DAVID A. CONDON
MAYOR

CITY OF SPOKANE - PURCHASING
808 W. Spokane Falls Blvd.
Spokane, Washington 99201-3316
(509) 625-6400

REQUEST FOR BIDS

City of Spokane, Washington

BID NUMBER: 4498-18

DESCRIPTION: UPRIVER DAM POWERHOUSE #1 KAPLAN GENERATOR DETAILED MAINTENANCE AND REPAIR

DUE DATE: MONDAY, OCTOBER 22, 2018
No later than 1:00 p.m.

City of Spokane - Purchasing
4TH Floor, City Hall
808 W. Spokane Falls Blvd.
Spokane WA 99201-3316

BID SUBMITTED BY:

COMPANY _____

MAILING ADDRESS _____

_____

PHYSICAL ADDRESS _____

_____

PHONE NUMBER _____

E-MAIL ADDRESS _____

Thea Prince

THEA PRINCE
Purchasing

CITY OF SPOKANE

REQUEST FOR PUBLIC WORKS BID

USING AIA FORM A201 – 2007

GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

REVISED MARCH 18, 2014

INSTRUCTIONS TO BIDDERS

PRE-BID CONFERENCE. A pre-bid conference will be held on Thursday, October 11, 2018 at 9:00 a.m. The location will be 2701 N Waterworks St., Spokane WA 99212.

1. **BID PREPARATION.**

A. PREPARATION OF BIDS.
Bids shall be typed or printed in ink, prepared on the form furnished by the City of Spokane and signed by authorized person of the bidder's firm. Errors may be crossed out with corrections printed in ink or typewritten adjacent and initialed in ink by the person signing the bid. If the bid contains any omission, erasures, alterations, additions, or items not called for in the proposal, or contains irregularities of any kind, it may constitute sufficient cause for rejection. Corrections and/or modifications received after bid opening will not be accepted.

B. PREPARATION OF ENVELOPE.
Place the completed bid in a sealed envelope. On the front of the envelope, clearly note if it contains the original or a copy and mark with the following wording:

"SEALED BID - IMPORTANT"
NAME OF PROJECT
OPENING DATE AND TIME
COMPANY NAME

2. **SUBMISSION OF BIDS.**
Submit one (1) original copy of the bid by 1:00 p.m., MONDAY, OCTOBER 22, 2018 to:

DELIVERY BY MAIL:
City of Spokane – Purchasing
4th Floor – City Hall
808 W. Spokane Falls Blvd.
Spokane, Washington 99201

HAND DELIVERY:
City of Spokane – "My Spokane" Service Desk
1st Floor – City Hall
808 W. Spokane Falls Blvd.
Spokane, Washington 99201

The City of Spokane is not responsible for bids delivered late. It is the responsibility of the Bidder to be sure the bids are sent sufficiently ahead of time to be received no later than 1:00 p.m. on the bid opening date.

Sealed bids will be opened at 1:15 p.m., MONDAY, October 22, 2018 in the Council Chambers, 808 West Spokane Falls Boulevard, Spokane, Washington 99201.

NOTE: Sealed bids will not be accepted by fax or email.

3. **BIDDERS' REPRESENTATION.**

Each bidder by making its bid represents that it has read and understands the bidding documents. Each bidder by making its bid represents that it has visited the site and familiarized itself with the local conditions under which the work is to be performed.

4. **SUBSTITUTIONS.**

A. Each bidder represents that its bid is based upon the materials and equipment described in the bidding documents.

B. No substitution will be considered unless written request has been submitted to the City department representative for approval at least five (5) days prior to the date for receipt of bids. Each request shall include a complete description of the proposed substitute, the name of the material or equipment for which it is to be substituted, manufacturer, warranty, availability of qualified and trained installers, drawings, cuts, performance and test data and any other data or information necessary for a complete evaluation.

C. If the City department representative approves any proposed substitution, the approval will be set forth in an addendum.

5. **INTERPRETATION.**

If a bidder discovers any errors, discrepancies or omissions in the bid specifications, or has any questions about the specifications, it shall notify the City department representative in writing. Any addenda issued by the City will be incorporated into the contract.

6. **WITHDRAWAL OF BIDS.**

The bidder may make written request to the City for withdrawal of a sealed bid prior to the scheduled opening. Unless otherwise specified, no bid may be withdrawn for a minimum of sixty (60) calendar days after the opening date.

7. **BIDDER PREQUALIFICATION.**

Prior to the award of contract, the apparent successful bidder shall be required to submit evidence of sufficient facilities, equipment, workers with formal and verifiable experience and training installing golf course irrigation systems with financial ability to insure completion of the work, and ability to provide a full warranty per bid specifications, unless waived by the City.

8. **BID SECURITY.**

The bid shall be accompanied by cash, a bid bond, certified or cashiers check payable to the order of the City of Spokane, in an amount of not less than five percent (5%) of the total bid amount. Bid bonds must be by a surety company authorized to do business as a surety in Washington State. As soon as the bid prices have been compared, the City will release the bid security of all except the three (3) lowest responsible bidders. When the construction agreement is signed and returned with executed payment and performance bonds, the other bid security will be released.

9. **AWARD OF CONTRACT.**

Award of contract, when made by the City, will be to the lowest responsive responsible bidder. Unsuccessful bidders will not automatically be notified of results.

