DOMESTIC

WATER MAIN EXTENSIONS

CHECKLIST

1. Developer submits legal description of proposed development.

2. District provides standards, conditions and specifications.

3. Developer submits distribution plan designed by licensed Professional Engineer.

4. Developer signs the agreement by the Friday prior to the Regular Board of Director's meeting on the second Tuesday of each month.

5. Board of Directors reviews plans and either accepts plan, modifies plan, asks for additional information or rejects plan.

6. After plan is accepted, District enters into Agreement with Developer for water main extension.

7. Water main extension constructed by licensed and bonded contractor to District Standards as certified by a licensed Professional Engineer.

8. District inspects and observes testing of water extension prior to approval.

9. Developer posts a one-year maintenance bond for the materials and workmanship if applicable.

10. Developer submits reproducable copy of as-built drawings and easements certified by the licensed Professional Engineer.

11. Developer conveys system to District for operation and maintenance and certifies the extension costs.

12. District notifies Chelan County, if applicable, that utility provisions for plat have been completed.

13. All services meters off of water main extension are installed by District as applicable hook-up fees paid by individual lot owners.

14. Prior to water service being turned on to property containing booster pump, District will verify proper installation and testing of backflow device.

STANDARDS, CONDITIONS & SPECIFICATIONS

DOMESTIC WATER MAIN EXTENSIONS

I. GENERAL:

The items herein contained are the Domestic Standards, Conditions, and Specifications of the Lake Chelan Reclamation District. These are minimums only and may be increased or altered to fit particular situations at the discretion of the District.

Definitions:

A. District - Lake Chelan Reclamation District, a quasi-municipal corporation organized and operating pursuant to Title 87, Laws of the State of Washington.

B. Developer(s) - The landowner, land developer, or agent responsible for installation of the water distribution system.

C. Water Main - A pipe designed to convey water to more than two users or to properties over l50 feet from an existing water main.

D. Water user - Any person, firm, or corporation having a water right within the District; this also includes the holders of title or evidence of title to land to which water service is furnished.

E. Water Service Line - The pipe, valves, and necessary accessories designed to convey water from the water meter to each lot, unless said lot is over 150 feet from the water main.

F. Water Distribution System - The collection of water mains and water service lines required to provide water service to each customer in a development.

II. STANDARDS AND CONDITIONS:

A. When extensions of the existing water system is required for service, an Agreement for Domestic Water Main Extension shall be entered into between the Developer and the District. See “Domestic Water Extension Agreement”.

III. SPECIFICATIONS:

A. EXTENSIONS: All extensions to the water system shall conform to the design standards of the District. The system must be capable of future expansion if required and be constructed of permanent materials.

B. PLANS AND SPECIFICATIONS: The installation of water extensions shall be in accordance with construction plans and specification approved by the District.

C. MATERIALS AND METHODS OF CONSTRUCTION:

1. Water pipe shall be ductile iron or C900 PVC. Ductile iron shall typically be class 50 in improved areas and class 52 in easement areas or when normal pressure exceeds 150

psi. PVC shall typically be class 235 in improved areas and class 305 in unimproved areas.

2. Fire hydrants shall be installed at a maximum spacing of 1,000 feet in rural areas and generally at 500 foot spacing in urban areas in accordance with appropriate Standard Detail.

3. Valving shall be installed at all intersections, on each end of easement lines and in-line at maximum spacing of l,000 feet. All tees shall have three valves and all crosses shall have 4 valves unless approved otherwise by the District.

4. Minimum cover for all water mains shall be three (3) feet to top of pipe unless otherwise approved.

5. Except as otherwise noted herein, all work shall be accomplished in accordance with the 2020 Standards Specifications for Road, Bridge and Municipal Construction and according to the referenced AWWA standard and recommendations of the manufacturer of the material or equipment used. Work will not begin prior to the completion of a pre-construction conference and upon receipt of all necessary license and insurance certificates. The Developer shall have a copy of the specifications on the job site at all times. Developer shall furnish a watertight plug of the appropriate size, which shall be installed in the end of the water main when work is delayed or stopped at the end of workday.

6. All materials shall be new and undamaged. Unless otherwise approved by the District, the same manufacturer of each item shall be used throughout the work. Materials used on larger jobs will require shop drawing and / or material submittals for District review and approval prior to commensing the work. The District will at its sole discretion, determine which jobs are large enough to require submittals.

7. TRENCH EXCAVATION: Clearing and grubbing where required shall be performed within the easement or public right-of-way and as permitted by the property owner and/or governing agencies. Debris resulting from the clearing and grubbing shall be disposed of by the Developer in accordance with the terms of all applicable permits. Trenches shall be excavated to the line and depth designated by the water plan to provide a minimum of 36 inches of cover over the pipe, unless otherwise approved. Except for unusual circumstances where approved by the District, the trench sides shall be excavated vertically and the trench width shall be excavated only to such widths as are necessary for adequate working space. The minimum trench width at the top of the pipe shall normally be the outside diameter of the pipe barrel plus l6 inches. No trench width less than 30 inches will be allowed. The trench shall be kept free from water until complete. Surface water shall be diverted so as not to enter the trench. The Developer shall maintain sufficient pumping equipment on the job to insure that these provisions are carried out.

   The Developer shall perform all excavation of every description and of whatever substance encountered and boulders, rocks, roots and other obstructions shall be entirely removed or cut out to the width of the trench and to a depth 6 inches below water main

grade. Where material is removed from below subgrade, the trench shall be backfilled to grade with material satisfactory to the District and thoroughly compacted.

Trenching operations shall not proceed more than 300 feet in advance of pipe laying without written approval of the District.

8. PIPE INSTALLATION WITHIN STREET RIGHT-OF-WAYS: The Developer may use any method which provides satisfactory results and is acceptable to the District and the agency having control of the road, provided that the Developer restores the roadway to its original condition or the road agency's standards, whichever is greater. Permits shall be required for all crossings. Highway crossings may require the placing of steel pipe casing by jacking or tunneling and laying the water main within this casing.

