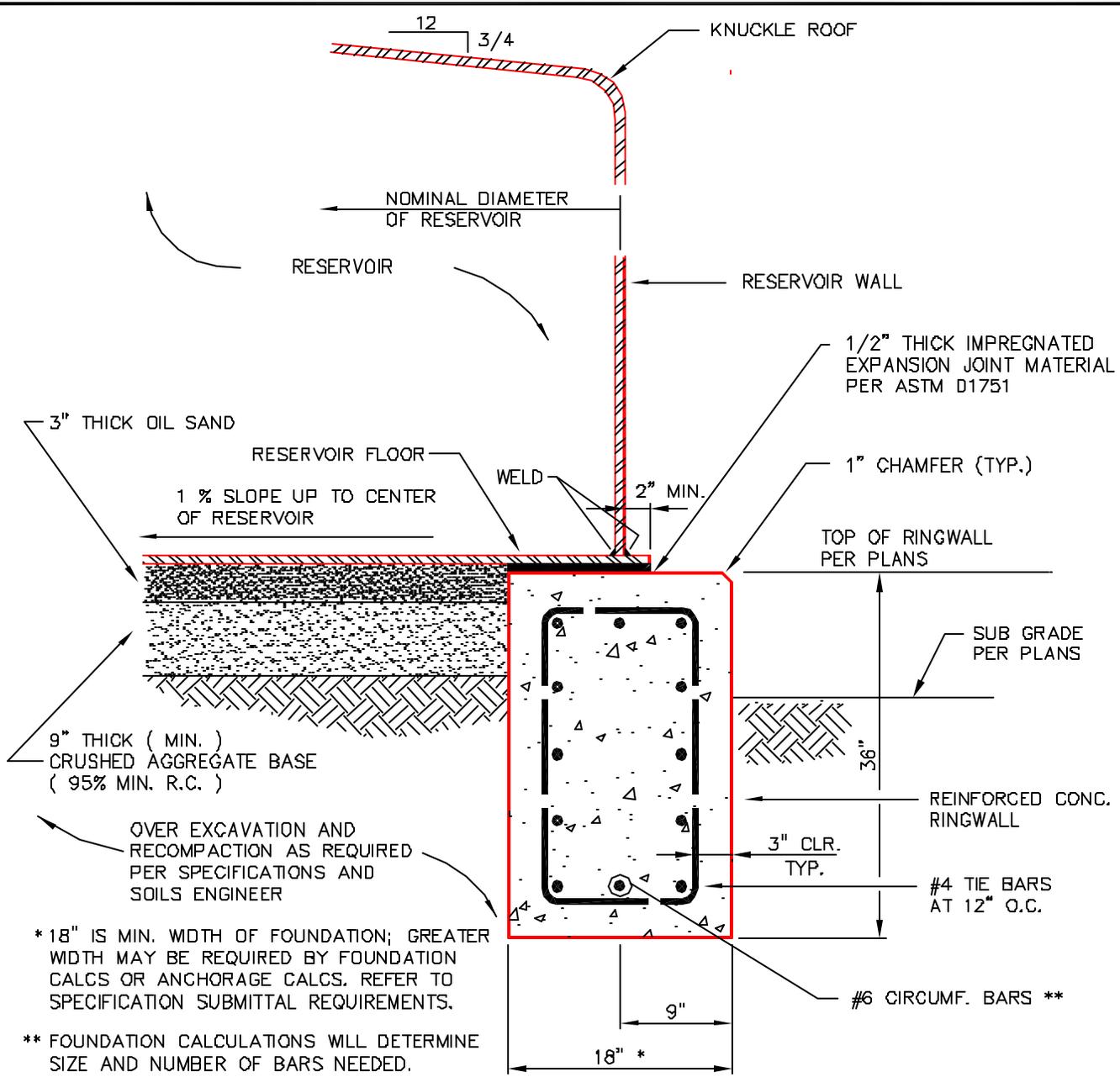


SECTIONAL PLAN
N.T.S.

NOTE:
SEE DETAILED RESERVOIR CONSTRUCTION PLANS FOR EXACT DIMENSIONS AND LAYOUT—SCHEMATIC ONLY
THIS SHEET. FIELD GRIND AND RADIUS ALL CORNERS, PROJECTIONS, EXPOSED WELDS, LEAVE NO SHARP EDGES.

WESTERN MUNICIPAL WATER DISTRICT

SCALE: NONE	TYPICAL HANDRAIL ENCLOSURE FOR ROOF HATCH DETAILS	DRAWING NO.
DATE: 8/15/03		R-2
APPROVED BY:	ALBERT A. WEBB ASSOCIATES CONSULTING ENGINEERS RIVERSIDE, CALIFORNIA	SHT. 1 OF 1 SHT.
R.C.E. _____		W.O. 01-0015



* 18" IS MIN. WIDTH OF FOUNDATION; GREATER WIDTH MAY BE REQUIRED BY FOUNDATION CALCS OR ANCHORAGE CALCS. REFER TO SPECIFICATION SUBMITTAL REQUIREMENTS.

** FOUNDATION CALCULATIONS WILL DETERMINE SIZE AND NUMBER OF BARS NEEDED.

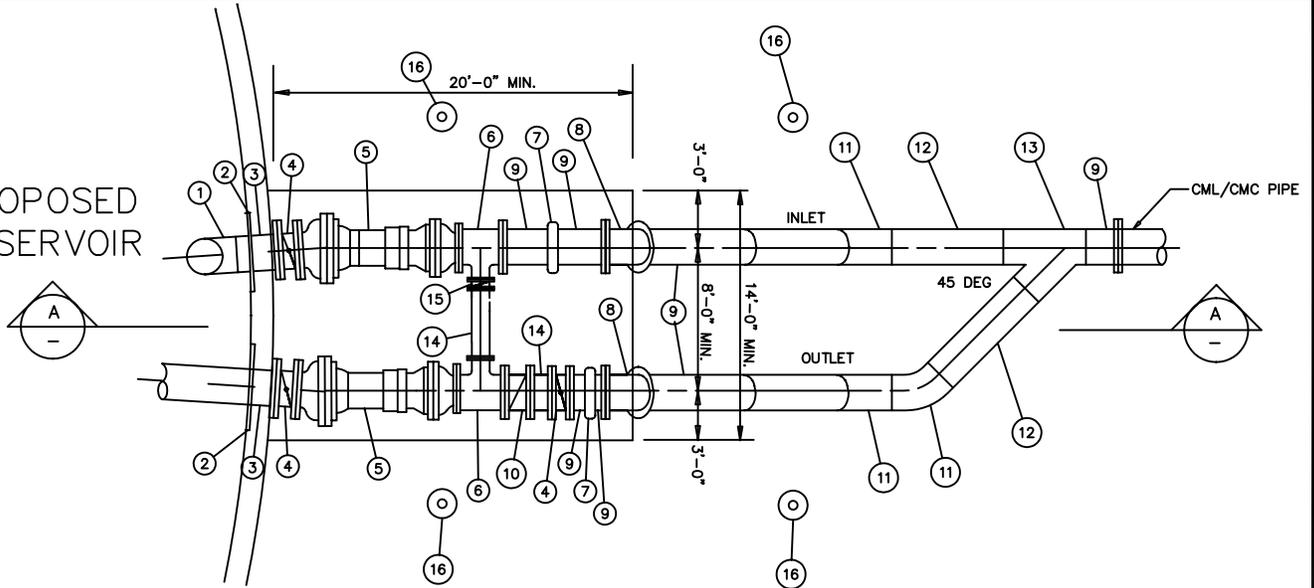
NOTES:

1. CONCRETE SHALL DEVELOP A MINIMUM COMPRESSIVE STRENGTH OF 3500 PSI AT 28 DAYS AND SHALL CONTAIN 6 SACKS (564 LB.) OF PORTLAND CEMENT PER CUBIC YARD.
2. REINFORCING STEEL SHALL BE GRADE 60 DEFORMED BARS.
3. MINIMUM LAP REINFORCING SPLICES = 36".
4. ALL REINFORCING STEEL SHALL BE 100% TIED OR AS DIRECTED BY ENGINEER.
5. FINISHED GROUND SURFACE SHALL SLOPE AWAY FROM CONCRETE RINGWALL PER PLANS.