10. **RECIPROCAL PREFERENCE FOR RESIDENT CONTRACTORS.**

A. In accordance with RCW 39.04.380 effective *March 30, 2012* the City of Spokane is enforcing a Reciprocal Preference for Resident Contractors. Any public works bid received from a nonresident contractor from a state that provides an in-state percentage bidding preference, a comparable percentage disadvantage must be applied to the bid of that nonresident contractor. A nonresident contractor from a state that provides a percentage bid preference means a contractor that: a) is from a state that provides a percentage bid preference to its resident contractors bidding on public works contracts; and b) at the time of bidding on a public works project, does not have a physical office located in Washington.

B. The state of residence for a nonresident contractor is the state in which the contractor was incorporated or, if not a corporation, the state where the contractor's business entity was formed. All nonresident contractors will be evaluated for out of state bidder preference. If the state of the nonresident contractor provides an in-state contractor preference, a comparable percentage disadvantage will be applied to their bid prior to contract award.

C. This section does not apply to public works procured pursuant to RCW 39.04.155, 39.04.280, or any other procurement exempt from competitive bidding.

11. **BIDDER RESPONSIBILITY CRITERIA (MANDATORY).**
Before award, the bidder must meet the following mandatory bidder responsibility criteria to be considered a responsible bidder. The bidder may be required by the Owner to submit documentation demonstrating compliance with the criteria. The bidder must:

A. Have a current certificate of registration as a contractor in compliance with chapter 18.27 RCW, which must have been in effect at the time of bid submittal;

B. Have a current Washington Unified Business Identifier (UBI) number;

C. If applicable:

1) Have Industrial Insurance (workers' compensation) coverage for the bidder's employees working in Washington, as required in title 51 RCW;

2) Have a Washington Employment Security Department number, as required in title 50 RCW;

3) Have a Washington Department of Revenue state excise tax registration number, as required in title 82 RCW.

D. Not be disqualified from bidding on any public works contract under RCW 39.06.010 or 39.12.065(3).

E. If bidding on a public works project subject to the apprenticeship utilization requirements in RCW 39.04.320, not have been found out of compliance by the Washington state apprenticeship and training council for working apprentices out of ratio, without appropriate supervision, or outside their approved work processes as outlined in their standards of apprenticeship under chapter 49.04 RCW for the one-year period immediately preceding the date of the bid solicitation; and

F. Until December 31, 2013, not have violated RCW 39.04.370 "*Off-Site Prefabricated Non-Standard Project Specific Items" reporting requirements* more than one time as determined by the department of labor and industries.

12. **BIDDER RESPONSIBILITY CRITERIA (SUPPLEMENTAL).**

A bidder will be deemed not responsible if:

A. the bidder does not meet the mandatory bidder responsibility criteria in SMC 7.06.500 and RCW 39.04.350(1), as amended; or

B. the bidder does not meet the supplemental bidder responsibility criteria as shown in these bid specifications. The bidder may be required by the City to submit documentation demonstrating compliance with the criteria.

If a potential bidder believes that the supplemental bidder responsibility criteria will exclude it from bidding, it may request the City to consider modifying the criteria. Any request shall be submitted to the Purchasing Section of the Accounting Department no later than five (5) days before the bid opening. The City shall evaluate any such request, and if a decision is made by the City to modify the criteria, the modification shall be communicated to all bidders and plan holders via the issuance of an addendum to the bidding documents. Likewise, in the event the City decides not to modify the criteria, it will endeavor to notify the requesting bidder of its decision.

As evidence that the Bidder meets the supplemental bidder responsibility criteria, the apparent lowest Bidder shall submit to the City within twenty four (24) hours of the notification time the completed supplementary bidder responsibility form with any required documentation. The City reserves the right to request this documentation from other bidders as well, and to request further documentation as needed to assess the bidder's responsibility.

The basis for evaluation of bidder compliance with the supplemental criteria shall be any documents or facts obtained by the City (whether from the bidder or third parties) which any reasonable owner would rely on for determining compliance. Determinations of responsibility or non-responsibility of a bidder due to the supplemental criteria shall be based on a review of all the supplemental criteria factors as a whole with no single item being determinative.

If the City determines the low bidder does not meet either the mandatory bidder criteria or the supplemental bidder criteria and is therefore not a responsible bidder, the Contracting Agency shall notify the bidder in writing with reasons for the determination. If the bidder disagrees with this determination, it will have a minimum of three (3) business days from receiving the determination to submit additional written information to the City. The City will consider any timely submitted additional information received from the bidder before issuing its subsequent determination. If the bidder disagrees with the City's subsequent determination it may appeal the determination to the Mayor or designee in writing within two (2) business days of receiving the City's determination. If the final appeal affirms that the bidder is not responsible, the City will not execute a contract with any other bidder until at least two (2) business days after the bidder determined to be not responsible has received the final determination.

13. **REJECTION OF BIDS.**
The City reserves the right to reject any or all bids, to waive minor deviations from the specifications, to waive minor informalities in bidding, whenever it is in the City's best interest, and to accept or reject all or part of this Request for Bids, at the prices shown.

14. **CONTRACTOR REGISTRATION.**
The City is prohibited from executing a contract with a contractor who is not registered or licensed as required by state law.