9. PIPE IN FILLED AREAS: Special treatment may be required at the discretion of the District. This treatment may consist of compacting the backfill in 6" layers, careful choice of backfill materials, use of restrained joint ductile iron pipe in short lengths, or such other reasonable methods or combinations as may be necessary in the opinion of the District.

10. FOUNDATION MATERIALS: Foundation materials needed shall be coarse graded gravel or crushed rock passing a 3-inch mesh. Pit run gravel passed through a 3-inch screen may be used provided that it is, in the opinion of the District, properly graded and otherwise suitable. Pipe zone backfill materials shall include the full width of the trench from four inches (4") below the bottom of pipe to six inches (6") above the top of the pipe. Pipe zone materials may be excavated native material containing no rock, organic matter, or materials larger than l/2 inch. Where the volume or quality of native excavated materials is inadequate, import materials shall be used. Import materials shall pass a 3/4" mesh and shall contain only negligible amounts of materials finer than No. 30 sieve.

11. DUCTILE IRON PIPE: Ductile Iron pipe shall be cement-lined standard thickness Class 50 or 52 unless otherwise specified and shall conform to the standards of USA Standard A-21.51 (AWWA C-l5l).

    Rubber gasket pipe joints to be push-on-joint (Tyton) or mechanical joint (M.J.) in accordance with USA Standard A21-ll (AWWA C-111), unless otherwise specified. Flanged joint shall conform to USA Standard B16.1.

    Standard thickness cement lining shall be in accordance with USA Standard A21.4 (AWWA C-1-4).

    The Developer shall furnish certification from the manufacturer of the pipe and gasket being supplied that the inspection and all of the specified tests have been made and the results thereof comply with the requirements of this standard.

12. DUCTILE IRON PIPE INSTALLATION: Ductile iron pipe shall be installed in accordance with AWWA Standard C-151 and the manufacturers recommendation.

The bottom of the trench shall be finished to grade with hand tools in such a manner that the pipe will have bearing along the entire length of the barrel. The bell holes shall be excavated with hand tools to sufficient size to make up the joint. Boltson mechanical joint pipe and fillings shall be tightened uniformly with a "Torque" wrench, which measures the torque applied. Required torque for mechanical joints shall be as follows:

4" - 24" pipe size 3/4" Bolts 60-90 # torque

Installation of push-on-joint (Tyton) pipe shall be in accordance with the manufacturer's instructions.

13. PVC PIPE: PVC pipe shall be AWWA C900 high-pressure water pipe. Class 235 pipe shall meet the requirements of DR 18 and class 305 shall meet the requirements of DR l4.

    The gasketed joint assembly shall conform to ASTM D3139 with gaskets conforming to ASTM F477.

    The Developer shall furnish certification from the manufacturer of the pipe and gasket being supplied that the inspections and all of the specified tests have been made and the results thereof comply with the requirements of this standard.

14. PVC PIPE INSTALLATION: PVC pipe shall be installed in accordance with AWWA M23 and the manufacturers recommendation. The bottom of the trench shall be finished to grade with hand tools in such a manner that the pipe will have bearing along the entire length of the barrel. The bell holes shall be excavated with hand tools to sufficient size to make up the joint.

15. IDENTIFYING TAPE AND TRACER WIRE: Identifying tape shall be installed twenty-four inches (24") below finished grade over all domestic pipeline in all locations. Pipe locator ribbon shall be two inches wide, plastic coated aluminum and shall be clearly marked, "CAUTION BURIED WATER LINE" continuously along the length of the ribbon with minimum 1 ½ inch letters. The ribbon shall be blue in color. Tracer wire shall be installed along all non-metalic pipe. Wire shall be 12-gage and shall terminate in every valve box. Wire splices shall be made with DryConn water proof connectors by King Innovation. Tape wire to pipe prior to backfill operations.

16. DUCTILE IRON FITTINGS: Ductile iron fittings shall be short body for working pressure rating of l50 psi, unless otherwise noted.

    Fittings shall be cement-lined in accordance with USA Standard A21.4 (AWWA C-104).

    Rubber gaskets for push-on-joint (Tyton) or mechanical joint (MJ) in accordance with USA Standard A21.11 (AWWA C-111).

    Gasket material for flanges shall be neoprene, Buna N, chlorinated butyl, or cloth-inserted rubber. Type of connections shall be specified as push-on-joint (Tyton), mechanical joint (MJ), plain end (PE), flanged (FL) or threaded (TH).

17. BOLTS IN PIPING: Except for mechanical joint fasteners, bolts, nuts, and washers shall be zinc plated. Flange bolts to be ASTM A307 Grade A or B.

18. GALVANIZED IRON PIPE AND FITTINGS: Where specified, galvanized iron pipe shall be standard weight, Schedule 80. Fittings shall be threaded malleable iron galvanized per USA Standard B16.3.

19. CONCRETE THRUST BLOCKING: Concrete thrust blocking shall be cast in place and have a minimum of 1/4 square foot bearing against the fitting and two square feet bearing area against undisturbed soil, or more as shown on the District's standard detail. Blocking shall bear against fittings only and shall be clear of joints so as to permit taking up or dismantling joint. All poured in place blocking shall have a minimum measurement of twelve inches (l2") between the pipe and the undisturbed bank. All bends and tees shall be blocked in accordance with standard blocking which is adequate to withstand full test pressures as well as to continuously stand operating pressure under all conditions of service. Precast blocking is allowed if approved by the District.

20. BEDDING CONCRETE: Bedding concrete shall be mixed from materials acceptable to the District and shall have a 30-day compressive strength of not less than 1,500 psi. The mix shall contain four sacks of cement per cubic yard and shall be of such consistency that the slump is between l inch and 5 inches.

21. GATE VALVES: All Gate valves shall, in design, material and workmanship, conform to the Standards of AWWA C-509 or C-515.