WESTERN MUNICIPAL WATER DISTRICT

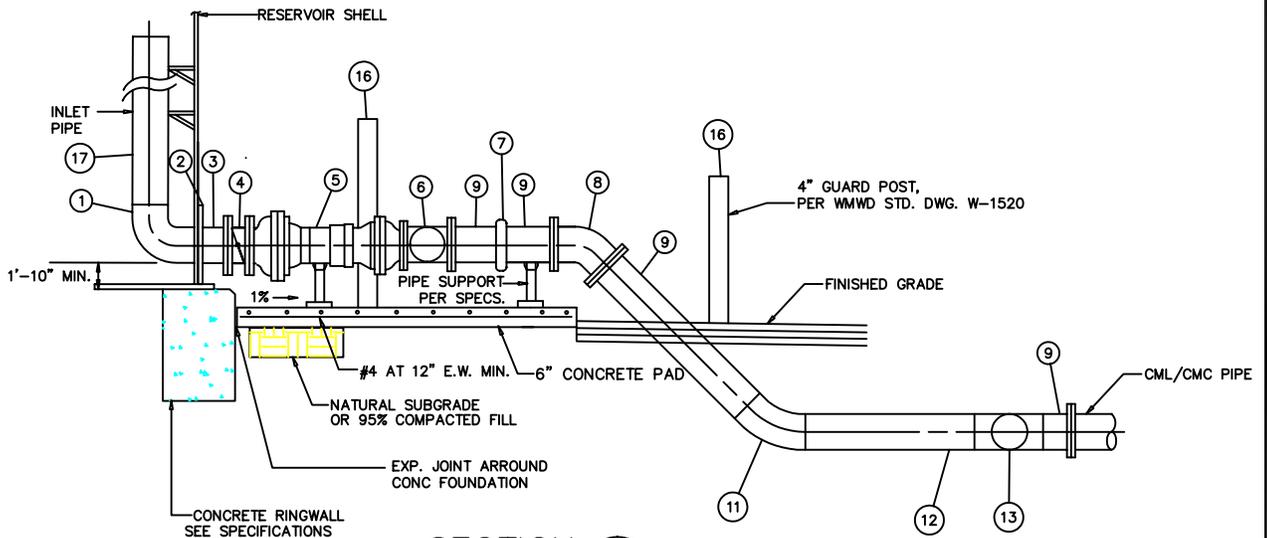
SCALE: NONE	TYPICAL CONC. RINGWALL FOUNDATION DETAIL	DRAWING NO.
DATE: 8/15/03		R-3
APPROVED BY:	ALBERT A. WEBB ASSOCIATES CONSULTING ENGINEERS RIVERSIDE, CALIFORNIA	W.O. 01-0015
R.C.E. _____		

PROPOSED
RESERVOIR



INLET/OUTLET PIPING DETAIL

N.T.S.



SECTION A
N.T.S.

MATERIAL LIST

- | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>① 90° STD. WT. STL. ELBOW, EPOXY LINED AND OUTSIDE COATED WITH RESERVOIR</p> <p>② REINFORCING PLATE PER AWWA STANDARDS</p> <p>③ NOZZLE EXTRA STRENGTH STL. PIPE, P.E.x FLG, EPOXY LINED AND OUTSIDE COATED WITH RESERVOIR</p> <p>④ FLG BUTTERFLY VALVE W/ HANDWHEEL, CL-150, EPOXY LINED, OUTSIDE PAINTED</p> <p>⑤ FLEXIBLE EXPANSION JOINT FLG x FLG DOUBLE BALL. FLEX-TEND "EBAA" OR APPROVED EQUAL</p> <p>⑥ FLG x FLG x FLG STD. WT. STL. TEE</p> <p>⑦ VICTAULIC COUPLING, STYLE 77, OR APPROVED EQUAL</p> <p>⑧ FLG x FLG 45° LONG RADIUS STD. WT. STL. ELBOW</p> | <p>⑨ FLG x GROOVED END STD. WT. STL. PIPE</p> <p>⑩ DOUBLE DOOR CHECK VALVE, CL-150, EPOXY LINED</p> <p>⑪ P.E. x P.E. STD. WT. STL. 45° LONG RADIUS ELBOW</p> <p>⑫ P.E. x P.E. STD. WT. STL. PIPE</p> <p>⑬ P.E. STD. WT. STL. WYE</p> <p>⑭ FLG x FLG STD. WT. STL. PIPE</p> <p>⑮ FLG. BUTTERFLY VALVE, CL-150, EPOXY LINED AND PAINTED, STD. VALVE NUT W/HANDWHEEL</p> <p>⑯ 4" GUARD POST PER W.M.W.D STD. DWG. W-1520</p> <p>⑰ STD. WT. STL. PIPE, OUTSIDE COATED WITH RESERVOIR</p> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

NOTES

1. PIPING SIZES TO BE APPROVED BY WESTERN, SUBMIT HYDRAULIC CALCULATIONS FOR CONNECTED PIPING SYSTEM
2. USE OUTSIDE PAINTED FOR ABOVE GRADE PIPE AND APPURTENANCES, AND CEMENT MORTAR COATED FOR BELOW GRADE PIPE.
3. ALL PIPING TO BE CEMENT MORTAR LINED EXCEPT AS NOTED.
4. ALL FLANGES TO BE 150#, EITHER SLIP ON OR WELD NECK AS REQUIRED.
5. GUARD POSTS TO BE PLACED AT 5' ON CENTERS MIN., WITH ADEQUATE WORKING SPACE AROUND PIPING

WESTERN MUNICIPAL WATER DISTRICT

SCALE: NONE

DATE: 3/15/05

APPROVED BY:

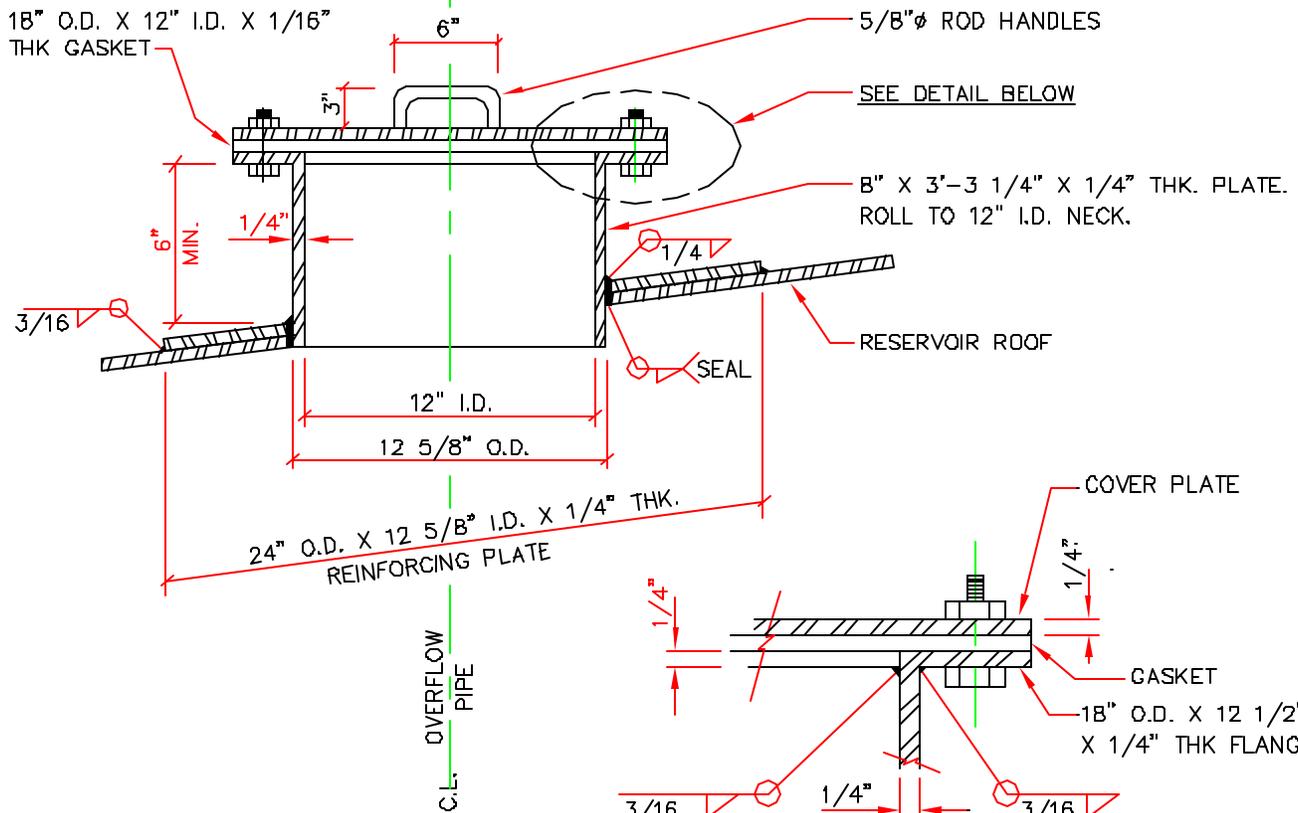
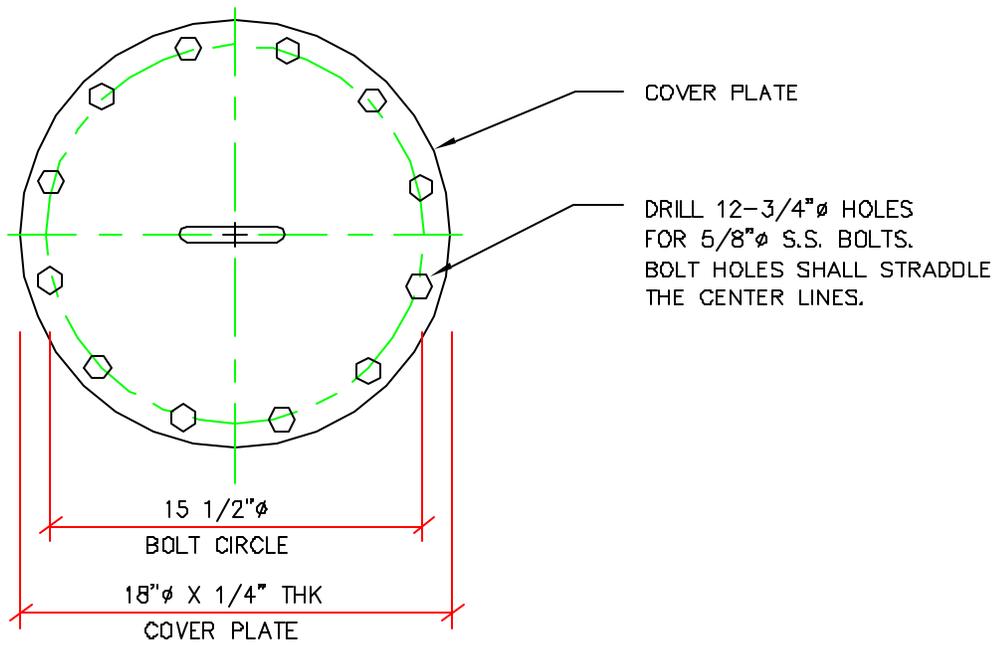
R.C.E. _____

**TYPICAL SIDE OUTLET
DETAIL**

ALBERT A. WEBB ASSOCIATES
CONSULTING ENGINEERS
RIVERSIDE, CALIFORNIA

DRAWING NO.
R-4

W.O. 01-0015



WESTERN MUNICIPAL WATER DISTRICT

SCALE: NONE

DATE: 8/15/03

APPROVED BY:

R.C.E. _____

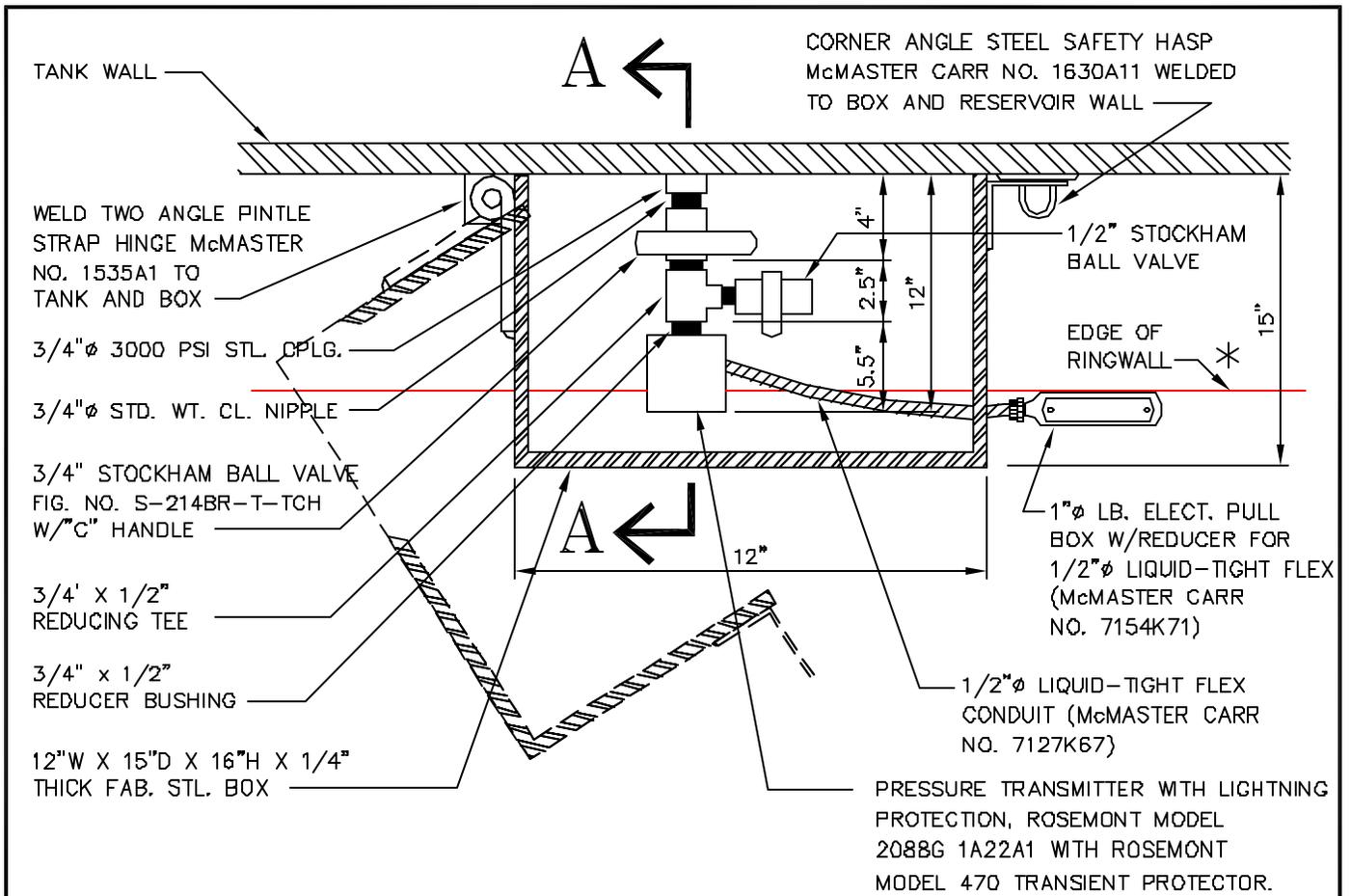
12" ϕ OVERFLOW HATCH

ALBERT A. WEBB ASSOCIATES
CONSULTING ENGINEERS
RIVERSIDE, CALIFORNIA

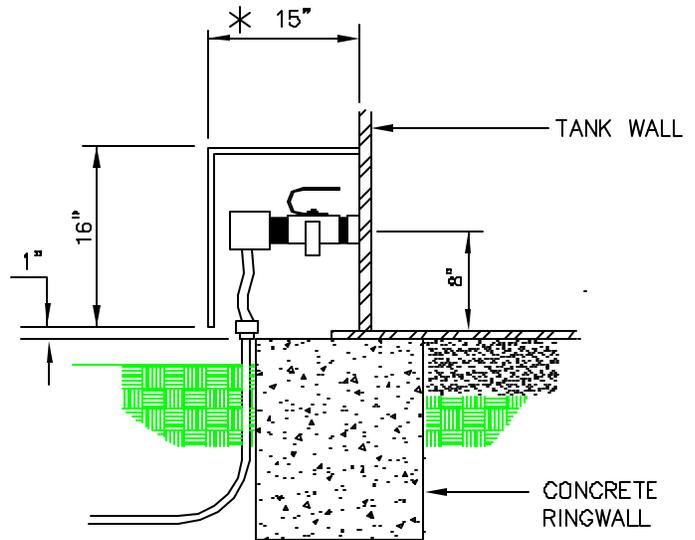
DRAWING NO.

R-5

W.O. 01-0015



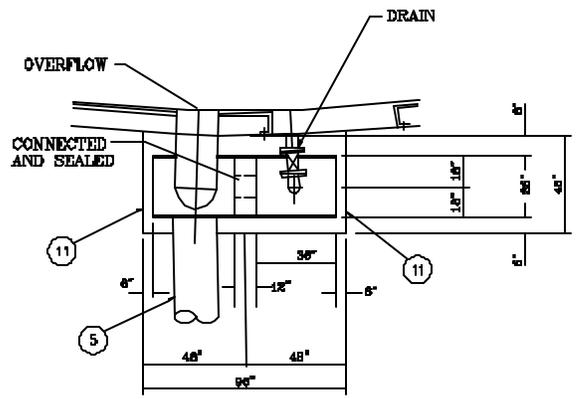
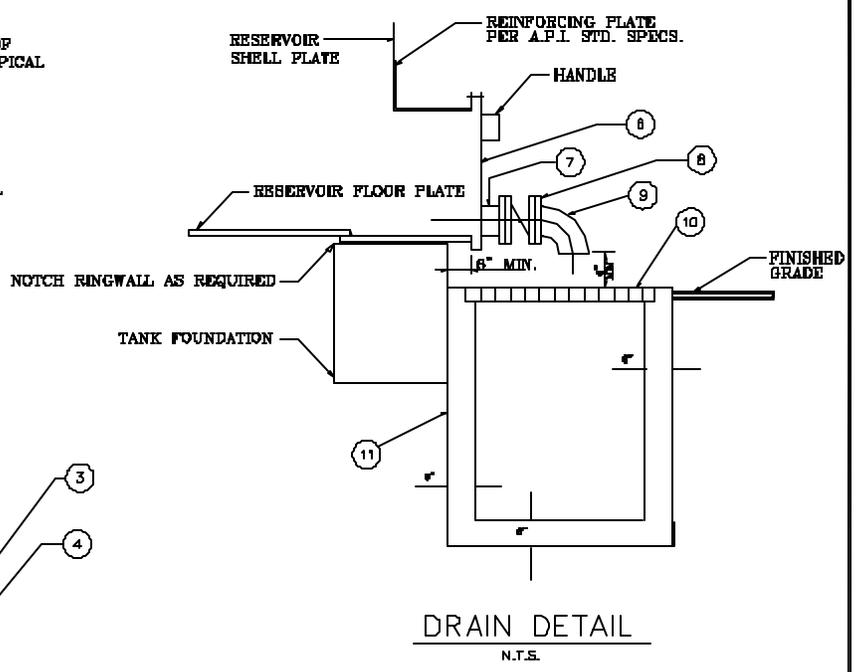
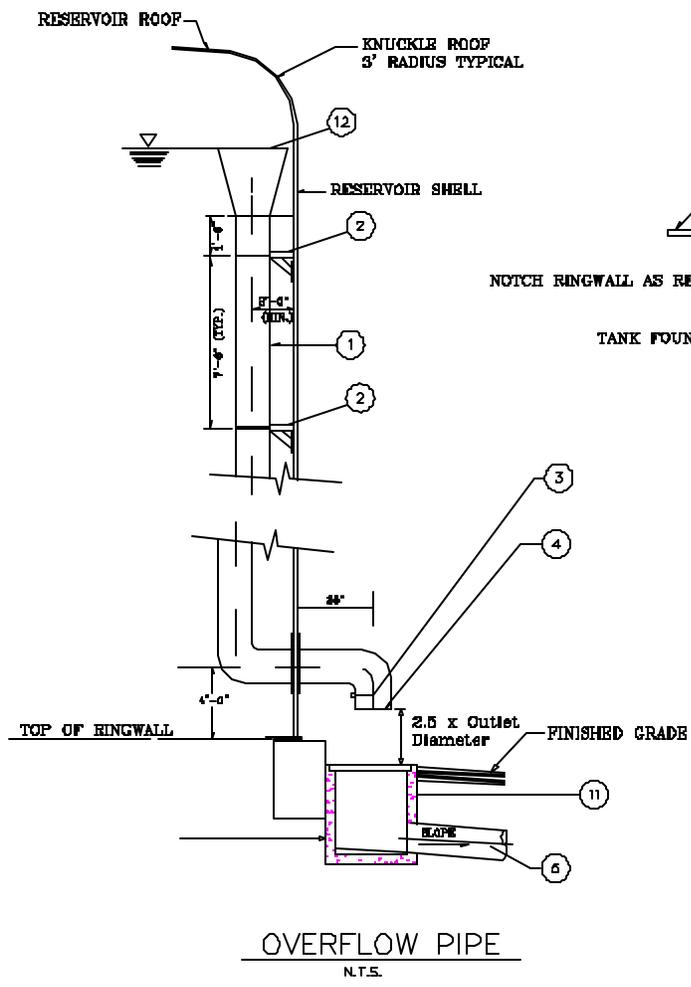
* ENCLOSURE SHALL EXTEND 2" BEYOND EDGE OF RINGWALL. CONTRACTOR SHALL, IF NECESSARY, MAKE ADJUSTMENTS TO ENCLOSURE WIDTH AFTER RINGWALL DESIGN IS APPROVED.