15. **EXECUTION OF CONTRACT.**
Within ten (10) days of contract award, the Contractor shall sign and return to the City an executed copy of the contract and payment/performance bonds and approved evidence of insurance unless otherwise mutually agreed by the City and Contractor.

16. **PUBLIC WORKS REQUIREMENTS.**
The scope of work for this project constitutes a public work under state law. Bidders are warned to take into consideration statutory legal requirements, particularly, the payment of prevailing wages, payment/performance bonds and sales tax implications in making their bids.

17. **APPRENTICESHIP.**
All Contractors and subcontractors are required to comply with Article X, 7.06 SMC, Public Works Apprentice Program, for public works construction projects as defined in RCW 39.04.010 with an estimated cost of six hundred thousand dollars ($600,000.00) or more, at least fifteen (15%) percent of the total contract labor project (all contractor and subcontractor hours) shall be performed by apprentices enrolled in a state-approved apprenticeship program.

1. The utilization percentage requirement of apprenticeship labor for public works construction contracts shall also apply to all subcontracts which value exceeds one hundred thousand dollars ($100,000), provided there is a state-approved apprenticeship program for the trade for which a subcontract is issued (see, SMC 7.06.510).

2. Each subcontractor which this chapter applies is required to execute a form, provided by the city, acknowledging that the requirements of Article X 07.06 SMC are applicable to the labor hours for the project.

3. Each subcontractor is required to submit by the 15th of each month, a City of Spokane Statement of Apprentice/Journeyman Participation form for worked performed the previous month.

4. Electronic Reporting and questions: Apprentice@spokanecity.org

18. **PROJECT CONTACT**.
The City of Spokane's project contact is:

Name: Stephen Burns, P.E.
Department: Water and Hydroelectric Services
Phone: 509.742.8154
Email: sburns@spokanecity.org

1. MISCELLANEOUS INFORMATION

1.0 BACKGROUND

Upriver Dam is located at 2701 N Waterworks Street, Spokane, WA, 99212. Initial construction of Powerhouse #1 was completed in 1937. The Powerhouse #1 structure is 90 feet wide, 35 feet long, and 50 feet high. The powerhouse has three Kaplan generator units operating under a design head differential of 33 feet. The generating units were originally rated at 1300 kW each. In 1982 they were upgraded to new ratings of 2 MW each while passing 835 cfs of river flow from the Spokane River. The maximum capacity of the powerhouse is 6 MW while passing a total flow of 2505 cfs. In 1986, the powerhouse was structurally stabilized with a slab and pile support system. Upstream of the powerhouse is an integral intake structure fitted with six vertical lift wheel and chain gates (tractor gates) to close water passageways to the units. A parapet wall is provided at deck elevation 1929' (Old City Datum) with a top elevation of 1934' (Old City Datum). The powerhouse has an indoor crane with 20 ton capacity. The top portion of Turbine #1 in Powerhouse #1 was disassembled, cleaned and repaired in 2008 (see the Bid Items 1 through 5 of these specifications). The lower portion of Turbine #1 has never been disassembled before, except for guide bearing maintenance. The turbine has been installed and in use since 1936.

1.1 INTENT OF THIS SPECIFICATION

It is the city's intent that this specification gives only the principal requirements for the work, and does not specify the work in complete detail. The work furnished shall meet the requirements of this specification for operation of the unit. If a conflict is discovered between this specification, including the owner's existing drawings, and suppliers' technical requirements, then the more stringent shall apply.

1.2 PRELIMINARY PROJECT SCHEDULE

1. A pre-bid meeting is scheduled for 9:00 am October 11, 2018, at 2701 N. Waterworks St, Spokane, WA, 99212.
2. Notice of Award (NOA), if award made, will be given after approval to proceed with this Turbine #1 detailed maintenance project is received from the city (Public Works Committee, City Council, and Mayor approvals).
3. A pre-construction meeting is tentatively planned for May 22, 2019.
4. After the pre-construction meeting, the city will issue Notice to Proceed letter.
5. Project Completion: See Bid Proposal documents for substantial and final completion dates.

1.3 DEFINITIONS

1. Owner or city: City of Spokane (COS)
2. Engineer: Stephen Burns, P.E.
3. Contractor: Unless otherwise noted, the successful bidder contracted with COS to perform the work and associated subcontractors.
4. Supplier or Manufacturer: The supplier of manufacturer of equipment or materials to be used by Contractor in completing the work.
5. Owner's Site Representative: A representative selected by, and to represent, the city.

1.4 CODES AND STANDARDS

1. In providing any materials, method or procedure specified by reference to the number, symbol or title of a specific specification standard, such as a Commercial Standard, American National Standard, Federal or State Specification, Industry or Government Code, a trade association code or standard or other similar standard, comply with the requirements of the latest version thereof and any amendments or supplements thereto in effect on the date of these Contract Documents, except as limited to type, class, grade, or modified in such reference.
2. Codes, specifications or standards referred to shall have full force and effect as though printed in these project Specifications. Such specifications and standards are not furnished to the Contractor since manufacturers and trades involved are assumed to be familiar with their requirements.
3. The publication "Best Practice Catalog – Propeller/Kaplan Turbine – Hydropower Advancement Project", Revision 2.0, by Mesa Associates and Oak Ridge National Laboratories via U.S. Department of Energy is readily available on line for detailed reference to best practices.