    Buried gate valves shall be iron body, bronze mounted, resilient wedge, non rising stem, operating stems equipped with standard 2-inch operation nut, and o-ring stem seals, suitable for installation with the type and class of pipe being installed. Ends to be as specified.

    Valves not buried shall be specified as part of the submittal process.

22. BUTTERFLY VALVES: Butterfly valves shall conform to AWWA Standard C504, Class 150, with cast iron short body and o-ring stem seal. Valves in chambers shall have a geared handwheel. Buried valves shall have a stem extension with AWWA 2-inch operating nut.

23. CHECK VALVES: Check valves shall conform to AWWA C508 and shall be specified for 150 psi working pressure, unless otherwise required. Valve shall have adjustable tension lever and spring to provide non-slamming action under all conditions unless otherwise specified.

24. AIR AND VACUUM RELEASE VALVES: Air and vacuum release valves shall be APCO - Valve and Primer Corporation, "Heavy-Duty", combination air release valve, or equal.

    Installation shall be as shown on the standard detail.

Piping and fittings shall be galvanized iron. Location of the air release valves as shown on the plans is approximate. The installation shall be set at the high point of the line. Water line must be constructed so the air release valve may be installed in a convenient location.

25. VALVE INSTALLATION: The valve and valve box shall be set plumb with the valve box centered on the valve. Valves boxes shall be set flush in pavement and in gravel roads as required by the District. Black top around valve boxes in unimproved roads for 2 feet. Where valve-operating nut is more than 3 feet below finished grade, a stem extension shall be installed conforming to the Standard Detail.

26. VALVE BOXES: Valve boxes shall be cast iron, two-piece with tabs, for 42-inch trench with extension, equal to Rich Manufacturing Company, or Olympic Foundry Company.

27. VALVE MARKER INSTALLATION: When specified, concrete marker posts painted with two coats, Rust-Oleum No. 2766 Hi-Gloss White Paint shall be set for all valves except auxiliary hydrant valves. The post shall be set at right angles to the road from the valve and shall be situated in a safe and reasonable conspicuous location, normally on the property line. Distance to valve shall be neatly stenciled on the post with two-inch numerals. Valve markers shall be installed only in unimproved or unpaved areas.

    Valve marker posts shall be reinforced concrete posts, 4" x 4" on one end, 6" x 6" on the other end, 42 inches long.

28. FIRE HYDRANTS: Fire hydrants shall be dry barrel, compression type with a minimum main valve opening of 5-1/4" "0" ring stem seal, (2) 2-1/2" N.S.T. hose nozzle connections, and (1) 4-1/2" pumper connection. The shoe connection shall be 6" Mechanical Joint or flanged. The bronze operating nut shall be 1-1/4" pentagonal. Hydrants shall be M&H Style 929 or equal. All hydrants shall be "Traffic Models" with approved breakaway features at the ground line. Hydrant shall have a minimum dimension of 18 inches from the ground line to the centerline of the pumper nozzle and 32 inches from the ground line to the top of the operating nut.

29. HYDRANT GUARD POSTS: Hydrant guard posts, when specified, shall be reinforced concrete posts, 8" X 8" X 6' long or 9" diameter X 6' long or 6" diameter Class 52 ductile iron pipe, concrete filled.

30. SERVICE CONNECTIONS: Connections shall be installed with pipe saddles on C900 PVC, asbestos cement, steel, and Class 50 ductile iron pipe and by direct tap into Class 52 or thicker ductile. Installation shall be as shown in the Standard Details. Minimum size tap is ¾-inch or the service pipe size, whichever is greater.

31. METER BOX: Concrete meter boxes with full lid shall be Fog Tite No. l Meter Box or equal. Meter boxes shall be Mueller No 250CS with Lid and insulation ring.

32. POLYETHYLENE SERVICE PIPE AND CONNECTIONS: Polyethylene pipe shall be manufactured from high molecular weight polyethylene (average molecular weight of 1,750,000) defined by ASTM-1248, as polyethylene Type 111 (3306) (PE). Pipe shall be made of all virgin material and conform to CS-255-63. Polyethylene pipe shall

meet all requirements of ASTM D2241-67. The pipe shall be Iron Pipe Size (IPS), and have a working pressure of 200 psi at 73.4 degrees F. It shall sustain 300 psi at 73.4 degrees F. for 1000 hours. It shall bear the NSF seal and the manufactured name of Carlon Hi-Mol, or Orangeburg SP. All connections to this pipe shall be of the Ford Packjoint, Mueller Company, or equal, compression type connection with a stainless steel insert stiffener or by o-ring type self-sealing fittings. All connections shall be rated at a working pressure of 200 psi.

33. BACKFLOW DEVICES: All backflow devices are to be certified yearly by a Department of Health certified backflow assembly tester (BAT). All backflow devices are to be installed in accordance with the most current version of AWWA manual "Cross Connection Control Manual, Accepted Procedure and Practice" and the District Cross Connection Control program.

    Reduced pressure backflow devices will be installed on all closed fire protection systems where chemicals are used. See Standard Detail. All other backflow devices shall be specified based upon the degree of hazard consistent with the classification by a certified cross connection control specialist (CCS) and Washington state law.

34. PRESSURE REDUCING STATIONS: Pipe, fittings and equipment shall be supported and blocked against static and dynamic loading in accordance with Section, "Concrete Thrust Blocking", and the equipment manufacturer's recommendations.

    Drain lines from pressure reducing stations shall be piped to a below grade drainage system or other open channel with adequate screening to prevent animals or insects to enter the station.

35. BACKFILLING: Backfilling and land surface restoration shall closely follow installation and testing of pipe, so that not more than 500 feet is left exposed without written approval of the District. Selected backfill material shall be placed and compacted around and under the water mains by hand tools to a height of 6 inches above the top of the water main. The remaining backfill shall be compacted to 95% of the maximum density as determined by Modified Proctor, ASTM D 1557, T 180 Method A. Where other agencies have jurisdiction over roadways, the backfill and compaction shall be done to the satisfaction of the agency having jurisdiction.