SECTION A-A

WESTERN MUNICIPAL WATER DISTRICT

SCALE: NONE	FABRICATED ENCLOSURE FOR PRESSURE TRANSMITTER	DRAWING NO.
DATE: 8/15/03		R-6
APPROVED BY:	ALBERT A. WEBB ASSOCIATES CONSULTING ENGINEERS RIVERSIDE, CALIFORNIA	W.O. 01-0015
R.C.E. _____		



MATERIAL LIST

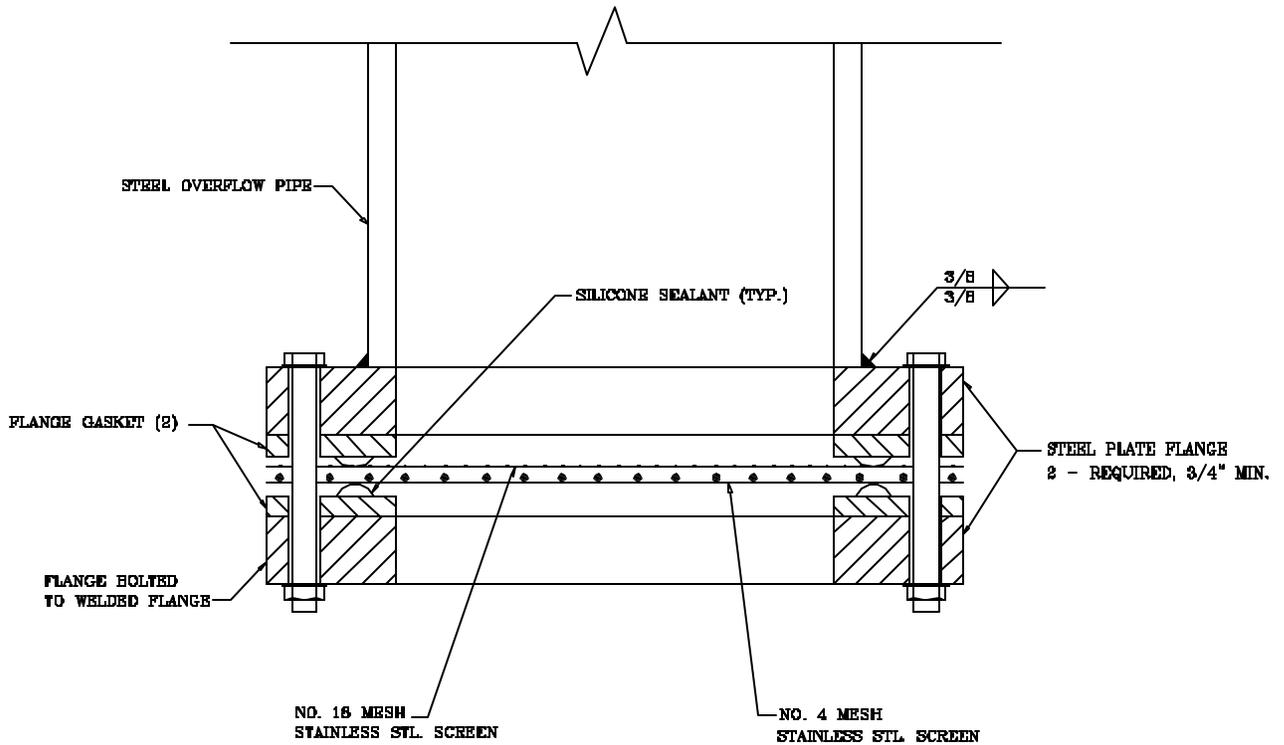
- ① STD. WT. STL. PIPE, EPOXY LINED AND OUTSIDE COATED WITH RESERVOIR, SIZED FOR MAXIMUM FLOW
- ② BRACKET, COATED WITH RESERVOIR
- ③ FLAPPER STYLE FLOW SWITCH CONNECTED TO THE SCADA SYSTEM
- ④ SCREEN, SEE DETAIL ON DWG R-7-A
- ⑤ 18" MIN. PVC STORM DRAIN, SLOPE TO SITE DRAINAGE SYSTEM
- ⑥ 36" x 48" STD. API B50 FLUSH TYPE CLEANOUT
- ⑦ NOZZLE EXTRA STRENGTH STL. PIPE, P.E.x FLG, EPOXY LINED AND OUTSIDE COATED WITH RESERVOIR
- ⑧ 8" GATE VALVE
- ⑨ 8" 90° BEND STD. WT. STL. PIPE, P.E.x FLG, EPOXY LINED AND OUTSIDE COATED WITH RESERVOIR
- ⑩ STEEL GRATE
- ⑪ 36" x 36" MIN. CONCRETE DRAIN BOX, SLOPE FLOOR TO DRAIN
- ⑫ COONE OVERFLOW WEIR, EPOXY LINED AND OUTSIDE COATED WITH RESERVOIR, SIZED FOR MAXIMUM FLOW

NOTES

1. PIPING SIZES TO BE APPROVED BY WESTERN. SUBMIT HYDRAULIC CALCULATIONS FOR DRAIN SIZING.
2. ALL FLANGES TO BE 160#, EITHER SLIP ON OR WELD NECK AS REQUIRED.
3. GUARD POSTS TO BE PLACED AT 5' ON CENTERS MAX., WITH ADEQUATE WORKING SPACE AROUND PIPING
4. SIZE ON CONCRETE DRAIN SHALL BE INCREASED AS REQUIRED.

WESTERN MUNICIPAL WATER DISTRICT

SCALE: NONE	TYPICAL DRAIN AND OVERFLOW DETAIL	DRAWING NO.
DATE: 8/15/03		R-7
APPROVED BY:		ALBERT A. WEBB ASSOCIATES CONSULTING ENGINEERS RIVERSIDE, CALIFORNIA
R.C.E. _____		W.O. 01-0015



OVERFLOW PIPE SCREEN DETAIL
N.T.S.