1.5 SITE ACCESS

1. Contractor shall have full use of Project site for Project operations during Project period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.
2. Access to the Powerhouse is via a single lane paved road to a set of double steel doors, total opening of 95 inches wide, 110 inches tall. The paved road shall not be blocked for any extended periods of time and remain clear for access by others. Access will be limited to the Contractor and their subcontractors, Owner and Owner's Site Representative. Staff from the FERC and other interested agencies will also have access. There will be no public access.
3. Staging and laydown areas: Coordinate and obtain approval of Owner for all staging, laydown and parking areas. It is strongly recommended that the bidder attend the pre-bid meeting to assess the site access conditions.
4. The Powerhouse will remain locked at all times when exterior access is not needed.

2. SPECIFICATIONS

2.0 GENERAL TURBINE MANUFACTURER SPECIFICATIONS

The following is from the original manufacturer's Specifications by Allis-Chalmers (1935):

1. Estimated weight of Runner, Hub, Turbine shaft, and intermediate shaft.17,500 lbs
2. Indoor crane load rating……..20 ton
3. Guaranteed maximum runaway speed at 33 ft. head ..... 490 rpm
4. Maximum lift of generator and intermediate shaft required to disconnect lower ends of oil piping to the blade servomotor. It is not necessary to lift the generator and the intermediate shaft for disconnecting the lower ends of oil piping to blade servomotor. After the oil (or Kaplan head) is removed from its base above the exciter, each of the two oil pipes can be unscrewed from their joints at the

servomotor and can be lifted up through the intermediate and the generator shaft and removed. The top of these pipes will thus reach about to elevation 1949.5, which does not interfere with the roof girders of the powerhouse. This design avoids additional intermediate pipe joints, thereby eliminating the danger of oil leaks.

5. Maximum hydraulic thrust (including runner and shaft) ..... 94,500 lbs.
6. Flywheel effect of WR^2 of runner hub and shaft ..... approx. 13,000 ft^2lbs.
7. Flywheel effect of WR^2 of generator required, for regulation ..... 315,000 ft^2lbs
8. Rating .....2222 kVA; 2000 Kw; 0.9 power factor; 2300 volts; 3-phase; 60 cycle
9. Guaranteed output at 30 ft. net head.....200 rpm; 2300 hp
10. Approximate weight of parts:
    - Completely assembled runner ..... 10,800 lbs.
    - Completely assembled runner with turbine shaft and servomotor .... 14,500 lbs.
    - Speed ring ..... 18,000 lbs.
    - Cover plate complete without bearing ..... 17,500 lbs.
    - Shifting ring ..... 1,700 lbs.
    - Intermediate shaft exclusive of pipes ..... 2,600 lbs.
    - Approximate weight of inner oil pipe ..... 75 lbs.
    - Approximate weight of outer oil pipe ..... 100 lbs.
11. Approximate outside diameter of speed ring ..... not over 12.5 ft.
12. Approximate height of regulating gates .....40 inches
13. Number of wicket gates.....16
14. Number of speed ring vanes 8
15. Approximate diameter and elevation of draft tube throat (at end of liner) ..... ……94 inches; El. 1891.5
16. Approximate elevation of blade servomotor and of shaft Couplings El. .....1908.5; El. 1915.5
17. Approximate size of shaft.....12 inches
18. Approximate diameter of runner.....80 inches
19. Diameter of pit liner.....124 inches

The following is a list of existing drawings that have survived:

1. General section of powerhouse and headworks..... 621
2. Drawing showing the general arrangement of all parts below . main shaft coupling 811-244
3. General arrangement of all parts above main shaft coupling.....811-233

2.1 KAPLAN TURBINE RUNNER OVERVIEW

The runner is a movable blade, Kaplan type designed by Allis-Chalmers (1935) described in the following paragraphs.

2.1.1 MATERIALS

The hub of the runner is made of ASTM A-27-24 Class B Medium cast steel. It is assumed the five blades are made of the same material as the hub. Each trunnion (or shank) is supported in two bronze bushed bearings integral with the hub casting. The outer bearing is large enough bore to allow for removal of the trunnion together with the operating lever cast with the blade. The blade is held centrifugally by a removable thrust surface locked into the central portion of the hub. Packing is provided surrounding the outer part of the trunnion. The packing is replaceable without removal of the blade, packed into the annular recess in the runner hub by a bronze retainer ring, made in three

sections. The surface of this retainer is flush with the contour of the runner hub. The lever arms of each blade are connected to a central cross head by means of double links with removable locked pivots. The cross head is an annealed steel fastened to the lower end of the operating rod, and is guided in the machined portion of the cast iron hub tip which in turn is doweled and bolted to the lower machined face of the runner hub.
To dismantle the blades after the runner and shaft are raised up out of the throat ring, the runner tip is removed allowing access to the five pairs of links which disconnect the individual blades. After removal of the thrust bearing surface of each trunnion, the blades can be pulled out of the hub.

The central portion of the hub is bored out and bushed to form a guide for the operating rod that reaches to the top of the servomotor inside of the turbine shaft.