36. HYDROSTATIC TESTS: Prior to the acceptance of the work, the installation shall be subjected to a hydrostatic pressure test of 200 psi for 60 minutes at the high point in the line, and any leaks or imperfections developing under said pressure shall be remedied by the Developer before final acceptance of the work. No air will be allowed in the line. The main shall be tested between valves. Insofar as possible, no hydrostatic pressure shall be placed against the opposite side of the valve being tested. Test pressure shall be maintained while the entire installation is inspected. The Developer shall provide all necessary equipment and shall perform all work connected with tests. Tests shall be made after all connections have been made. This is to include any and all connections as shown on the plan. Insofar as is practical, tests shall be made with pipe joints, fittings and valves exposed for inspection. For approval, pressure shall not drop more than 5 psi in 60 minutes. The Developer shall perform the test to assure that the equipment to be used for the test is adequate and in good operating condition and the air in the line

has been released before requesting the District to witness the test. The District shall witness the test; if the test does not pass inspection for any reason, additional trips required to witness the test may be at the Developer's expense.

37. STERILIZATION AND FLUSHING OF WATER MAINS: Sterilization of water mains shall be accomplished by the owner in accordance with the requirements of the State Department of Health and in a manner satisfactory to the District. The section to be sterilized shall be thoroughly flushed at maximum flow prior to chlorination. At no time shall chlorinated water from a new main be flushed onto the ground or into a water body without adequate dechlorination equipment. Flushing period must be approved by the District. Sections will ordinarily be sterilized between adjacent valves unless, in the opinion of the District, a longer section may be satisfactorily handled. Chlorine shall be applied by solution fed at one end of the section with a valve or hydrant at the opposite end opened sufficiently to permit a flow through during chlorine application. The chlorine solution shall be fed into the pipeline already mixed by an automatically proportioning applicator so as to provide a steady application rate of not less than 60-ppm chlorine. Hydrants along the chlorinated section shall be opened during application until the presence of chlorine has definitely been detected. When a chlorine concentration of not less than 50 ppm has been established throughout the line, the valves shall be closed and the line left undisturbed for 24 hours. The line shall then be thoroughly flushed and water samples taken for approval by the local health agency. Flushing period must be approved by the District. The Developer shall exercise special care in flushing to avoid damage to surrounding property. Should the initial treatment result in an unsatisfactory bacteriological test, the original chlorination procedure shall be repeated by the Developer until satisfactory results are obtained.

38. CONCRETE VAULTS: Concrete vaults used for pressure reducing stations or air vacuum stations shall have walls of a uniform thickness and shall be plumb. Sections shall fit together with a close tolerance and shall be water tight. Aluminum hatches are required in non-traffic areas and manhole lids and covers in traffic areas.

39. PIPE LINING: Shall be allowed on rehabilitation of older lines when the system analysis shows that reductions in inside diameter will not impact target demand or fire flow conditions. All pipe lining projects will be in conformance with AWWA Standards for pipe lining.

40. PRESSURE ZONE STANDARDS: The Lake Chelan Reclamation District herein provides standards for providing domestic water service into future pressure zones identified in the Water System Plan. The Water System Plan identifies future service areas in higher elevations a. Thsee service areas shall be served by booster pumps and storage tanks contemplating the current or future need for fire flow service. Permanent reservoirs shall be designed to meet specified hydraulic grade lines so that as systems are ultimately intertied and no operational problems are encountered. Reservoir overflow elevations and performance standards will be determined by the District.

    If booster pump stations and reservoirs are required to serve expected development, the District will require the preparation of an engineering report to study the relationship of the project to the local service area, future growth, impact on the LCRD system and fire flow requirements. The engineering report shall meet the requirements of the

Department of Health for a Project Report. The report will be reviewed and approved first by the District and then by the Department of Health. Fire flow capabilities and storage requirements will be reviewed and approved consistent with the requirements of the District and the Chelan County Fire Marshall. Upon approval of the engineering report, plans and specifications for the complete system shall be prepared for the review and approval of the District. In addition, the booster pump and reservoir designs shall be reviewed and approved by the Department of Health.

All designs shall incorporate the ultimate goal of the standard system configurations within the service area. The District retains full review and revision rights over facility designs. Equipment equals can be proposed in lieu of those specified in these specifications, but must be clearly identified in the submittal process. The District retains full and final determination of what equipment shall be considered "equal". Interim system configurations may be acceptable when lower densities or the jumping of pressure zones is anticipated. The developer will design the interim system components with the understanding that items will be replaced in the future and that the cost of such future improvement will be borne by the customers receiving the benefits of the new standard system configurations. Impact fees will be assessed to users within the new service area as they connect to the system. The impact fees will be used to pay for the future standard system components as calculated by the District.

All booster pump systems in the future service areas shall be open systems. Closed booster pump systems may be allowed only within the retail service area for small, isolated, high elevation areas where the service area is not contiguous with higher elevation lands as determined solely by the District.

The domestic water system shall be analyzed with a hydraulic modeling program to verify the capability of the system to provide the necessary flows supplying the booster system without a loss of pressure below established DOH and District design standards. Off-site mitigation by the developer to the distribution system may be required to meet instantaneous flow needs of the project.

41. BOOSTER PUMP STATIONS: All booster pump stations shall be a minimum of a duplex station and shall be housed in an above grade concrete utility building as manufactured by CXT Incorporated or an approved equal. No below grade vaults shall be allowed for use as a booster pump station. Colors and textures shall be approved by the District during the shop drawing submittal and review process. Access shall be through doorway openings large enough to adequately install and remove all pumps, motors, piping, motor control centers and other electrical or telemetry equipment. Roof hatches or removable skylights may be required at the discretion of the District to facilitate removal of pumps. The building will be equipped with security, lighting, heating and ventilation as necessary to protect the equipment and provide a safe and effective working environment. The building shall be sited on a stable, graveled or paved site with adequate space to park at least one operational vehicle. Adjoining banks shall be sloped, retained or stabilized so as to protect the building and provide access to the operational needs of the station. Severe or filled sites may require the review and approval of a licensed geotechnical engineer to approve the stability of the site for the intended use as determined by the District. The building design shall be in accordance with the latest edition of the International building code and County Standards.