WESTERN MUNICIPAL WATER DISTRICT

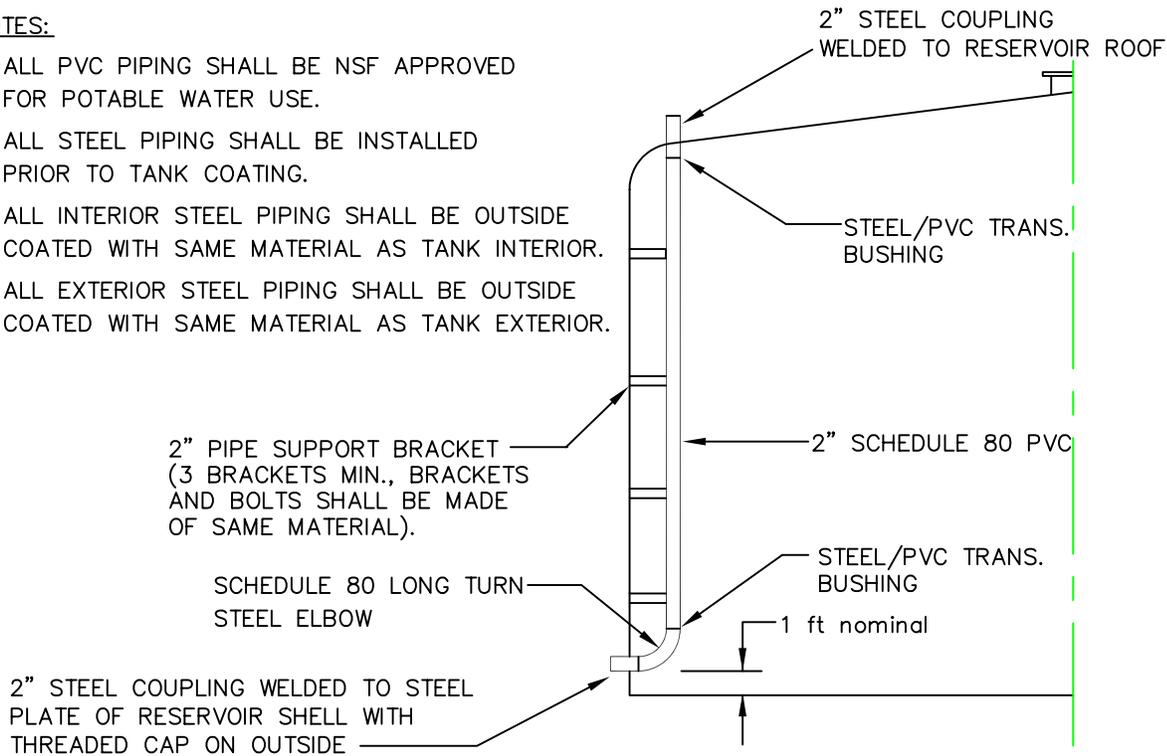
SCALE: NONE
 DATE: 8/15/03
 APPROVED BY:
 R.C.E. _____

**SCREEN DETAILS
 (SEE DWG R-7)**
 ALBERT A. WEBB ASSOCIATES
 CONSULTING ENGINEERS
 RIVERSIDE, CALIFORNIA

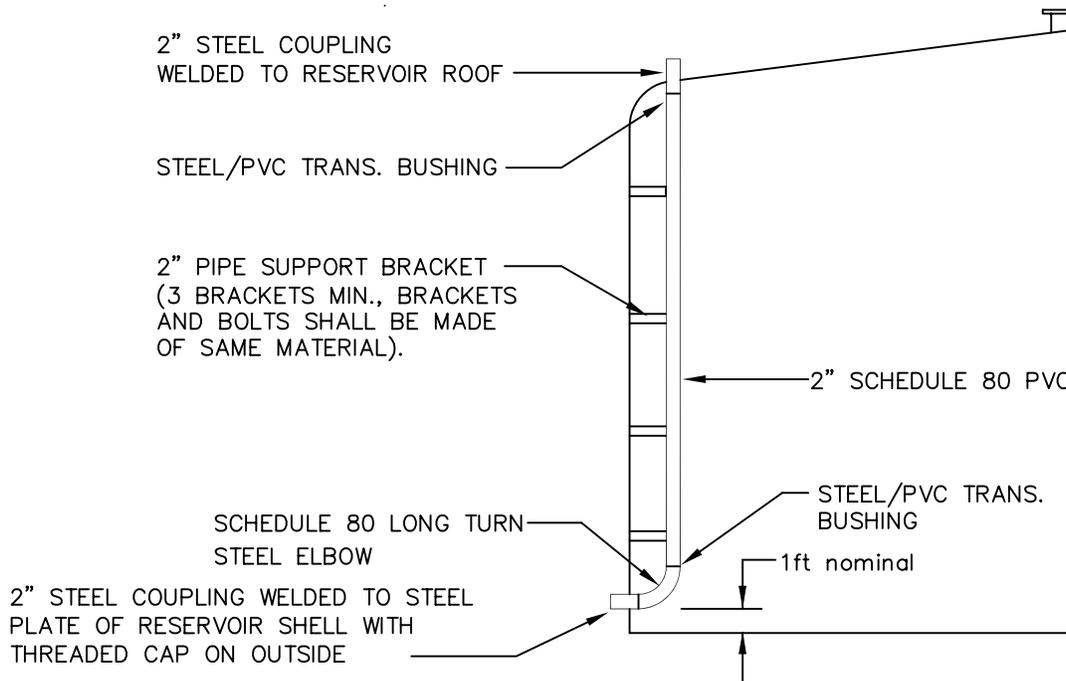
DRAWING NO.
R-7.A
 W.O. 01-0015

NOTES:

1. ALL PVC PIPING SHALL BE NSF APPROVED FOR POTABLE WATER USE.
2. ALL STEEL PIPING SHALL BE INSTALLED PRIOR TO TANK COATING.
3. ALL INTERIOR STEEL PIPING SHALL BE OUTSIDE COATED WITH SAME MATERIAL AS TANK INTERIOR.
4. ALL EXTERIOR STEEL PIPING SHALL BE OUTSIDE COATED WITH SAME MATERIAL AS TANK EXTERIOR.