The tip of the hub has a drain plug at the bottom to drain all oil from the interior of the hub. Refilling of the hub is done through the hollow turbine shaft from above the cover plate. The top of the hub is machined and recessed to fit the flanged end of the turbine shaft. Steel studs are tapped into the hub to bolt/couple the runner, hub, and shaft. Radial keys bear the torsion force to prevent shearing of the bolts. The top face of the hub is machined as a thrust surface against the bottom of the cover plate preventing uplift during extreme conditions of sudden load rejection.

While the trunnion dimensions were designed such that excessive pressures would not occur causing damage to the surfaces and corrosion was not considered a factor, the Upriver Mechanics suspect there is considerable leakage into the hub at the trunnion bearings.

2.1.2 SERVOMOTOR

The servomotor operates the titling mechanism at a rate of five seconds in either direction with an oil pressure of 2000 psi. under any operating head.

2.1.3 HYDRAULIC OIL PRESSURE LINES IN THE SHAFT

There are two hydraulic oil pressure lines inside the generator shaft and the intermediate shaft. One line provides oil to the servomotor piston to open the runner blades and the inner line provides oil to the servomotor to close the blades. The inner line is fastened to the piston and serves at the relay rod of the Kaplan head.

2.1.4 OIL HEAD (KAPLAN HEAD)

The oil head has a cast iron machined base bolted to the machined surface above the exciter housing (permanent magnet generator now removed). The oil head has two pressure chambers providing oil to the servomotor cylinder and contains the thrust bearing for the revolving relay pipe and the non-revolving extension projects through an adjustable packing box into the dome where it is linked to the position indicator and governor junction box.

2.1.5 SHAFT – GENERAL

The upper most machined face of the shaft is at el. 1915.5’ (3.5 feet below the base of the generator floor, which is at el. 1919’). It is a flanged, 12 inch outside diameter, and 4 inch inside diameter (bored). The shaft is made of “open hearth carbon steel, compression forged and heat treated at the company’s own forge shop” (Allis-Chalmers, 1935).

2.1.6 TURBINE SHAFT AND INTERMEDIATE SHAFT

The shaft is in two sections. The lower, or turbine shaft, is bored to contain the hub operating rod. The upper shaft has the servomotor cylinder integrally forged and flanged

and recessed for the connection to the lower end of the intermediate shaft. It was provided with a stainless steel split sleeve where the shaft projects through the packing box. The cylinder contains the servomotor piston which is held to the operating rod.

The intermediate shaft is bored to contain the two oil pipes leading to the oil head. It is flanged on both ends to bolt to the generator shaft and the servomotor cylinder cover above the turbine shaft.

Packing is installed around the rod below the servomotor piston to prevent governor oil leakage along the operating rod into the runner hub. The intent is to prevent oil from leaking out of the joint between the servomotor cylinder and the intermediate shaft flange.

2.1.7 **GUIDE BEARING SYSTEM**

The guide bearings for the three hydroelectric generators in Powerhouse #1 are water lubricated lignum vitae type. Each bearing has four sections of bearing surfaces, each positioned longitudinally and adjustable. Each section constitutes a shoe of cast iron lined with lignum vitae blocks dove-tailed into the matching grooves in the shoe. The shoe rests in machine tapered recesses in the bearing housing and the contact surfaces of the guides of the shoe are lined radially and sideways with renewable bronze pads to prevent rusting of the shoe into the housing. Each shoe is radially adjustable and fixed by lock screws, accessible from the top of the bearing.

The housing containing the four shoes is a casting in halves bolted together and rests in a taper bored seat in the cover plate. The contact surfaces of the housing have brass rings to prevent rusting and to facilitate tight bolting of the housing to the cover plate.

A trough is provided above the bearing housing which forms a basin for the water lubrication to which there are two separate feed of water. A cover is at the bottom of the bearing housing and surrounding the shaft to restrict the loss of lubricating water to the bearing. The bearing is 20” long and a shaft diameter of 12”. The housing is capable of being lifted over the servomotor cylinder.

2.1.8 **HEAD COVER**

The head cover is split in halves and bolted together. It is flange-fitted to the speed ring and the lower portion bored tapered to form the seat of the guide bearing housing. The bottom face adjacent to the runner hub is a machined thrust bearing surface should the runner be subjected to uplift. This thrust surface prevents damage during emergency conditions.

The upper central portion of the head cover is machined for bolting the shaft packing box housing to it and turned and faced for the shifting ring track. Grease lubricated bronze pads line this track to prevent friction and rusting. The outer portion of the head cover is bored for the upper guide vane stem’s bearings and stem packing boxes. The bearings are bronze bushed and meant to be grease lubricated.

2.1.9 **WICKET GATES AND STEMS**

There are sixteen wickets consisting of copper bearing plate steel vane bodies and “open hearth steel” stems. The stems have blocks to which the vane body is riveted and welded. The stems are machined to revolve in the lower bearing in the guide vane ring, the upper bearing in the packing box portion and the third top bearing in the cover plate. The stem is bored for grease to be applied to the lower guide vane stem bearing and the bearing is grooved on the pressure side of the stem.

2.1.10 **WICKET GATE SHIFTING RING**

The shifting ring is a solid casting of annealed cast steel. The resultant forces are mitigated by a bronze lined track on the cover plate and its weight in carried on bronze lined pads. A machined flange carries the pivots engaging the connecting links between shifting ring and guide vane levers. Two bronze bushed large lugs are cast into the ring and connected to the two rods operated from the torsion shaft of the governor. This arrangement allows for the removal of the shaft packing box and guide bearing without disturbing any connections.