Calculations shall be provided, stamped by a licensed engineer registered in the state of Washington. The minimum design criteria shall be as follows or as required by code, whichever is greater:

Snow load:	55 psf or as required by the Chelan County Building Official for elevation above 1575
Base Wind Speed:	85 mph
Wind Exposure:	C
Occupancy:	Essential Facility
Seismic Paraments:	Sds=0.046 Sd1=0.022
Site Coefficient:	D

Site and building plans and structural calculations shall be of sufficient detail for the building permit approval by Chelan County.

The building shall be provided with double steel doors of adequate size to install and remove all equipment in the building. The doors shall have locking mechanisms with cylinders interchangeable with District key sets. An intrusion alarm shall be wired to the door and the alarm system that can be disarmed with a separate key switch. Doors shall be fully weather-stripped and include hold-open hardware.

The building shall be provided with a wall mounted ventilation panel with a hand-off-auto switch for ventilation control. In the hand mode, a relay shall be energized to provide power to a 120 VAC single phase exhaust fan and motorized intake louver. In the auto position, the relay will be energized based upon a temperature setpoint from a remote Honeywell wall mounted cooling thermostat with a range of -30 to 100 degrees Fahrenheit in order to start and stop the exhaust fan and motorized intake louver. The fan and louver shall be sized depending upon building size.

Provide an Qmark brand wall mounted space heater with a built-in thermostat with a range of 40 to 100 degrees Fahrenheit sized for the space in the building. The building shall be lit with standard 120W four-foot fluorescent lamps on a switch located near the doorway and one exterior 150W metal halide light with an interior switch control. The building shall have one 20A exterior rated, one 20A interior wall mounted duplex outlet, weather head, mast and Yagi antenna for the radio controlled communications system. Two 2-inch sweep conduits for future use shall be provided as penetrations through the building floor and shall be located underneath the telemetry panel.

Packaged booster pump systems (if approved by the District) shall be provided complete, including, but not be limited to base structure, pumps and motors, suction and discharge piping and valves, pump system accessories, and a complete motor control panel for pumps. The package booster pumps shall be end suction or multi-stage centrifugal pumps equal to Grundfos BoosterpaQ with integrated pump skid and control panel as designed and manufactured by a company with at least five years experience providing this type of equipment of a similar complexity. The panel may be located off skid and, if so, shall be wired by the contractor per the manufacturer's instructions. The manufacturer is required to be on site to help with the technical hookups of the equipment.

The manufacturer will bear all responsibility for the installation of the control panel. It will be the manufacturer's responsibility to inspect and warrant the intertie between the control panel and the pump skid. The control panel shall be NEMA 1A Hoffman panel and shall be labeled under the requirements of UL 508A. The panel shall have a backpan and shall have numbered terminal blocks for all external connections. Control wire shall be a minimum 16 AWG, MTW and shall be color-coded in accordance with all applicable codes and laws. All wires shall be labeled or number coded as to their purpose. Spiral wrap, tie wrap, fasteners and wire duct shall be provided as required for aesthetics and safety. All components mounted on the door shall be wired with insulated connectors (where "finger proof" terminals are not provided) to prevent accidental shock hazards. All components on the backpan shall be mounted on DIN rail or fastened via drilled and tapped screws to facilitate easy component replacement. Pop rivets shall not be allowed.

Booster pumps shall be designed in accordance with the Department of Health Design Manual. Motors that are 20 horsepower or larger shall be 480v, 1,800 rpm motors and shall be provided with solid state reduced voltage starters. Variable Frequency Drives with 5% line and load reactors may be required depending upon the pumping application. Average daily demand (ADD) in the District is 200 gallons per person per day. Maximum daily demand (MDD) is 2.5 times the ADD. Peak hour demand (PHD) in gallons per minute is 2.75 times the MDD divided by 1,440 minutes. The District may change these values at their discretion.

Submittals are required from the manufacturer prior to approval and shall include the following:

- System schematic diagrams with all components indicated.
- Technical data sheets for all components
- Detailed arrangements and dimensional drawings of the booster pump package with all devices and equipment indicated.
- Control panel schematic.
- Interior and exterior control panel layout drawing.

The booster pump system manufacturer shall guarantee the booster system to be free from defects in design, operations, materials and workmanship for a period of two (2) years warranty following the date of acceptance, by formal action of the District.

Warranty and guarantees by suppliers of various components in lieu of a single source responsibility by the manufacturer will not be accepted. The manufacturer shall be solely responsible for the guarantee of the pumping system and all components that make up the pumping system. In addition, the manufacturer agrees to provide manuals and on-site instructional information to the stations operation and maintenance after a successful startup. All components of the booster pump system shall be calibrated by the manufacturer after completion of the installation. Each component shall be adjusted to be within the manufacturer's required range and for the specific application. Components that cannot be properly calibrated or that are found to exceed the manufacturer's specified range or accuracy shall be removed and replaced at the developer's expense.

The completed pump system shall be factory tested prior to shipment. Testing shall include, but not be limited to, pump flow, pressure, control panel and accessory operation. The District shall have the right to visit the manufacturer's shop / office to inspect the pump system's fabrication at any time.

The entire booster station shall be factory prefabricated on a common structural skid with a minimum ¼" steel housekeeping pad. All metal fabrication shall be stainless steel or mild steel hot-dipped galvanized after fabrication. All metal fabrication bolts and connections to concrete shall be stainless steel. Any metals that are not stainless steel or aluminum shall be coated with an epoxy paint system equal to Tnemec series 66.