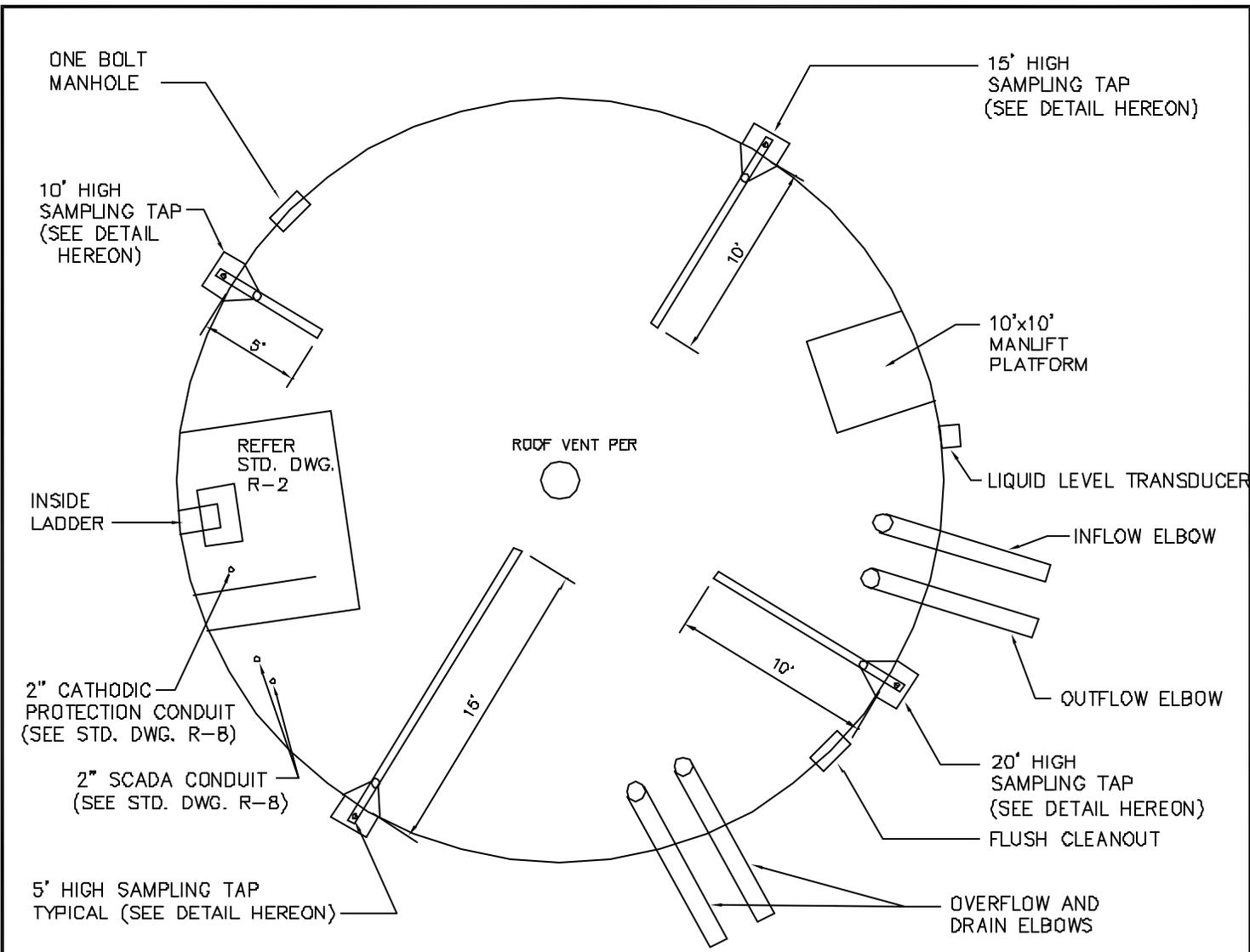
2" CATHODIC PROTECTION



2" SCADA CONDUIT

WESTERN MUNICIPAL WATER DISTRICT

SCALE: NONE	2" OUTLETS - DETAIL	DRAWING NO.
DATE: 3/15/05		R-8
APPROVED BY: DRAFT	ALBERT A. WEBB ASSOCIATES CONSULTING ENGINEERS RIVERSIDE, CALIFORNIA	W.O. 01-0015
R.C.E. _____		

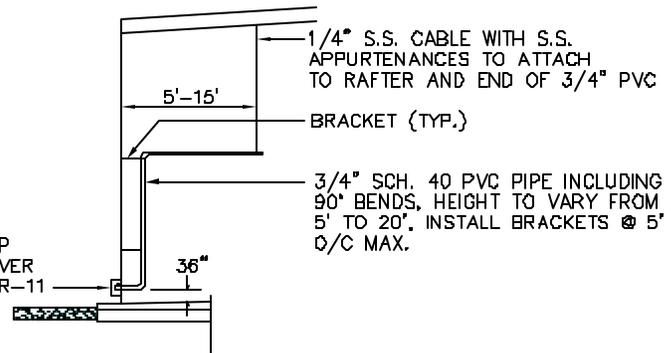


PLAN VIEW RESERVOIR

NOTES :

- 1) EXACT LOCATION OF APPURTENANCES (NOT ALL DEPICTED) WILL BE SPECIFIED ON FABRICATION DRAWINGS BY WESTERN.
- 2) ALL PLATES WELDED TO FLOOR OR WALLS SHALL BE SEAL WELDED.
- 3) LOCATION OF HATCH AND MANLIFT PLATFORM MUST HAVE CRANE TRUCK ACCESS.

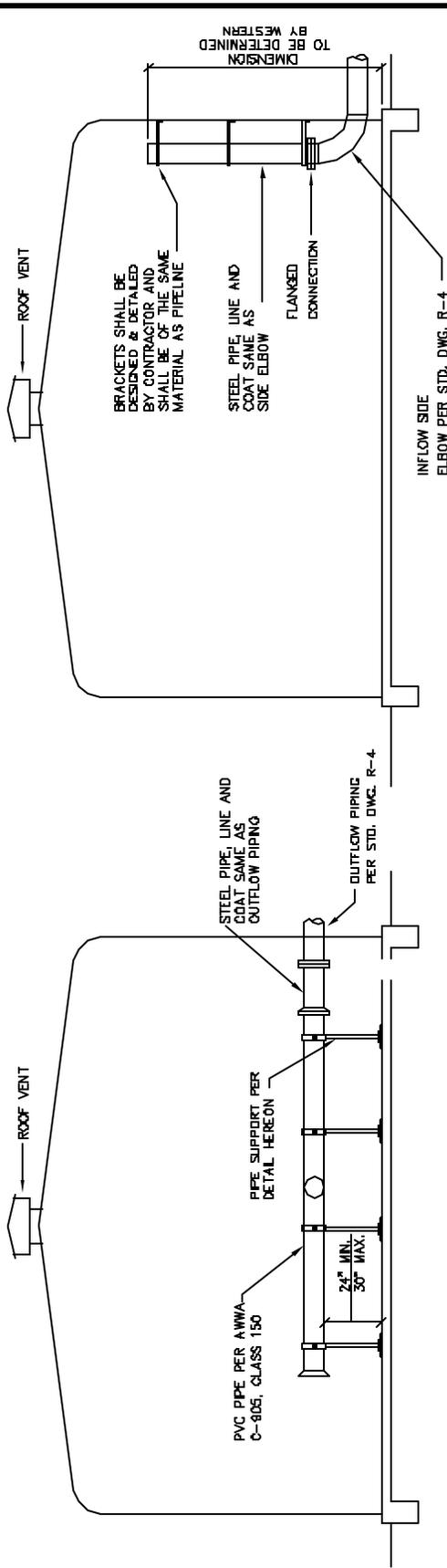
3/4" CORP STOP
W/ LOCKING COVER
SEE STD. DWG. R-11



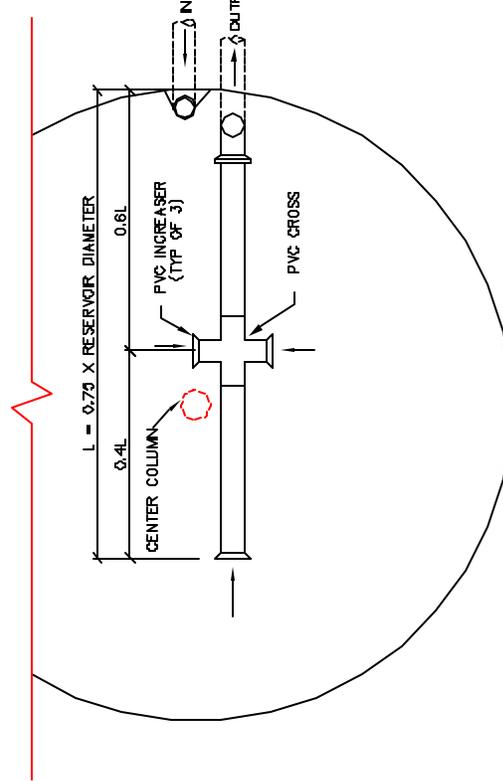
SAMPLING CORP STOP DETAIL
(TYPICAL OF FOUR LOCATIONS @ 90° TO EACH OTHER)