2.1.11 **STEM LEVERS AND SHEARINGS**

Connection between the shifting ring and the guide vane levers is made by links with a breaking strength designed to fail when an obstruction occurs. This allows the governor to close the remaining wickets. The pivot in the end of the guide vane lever is removable without dismantling any other part of the system to replace any failed links. The removable pin in the guide vane lever also has an eccentric shank allowing the individual adjustment of each vane to minimize water leakage.

The guide vane levers are made of “high grade semi-steel” (Allis-Chalmers, 1935). They are key-seated and fitted over the upper end of the guide vane stems. An adjusting device holds the guide vane in proper position and the face of the hub of the lever acts as a thrust bearing collar for the weight of the guide vane. The hub has a stop pin which prevents the guide vane(s) from swinging in the case that it becomes detached from the shifting ring.

The removal of only one connecting rod to the shifting ring is required to allow for the removal together of the cover plate, shifting ring, etc.

2.1.12 **GOVERNORS**

The governor to the turbine was upgraded to a digital system in 2012 simplifying the operation and maintenance of the unit. This project does not include any maintenance work for the governor system.

3. SCOPE OF WORK.

3.1 **GENERAL PERFORMANCE.**

1. Furnish all materials, plant, tools, expendables, labor, supervision and other items necessary under the Contract to complete the following Scope of Work on which Contract progress and payment will be based.
2. Project Management and Coordination includes the coordination between the Owner and Field Superintendent as well as the coordination between the Owner’s and Contractor’s Site Safety Supervisors. There is no separate pay item for construction management and field supervision; it is included in the balance of the items.
3. Contractor is responsible for the overall project schedule, milestone schedule, coordinating deliverables, lead times, and installations to meet the overall project end date.

3.2 **ENGINEERING DRAWINGS**

1. Reference drawings include the original Upriver Powerhouse #1 turbine and related equipment design drawings and are included in the project package.
2. Use the reference drawing package, in conjunction with best practices and verified field measurements, to develop detailed project and fabrication drawings as discussed in the Submittals Procedures section of this specification. Notify Owner’s

Site Representative as early as possible for any interpretation which Contractor needs to carry out the work. Contractor's failure to review the Owner's drawings in a timely manner to allow for corrections or revisions shall not be a valid reason to extend contract completion dates.

3. Engineered reference drawings are, in general, made to scale. Take all working dimensions from figured dimensions on drawings or from actual measurements at Site. Dimensions shall not be taken from drawings by scaling. Contractor shall field verify all dimensions and elevations shown on the reference drawings and in these specifications.
4. Owner reserves the right to furnish additional drawings for proper execution of the Work as Owner deems necessary. Maintain a copy of the reference drawings on site and execute the work according to the latest drawing revisions.
5. Per Sections 5.2, 7.0 through 7.4, and 10.0 through 10.3 of this specification, Contractor shall maintain and regularly update, accurate Activity Logs and Record Drawings of actual conditions to record all deviations and variations from the drawings. When requested by the Engineer and/or upon completion of a pay item of the Work, Contractor shall deliver to Engineer marked up prints of project drawings showing such deviations and variations in the Work.

3.3 MEASURE AND PAYMENT

3.3.1 CONTENT

1. The breakdown of bid items below are suggested items to be included in Contractor's Schedule of Values. Contractor may revise this list as necessary in order to provide a further breakdown of bid items.
2. Bid Items 1, 2, and 8 are to be bid as individual items.
3. Bid Items 3 through 7 have two parts: Part A and Part B. Part A and Part B are to be bid separately. The following is how these bid items are structured:
    a. Part A – This portion of the bid includes the disassembly, non-destructive testing (NDT) of the components, known automatic replacement items and report of findings and recommended repair options, if applicable. The sum of Bid Items' Part A will be considered as the Base Bid for the project.
    b. Part B – This portion of the bid item(s) is for the repair of disassembled components, as approved by the Owner, prior to reassembly. The sum of Bid Items' Part B will be considered an Option to the owner.
4. Reference Section 7.3 of this specification for the Contractor Requirements for the work.

3.3.2 ITEMS OF WORK

The project schedule is tentatively from June 2019 to December 2019 during the low flow season. The city will perform the following Items of Work and they are not to be included in the Contractor's Schedule of Values.

1. Installation of inlet and outlet bulkhead gates, sealing the draft tube, and initial dewatering of the unit.
2. Disconnection of all electrical, data, and hydraulic connections, where practicable, and the unit tagged out. The city will continue to disconnect electrical connections throughout the project.
3. The city will be replacing temperature sensors as the unit is being reassembled and reconnected. Contractor must notify the city prior to reassembly of those parts of the unit containing temperature sensors.

The Contractor's Work includes the following:

Bid Item No. 1: Work Plan
Work includes the preparation of a detailed Work Plan and any necessary revisions prior to approval.

Payment will be lump sum, made in accordance with the approved Monthly Application for Payment.

Bid Item No. 2: Mobilization
Work shall consist of pre-construction expenses and costs of preparatory work and operations, including but not limited to those necessary for the mobilization of personnel, equipment and supplies to the project work areas, and all other costs incurred prior to beginning the Work.