All interconnected piping shall be completed and testing prior to shipment. Discharge manifolds, as well as sensing lines with shut off cocks for gauges and pressure switches shall be furnished assembled. Suction and discharge headers shall be factory supplied stainless steel, epoxy coated steel (inside and outside) or field constructed ductile iron pipe, and shall be connected to a single pipe and shall be flanged or threaded. All electrical wiring shall be enclosed with galvanized rigid conduit, with final connections to vibrating equipment made with liquid tight flexible conduit. All other fittings shall be flanged or threaded.

The system manufacturer shall develop an operating and maintenance manual which includes the following operation and maintenance information:

- Normal operating procedures
- Preventive maintenance
- Troubleshooting
- Calibration
- Testing
- Replacement of components
- System drawings
- Catalog data and complete parts list for all equipment and control devices
- Listing of recommended spare parts
- Listing of recommended maintenance tools and equipment

Booster pumps systems shall include both a sampling tap and an injection tap. Pressure gages (both manual and electronic) shall be provided for both the discharge and the suction side of the pumps. Manual pressure gages shall be glycerine filled, 4-½" face, with stainless steel, brass and/or bronze components in contact with water. Gages shall be selected so the normal operating pressure resides at approximately 50% - 70% of full scale. Electronic gages shall be Keller pressure transmitters with 0.25% static accuracy, customizable pressure ranges and an analog output or equal. The control system shall be designed to monitor for low suction pressure and lockout the pumps during such occurances. Each condition shall include a time delay feature adjustable from zero to 30 seconds to prevent nuisance tripping. An electronic transmitter shall be provided that has dual output, 4-20mA and pulse, with the flow meter mounted on the discharge side of the pumps. The Siemans Sitrans F Mag 8000W flow meter shall be sized for the application and shall be flanged or threaded with an accuracy range of plus or minus

0.5%. Include combination transmitter / totalizer on flow meter. Each pump shall be isolated on both the suction and discharge side with AWWA C-509 or C-515 resilient seated gate valves. Packaged systems may use ball valves on the discharge side only when configured by the manufacturer as standard. The discharge side of each pump shall include either an AWWA C-508 check valve with lever and spring or a pump control valve. Selection of the type of discharge valve will be solely by the District, generally chosen based upon the type of motor control and flow rates. The control panel shall include automatic alternation of the pumps, emergency generator receptacles equal to Crouse-Hinds Posi Lok systems, and manual transfer switch that will be a key operated mechanical lockout by Kirk Key in conjunction wih the main service disconnect. The utility meter base shall be externally mounted to the building to Chelan County PUD standards. Provide a current transformer cabinet if required by Chelan County PUD. Pump control setpoints shall be capable of being set at the control panel. Pressure reducing and sustaining valves shall be located between pressure zones and bypass modulation shall be provided by solenoid actuated control valves. All pump control, surge and pressure sustaining valves shall be Cla-Val brand valves. Control valves shall include a limit switch for remote position indication, wired to the control panel.

Electrical equipment required for the booster pump station includes a thermal magnetic main circuit breaker sized based upon two motors running at the same time with the addition of a full lighting panel load. Motor short circuit protector (MPC) breaker disconnect switches with padlock provisions shall be magnetic trip only. Motor starter units shall be combination type with components and wiring readily available. Motor overload protection shall be provided by a self-powered overload relay. The overload device shall provide phase loss protection and be ambient insensitive, sized to protect the motor actually installed with allowance for the power factor correction, if applicable. A UL listed digital power monitor shall interrupt the control power in the event of phase loss, phase reversal, low voltage and phase imbalance. The digital power meter shall be a Siemans 9300. It shall have primary fuse protection. Contacts shall be rated for 15A resistive at 120 VAC. The single phase power monitor shall automatically reset when proper power is restored. Lightening protection shall be provided with the electrical system and control panel.

The load panel shall be a minimum of 18 pole spaces to provide power to all building electrical equipment and lighting fixtures. If service feeder is 480 volt, provide a UL approved and NEC sized dry-type lightening transformer and transformer disconnect. Feeder circuit breakers shall be thermal magnetic and sized per NEC. Provide Siemens current limiting, 100% rated molded case breakers or equal. Provide two spare 20 amp single pole breakers. A 20A GFCI duplex outlet receptacle shall be provided with a dedicated 20A circuit breaker mounted on the backpan.

Run time meters shall be provided and shall be 2-½ inches square case type for flush panel mounting. The meters shall have a six-digit non-reset register with the last digit indicating tenths of an hour. Eight-digit LCD Remington 3301-300 operational counters shall be provided with a 7-year self-contained battery.
The I&C and telemetry system shall be provided under the supervision of a single system integrator who is regularly engaged in the design and installation of such systems of a similar scope and complexity. The integrator shall be solely and completely

responsible for the final design and assembly of the entire control system. The PLC shall be a completely integrated distributed programmable controller system capable of analog and sequential control, data acquisition and display, alarm annunciation and communications using the PLC system. The device when connected to an Integra TR radio shall have telemetry capabilities for transmitting data using Modbus protocol to and from the master PLC located at the District Office. Pre-qualified system integrators include Stead & Associates or Technical Systems, Inc. Any other integrator must be located within 200 miles of the District and must submit qualifications and experience in similar installations to qualify. The District will be the sole judge of qualified integrators.

Provide submittals for each item in the UL-508 listed telemetry panel which shall include as a minimum a wiring diagram or connection schematic showing all devices and terminals and their physical relationship to each other and an interconnection diagram showing all external connections between the terminals of equipment and outside points, such as field and auxiliary devices. Terminal blocks shall be shown as actually installed and shall identify the equipment connections. As-built drawings shall be supplied after startup and upon completion of the project.