WESTERN MUNICIPAL WATER DISTRICT

SCALE: NONE	MISCELLANEOUS RESERVOIR APPURTENANCES	DRAWING NO. R-9
DATE: 8/15/03	ALBERT A. WEBB ASSOCIATES CONSULTING ENGINEERS RIVERSIDE, CALIFORNIA	
APPROVED BY:		
R.C.E. _____		W.O. 01-0015

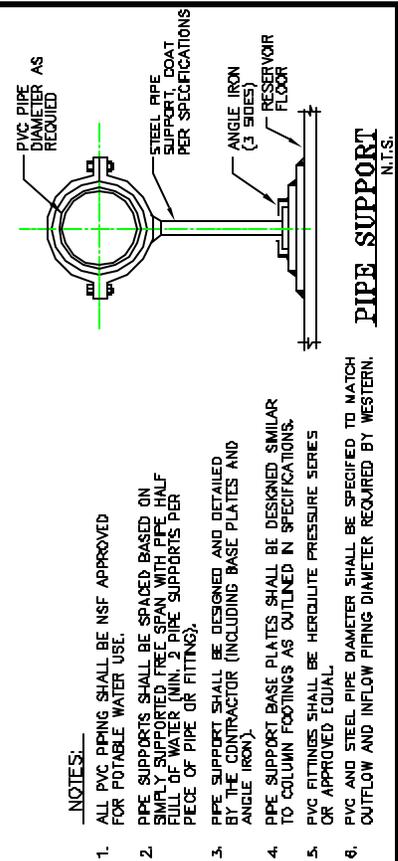


PROFILE VIEW - OUTFLOW LINE
N.T.S.



PLAN VIEW - INFLOW & OUTFLOW LINES
N.T.S.

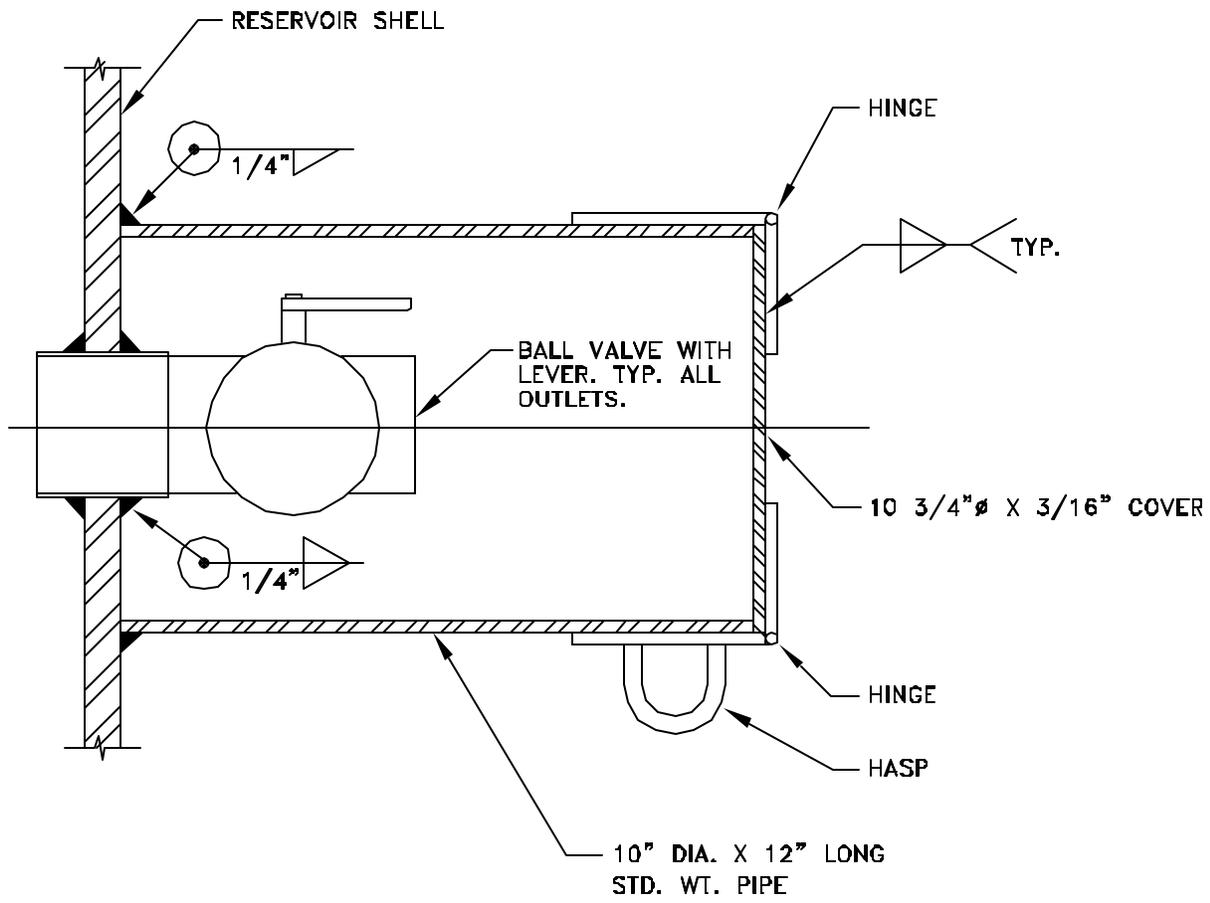
PROFILE VIEW - INFLOW LINE
N.T.S.



NOTES:

1. ALL PVC PIPING SHALL BE NSF APPROVED FOR POTABLE WATER USE.
2. PIPE SUPPORTS SHALL BE SPACED BASED ON 24" MAX. SPACING BETWEEN BRACKETS PER STD. DWG. R-4. PIPE SUPPORTS PER PIECE OF PIPE OR FITTING.
3. PIPE SUPPORT SHALL BE DESIGNED AND DETAILED BY THE CONTRACTOR (INCLUDING BASE PLATES AND ANGLE IRON).
4. PIPE SUPPORT BASE PLATES SHALL BE DESIGNED SIMILAR TO COLUMN FOOTINGS AS OUTLINED IN SPECIFICATIONS.
5. PVC FITTINGS SHALL BE HERCULITE PRESSURE SERIES OR APPROVED EQUAL.
6. PVC AND STEEL PIPE DIAMETER SHALL BE SPECIFIED TO MATCH OUTFLOW AND INFLOW PIPING DIAMETER REQUIRED BY WESTERN.

WESTERN MUNICIPAL WATER DISTRICT	
SCALE: NONE	DRAWING NO. R-10
DATE: 8/15/03	ALBERT A. WEBB ASSOCIATES CONSULTING ENGINEERS RIVERSIDE, CALIFORNIA
APPROVED BY:	
R.C.E.:	
W.O. 01-0015	



WESTERN MUNICIPAL WATER DISTRICT

SCALE: NONE	3/4" AND 1" SHELL OUTLET LOCKING COVER	DRAWING NO.
DATE: 8/15/03		R-11
APPROVED BY:	ALBERT A. WEBB ASSOCIATES CONSULTING ENGINEERS RIVERSIDE, CALIFORNIA	
R.C.E. _____		W.O. 01-0015