Items which are not included in the item of mobilization include, but are not limited to, any portion of the work covered by a specific bid item incidental work which is to be included in a Bid Item or Items, profit, interest borrowed money, overhead or management costs.

Payment will be lump sum and includes compensation for all work associated with Mobilization, in accordance with the Contract Documents. Progress payments will be made in accordance with the approved Monthly Application for Payment.

Bid Item No. 3:
Work under this section shall consist of all labor, materials, and equipment to carefully and meticulously disassemble the top portion of the Turbine #1 unit, recording the exact execution of each step to facilitate the reassembly of the unit. The following tasks are included, but not limited to:

Part A:

1. Remove the packing, packing gland, and the packing box. Drain the oil from the lower generator bearing and the drain case for the coupling.
2. Remove the timing gear cover and the timing gear. Split and remove the upper generator guide seal, split the cover then remove it.
3. Drain all of the oil out of the oil head and the oil head shafts.
4. Remove the guide bearing and split the guide bearing support.
    i. Disassemble bearing, noting component clearances;
    ii. Clean, inspect, and NDT shoes;
    iii. Inspect bearing surfaces;
    iv. Report on findings and recommend repair options if applicable.
    v. Final blast and coat on applicable surfaces;
    vi. Provide final report on prior and as-repaired measurements
5. Drain the oil from the upper guide bearing and thrust hub. Remove the packing gland from the top of the oil head and remove the top bowl. Note: nuts on the top of the shaft for blade position are left hand thread.
6. In the second bowl of the oil head, remove the stub shaft (left hand threads), then take off the cap to the brass cup (left hand threads). Remove the tapered dowel in the shaft. Remove the packing in the third bowl. Remove the nut cap and the second bowl. Remove the last bowl.
7. Remove the upper portion of the exciter housing. Remove the exciter rotor.
8. Remove the steps to the unit. Remove the lower portion of the exciter housing.

9. Remove the two oil head pipes from the shaft, removing the outer shaft first. The outer shaft is 184.5 inches long. Then remove the inner pipe which is 203.5 inches long.
10. Crane the unit, and set it on the steel blocks, making sure it is not set on poles or bolts but on the iron so as not to damage the pole pieces.

Part B:

1. As separate items, provide the shop rate and number of hours to perform the repair of item(s) referenced in Bid Item No. 3, Part A, Section 4.

Bid Item No. 4:

Work under this section shall consist of labor, materials, and equipment necessary for the following items, continuing to disassemble the top portion of the Kaplan turbine unit:

Part A:

1. Once the unit is jacked and on blocks, remove the upper guide bearing (Note: it may be easier to remove the upper guide bearing first). Remove the annular shaft keys. Remove the bolts and dowels from the thrust block support, jack the thrust support up and remove the thrust block. Leave the thrust runner plate and the thrust bearings in the thrust support. Place the thrust support to the side.
    i. Disassemble bearing, noting component clearances;
    ii. Clean, inspect, and NDT shoes;
    iii. Inspect bearing surfaces on thrust runner and shaft;
    iv. Inspect and record dimensions on thrust runner flatness and perpendicularity;
    v. Report on findings and recommend repair options.
    vi. Final blast and coat on applicable surfaces.
2. Remove the upper plates on the rotor and prepare the rotor for lifting. Protect the rotor and windings from hitting one another. The weight of the rotor is unknown, so use heavy rigging. Lift slowly and evenly.
3. Clean the rotor and stator using dry ice blasting.
    i. Visually inspect winding insulation for signs of degradation and failure;
    ii. Visually inspect windings for signs of contamination build up;
    iii. Visually inspect for loose ties and blocking;
    iv. Perform “tap test” for loose stator wedges;
    v. Perform the following electrical tests:
        1. Stator winding groundwall insulation resistance;
        2. Stator winding resistance test;
        3. Stator winding DC Step Voltage test;
        4. Rotor winding groundwall insulation test;
        5. Rotor winding resistance test;
        6. Rotor winding drop test.
    vi. Report on findings and recommend repair options;
    vii. Provide final report on prior and as-repaired measurements.
4. Generator guide bearing, disassemble components:
    i. Disassemble bearing, noting component clearances;
    ii. Clean, inspect, and NDT shoes;
    iii. Inspect bearing surfaces on shaft or shaft sleeve;
    iv. Report on findings and recommend repair options if applicable.

v. Final blast and coat on applicable surfaces;
vi. Provide final report on prior and as-repaired measurements.

Part B:

1. As separate items, provide the shop rate and number of hours to perform the repair of item(s) referenced in Bid Item No. 4, Part A, Section 1.
2. As separate items, provide the shop rate and number of hours to perform the repair of item(s) referenced in Bid Item No. 4, Part A, Section 3.
3. As separate items, provide the shop rate and number of hours to perform the repair of item(s) referenced in Bid Item No. 4, Part A, Section 4.