The equipment provided for the telemetry panel shall be new industrial grade, free from defects, and the most recent version of the product. Obsolete or phased out versions of the product will not be allowed. Provide DC power supplies as required for specific equipment. Standard Gel Cell batteries shall provide smooth, non-mechanical transfer to backup power and shall be of sufficient ampere-hour capacity for 1 hour of battery backup power supply. The RTU power supply shall be connected to a UPS unit for power protection in the event of a utility power failure. The UPS shall be a minimum 350VA or equal. A transient protection unit shall isolate and protect the instrumentation and telemetry electronics against electrical surges on input and output signal and power lines for transients up to 2500V peak with a waveshape as required by ANSI / IEEE. Wiring shall be minimum 600-volt class, PVC insulated, 16 AWG conductor. All wiring shall be terminated at one-piece molded plastic terminal blocks rated for 300 volts. Fusible terminal blocks shall be provided with a LED blown fuse indicator for each terminal. Provide fusing on the line and load side of all field devices.

The 24 VDC power shall be derived from a properly sized power supply. The control panel shall have an over current protection device with suitable interrupting requirements for the system. Fused disconnects shall be provided in accordance with NEC and the system requirements.

The pumps will be required to run in both normal hand mode and in auto mode. In hand mode, each booster pump will be allowed to run under any circumstance. In auto mode, booster pump 1 will be started and stopped based upon the control system described in sections below. The level shall be converted to a 4-20 mA signal and shall be displayed on the user interface screen. The PLC will then send a “pump call” signal to the next pump based upon a user adjustable setpoint. The HOA switch for each pump shall be wired from the pump control panel to the telemetry panel in order to determine the position of the switch. The following is a list of conditions for the booster pump station:

- Pump 1 and pump 2 shall have the ability via a simple switch or control panel setting to either be alternated between each pump start or to be made the stand alone pump for this facility.
- All booster pumps shall be stopped in the auto mode based on high discharge pressure, low suction pressure and or no flow measured from each pumps pressure switch or the flow meter. Adjustable time delays shall be provided for each condition.
- All setpoints shall be user adjustable from a color touch screen.
- In the event a pump fails, the telemetry system will remove the pump call from that pump and will take the pump offline until the pump fail alarm is manually reset from the touch screen. A pump fail alarm will be sent to the communications system for remote indication.

A non mercury type float switch shall be used as a high reservoir level alarm. This float shall be wired into the motor control logic in order to stop the pump to prevent overfilling the reservoir. The high reservoir level alarm shall have a time adjustable period to prevent nuisance tripping and shall be independent of the telemetry system. Additionally, a high level alarm signal shall be sent to the telemetry system to notify District personnel.

The PLC shall also receive a 4-20 mA signal as well as a pulse signal from the flowmeter. The PLC shall also monitor the pressure gages on both the suction and discharge pipes and the reservoir level. The contractor shall calibrate and tune all instruments, indicators, recorders, loops, etc. and record them in tabular form for submittal to the District with the O&M manuals.

Closed Systems

Closed booster pump systems will be allowed only within the retail service area for small, isolated, high elevation areas where the service area is not contiguous with higher elevation lands. Pump operations in closed booster pump systems may be governed by flow, pressure, VFD, pressure tank, timer or any combination depending upon the size and functions required within the service area. VFD motors shall be considered the default style unless the District determines that a more efficient and effective system is available. Provide calculations of demands and fire flows relative to pressure tank and or pump sizing criteria and selection. All service connections served by a closed booster pump system and located at a higher elevation than the booster pump station are required to have premise isolation commensurate with the degree of hazard of the user but at least a double check valve assembly.

Open Systems

Booster pumps on open systems shall be controlled by the water level in the receiving reservoir. Reservoir level shall be monitored by submersible level transmitters like or equal to Keller submersible level transmitters with 0.25% static accuracy, custom pressure range capable, analog outputs and with aneroid bellows as required. Conduit shall be installed between the booster pump control panel and the reservoir termination panel to house instrumentation wiring. All service connections served by an open booster pump system and located at a higher elevation than the booster pump station are

required to have premise isolation commensurate with the degree of hazard of the user but at least a double check valve assembly.

42. RESERVOIRS: The District standard for storage reservoirs is welded steel reservoirs. Reservoirs will be sized in accordance with the Department of Health Design Manual. Standby storage shall be equal or greater than one times the calculated average day demand unless increased by the Department of Health or the District based upon the project requirements. Fire suppression storage may not be nested with standby storage unless specifically approved by the Chelan County Fire Marshall. Equalizing storage shall be provided at and above an elevation to provide at least 30 psi to the highest service location in the planning area. Operational storage shall be at least 20% of the total volume of the tank. The overflow elevations are set by standard in accordance with the pressure zone requirements.

    Reservoirs shall be sited on stable, graveled or paved sites with adequate space to park at least one operational vehicle. Adjoining banks shall be sloped, retained or stabilized so as to protect the reservoir and provide access to the operational needs of the tank. Severe or filled sites may require the review and approval of a licensed geotechnical engineer to approve the stability of the site for the intended use if required by the District.

    Design steel reservoir in accordance with applicable building codes, seismic requirements, API 650, NSF 61, the IBC, and AWWA D100. Contractor may elect to furnish the reservoir in accordance with Appendix C of AWWA D100. Design calculations or analysis on tank including design of foundation shall be submitted to the District by a licensed engineer registered in the state of Washington. Design tank as a cylindrical above-ground metal tank of all welded construction. Roof shall be designed as a low-cone type with a maximum slope of 1 inch in 12 inches and a 3" overhang. Provide columns and structural framing as needed for low-cone type roofs. Design reservoir walls, foundations and bottoms in accordance with the allowable soil bearing pressures at the site and the equivalent fluid pressures. Oil on the 4" minimum deep sand mat under the tank shall be food grade oil. Petroleum based oil is not acceptable.

    Accessories for welded steel reservoirs shall include two shell manholes, one 24" in diameter and one 30" in diameter that are both accessible from ground level in the lowest ring of the reservoir shell in accordance with AWWA D100. Rubber gasketed cover plates shall be hinged to swing horizontally on a davit for ease of opening.

    A caged outside ladder with landing and safety rails shall be provided and designed to meet safety standards. The ladder may be vertical, but must not have a backward slope at any point. Construct the ladder rails with bars not less than 2" x 3/8" in size spaced at 18". Construct rungs of round or square bars not less than ¾" in size spaced at 12" intervals. Attach the ladder to the shell of the reservoir with brackets placed at intervals not to exceed 6 feet. An anti-climb guard consisting of a hinged ground level cover with a heavy duty safety clasp for padlocking from ground level shall be provided. Provide a safety climb device on any tanks taller than 20 feet.

    Provide an interior heavy duty nylon / polypropylene rope safety ladder suspended from the edge of the hatch opening to the bottom of the tank. Rope shall be suitable for continuous submergence in chlorinated drinking water and shall be of sufficient strength to support a

minimum of 250 pounds. The ladder shall be weighted so that it hangs vertically in the tank when water is circulating. Suspend a closed cell polystyrene life ring from the mid-point of the ladder with a nylon / polypropylene rope to allow the life ring to float on the surface at any water surface elevation. The rope shall be the same material as the ladder.

One 36" x 36" roof hatch shall be provided near the top of the outside ladder and within the safety landing. The opening shall be curbed at least 6 inches high. The cover shall overlap the curb by at least 2 inches and shall be hinged with a locking clasp suitable for use with a padlock. One roof vent shall be located near the apex of the roof. The vent shall be sized to adequately exchange air during maximum fill and withdrawal rates. The vent shall be weatherproof and shall exclude birds, animals, and insects using non-corrodible dual wire mesh. Vent shall meet the requirements of AWWA D100 to provide fail safe operation if clogged or frosted over. Vent shall also be easily dismantled and cleaned. The vent shall be flange mounted.

The reservoir will be provided with separate steel pipe inlets and outlets. A drain pipe will be provided with a 6-inch tall removable protruded section in the bottom of the reservoir. The drain pipe attached to the floor shall be one continuous welded steel pipe flanged to and isolated by a resilient wedge gate valve exterior to the footprint of the tank. The drain pipe shall direct the flow to an overflow location identified in the site plan. The overflow pipe shall be a steel pipe set to the required elevation for the pressure zone as prescribed by the District standards. The overflow shall join with the drain pipe downstream of the isolation valve and shall be directed to an overflow location identified in the site plan. The overflow pipe shall be supplied with a 24 mesh non-corrodible screen and shall be installed at an accessible point within the pipe near the outlet to prevent ingress of birds or animals. The inlet, outlet, drain and overflow pipes shall be sized appropriately for the maximum fill and withdrawal rates. Pipe within the tank may be welded stainless steel or painted steel with flanged connections.

A painter's trolley track shall be provided on the inside of the reservoir for maintenance purposes. A graduated staff gage water level indicator with a one-half scale target shall be attached to the reservoir with a float driven pointer on the gage indicating the depth of the water in the tank. The orientation of the gage will be noted on the site plan for easy observation. Install a 2" PVC stilling well and cable hanger for the installation and maintenance of the submersible level transducer. A NEMA 3 panel shall be placed on top of the reservoir to tie the transducer into the control wire from the booster pump station.

The reservoir shall be protected with sacrificial anodes designed for the size of the reservoir and in consideration for the type of interior paint used on the project. Metal studs for mounting the anodes and a test hole on top of the reservoir will be installed in advance of final surface preparations or the application of coatings. The sacrificial anodes will be installed after coatings are complete and accepted. After installation of the anodes and the filling of the reservoir, the system must be tested and inspected by a corrosion engineer.

The reservoir shall be painted between April 15 and October 15. Surface preparation and coating applications shall be in strict accordance with the manufacturer's printed instructions and the NACE standards. Protection of surfaces not scheduled to be coated shall be determined by the District and if the potential exists for surrounding areas to be damaged

by either the surface preparation or the application of the coating, adequate protections must be supplied.

Interior and exterior primers shall be Tnemec Hydro-Zinc 91-H2O applied after a SP10 near-white blast cleaning. Grind all welds to remove nibs and high points and remove any weld splatter from plates prior to coating application. The final dry film thickness shall be 2.5 to 3.5 mils. The interior top coat shall be Tnemec Pota-Pox 80, Series 141 with a final dry film thickness of 10 to 12 mils. Total system dry film thickness of the interior coating system will be a minimum of 13.0 mils. The exterior top coat shall be Tnemec Endura-Shield, Series 73 with a final dry film thickness of 3.0 to 5.0 mils in the color of Desert Sand. Total system dry film thickness of the exterior coating system will be a minimum of 6.0 mils. All welds shall be stripe coated. Contractor shall provide holiday testing equipment for use by the District to inspect finished coating quality. Any areas that fail in thickness, pinholes, or other obvious defects shall be corrected prior to acceptance.

The reservoir must be disinfected after the coating system is complete, the coating systems have been fully cured per the manufacturer's recommendations, and field quality control inspection is complete. Disinfection procedures will follow AWWA C 652 methods.

43. TRANSMISSION AND DISTRIBUTION LINES IN BOOSTED PRESSSURE ZONES: Transmission lines from the booster pump to the reservoir shall be located within the County road right-of-way when possible. Alternatively, the transmission lines can be installed in private roads along areas of normal ingress and egress if the District is given unrestricted access to the roadways. Transmission and distribution mains following easements going "cross country" shall be discouraged, but when allowed, shall include a dedicated, unrestricted, graveled access way at least ten feet wide with no more than a 10% grade. Locations of booster pumps and reservoirs, sizes and service areas shall not be incompatible with the Water System Plan. Booster pump stations shall be located on or adjacent to County road rights of ways. Storage reservoirs shall be located adjacent to County road rights of ways on deeded or dedicated lands at the end of transmission lines. Transmission mains shall be at least 10" diameter lines and distribution lines shall be at least 8" diameter lines if dead-ended and it least 6" diameter lines if they can be looped. Transmission mains shall be sized so that the velocity during either maximum pumping demand (not including fire flow) does not exceed 5 feet per second. Final determination of transmission main size will be made solely by the District.