Bid Item No. 5

Work under this section shall consist of labor, materials, and equipment necessary for the following items to disassemble, test, and repair the lower portion of the Kaplan turbine unit:

Part A:

1. In the pit, disconnect the two actuator rods connected to the main torsion shaft of the governor. Remove the cover plate and shifting ring.
2. Prior to disassembly with runner still in place, measure and record gap between runner blades and discharge ring. Raise the runner and shaft out of the throat ring.
3. Perform the following:

    a. Blade servomotor and actuating rods, disassemble component(s):
        i. Inspect sliding surfaces and measure ID/OD of piston and bore, report on findings and recommend repair options if applicable;
        ii. Replace piston rings;
        iii. Final blast and coat as applicable;
        iv. Provide as-repaired report of prior and final component dimensions.
    b. Turbine shaft:
        i. Clean shaft and NDT shaft and coupling areas, report on NDT findings and recommend repair options if applicable;
        ii. Inspect shaft, coupling, bearing and seal journal surfaces and measure/record coupling bolt bores and perpendicularity/flatness of flange faces, report on findings and recommend repair options if applicable. Recommend sleeving plan for corroded/eroded guide bearing journal surface.
        iii. Measure shaft runout/straightness and repair as necessary to within manufacturer's guidelines.
        iv. Measure and record dimensions of body-fit coupling bolts and nuts;
        v. *Note: this step is during reassembly*. Join turbine shaft to generator shaft and line-bore coupling bolt bores;
        vi. Manufacture new body-fit coupling bolts and nuts, match-mark bolts to coupling bores;
        vii. Provide as-repaired report of prior and final component dimensions.
    c. Turbine shaft seal, disassemble component(s):
        i. Visually inspect and provide report along with repair recommendations, if applicable

ii. Final blast and coat as applicable.
iii. Provide as-repaired report of prior and final component dimensions.

d. Turbine guide bearing, disassemble component(s):
    i. Transport the existing shoes, staves, and housing to contactor's machine shop for cleaning, blasting, and re-coating.
    ii. Ship an existing stave to a supplier of Lignum Vitae for inspection and report. Supplier to cut new replacement stave section sets, with multiple stacked segments with end grain oriented toward the shaft.
    iii. Transport new stave segments to contractor's machine shop to perform final trimming, individual fitting and installation into the steel shoes. If the contractor opts for a machine shop other than the Lignum Vitae supplier, a representative from the Lignum Vitae supplier will be provided by the contractor for instruction and oversight for fitting the shoes with the staves.
    iv. With the new staves installed, the shoes are then fitted into the guide bearing housing, set up in a lathe and finished to an inside diameter per the drawing dimension of 12.005 inches.
    v. Include the refurbishment of the facility's spare bearing in this bid (this means a total of two bearing sets of shoes and staves). Include specific storage instructions and equipment as recommended by the manufacturer.

Part B:

1. As separate items, provide the shop rate and number of hours to perform the repair of item(s) referenced in Bid Item No. 5, Part A, Section 3-a.
2. As separate items, provide the shop rate and number of hours to perform the repair of item(s) referenced in Bid Item No. 5, Part A, Section 3-b-i.
3. As separate items, provide the shop rate and number of hours to perform the repair of item(s) referenced in Bid Item No. 5, Part A, Section 3-b-ii.
4. As separate items, provide the shop rate and number of hours to perform the repair of item(s) referenced in Bid Item No. 5, Part A, Section 3-b-iii.
5. As separate items, provide the shop rate and number of hours to perform the repair of item(s) referenced in Bid Item No. 5, Part A, Section 3-c.
6. As separate items, provide the shop rate and number of hours to perform the repair of item(s) referenced in Bid Item No. 5, Part A, Section 3-d.

Bid Item No. 6

Work under this section shall consist of labor, materials, and equipment necessary for the following items, continuing to disassemble, test, and repair the lower portion of the Kaplan turbine unit:

Part A:

1. Vacuum breaker valve, disassemble component(s):
    a. Visually inspect and provide report along with repair recommendations, if applicable
2. Inner and outer head covers, disassemble component(s):
    a. Visually inspect and provide report along with repair recommendations, if applicable (determine if upper wicket gate bushings need to be upgraded

to grease-free bushings Thordon, CIP, Orkott, etc). Include upgraded material in this bid item for project budget purposes.
        i. Inspect and measure operating ring bearing journal surfaces to determine if repair is recommended, include findings in report.
    b. Final blast and coat as applicable.
    c. Provide as-repaired report of prior and final component dimensions.
3. Shifting ring, disassemble component(s):
    a. Visually inspect and provide report along with repair recommendations, if applicable.
        i. Inspect and measure operating ring main bearing material, record as-found dimensions.
        ii. Inspect and measure gate link bushings;
        iii. Determine if main bushing material needs to be upgraded to grease-free material such as Thordon, CIP, Orkott, etc). Include upgraded material in this bid item for project budget purposes.
    b. Final blast and coat as applicable.
    c. Provide as-repaired report of prior and final component dimensions.
4. Levers and links, disassemble component(s):
    a. Visually inspect and provide report along with repair recommendations, if applicable.
        i. Inspect and measure bushing material, record as-found dimensions.
        ii. Determine if bushing material needs to be upgraded to grease-free material such as Thordon, CIP, Orkott, etc). Include upgraded material in this bid item for project budget purposes.
    b. Final blast and coat as applicable.
    c. Provide as-repaired report of prior and final component dimensions.
5. Gate servomotor and connecting linkages, disassemble component(s):
    a. Inspect sliding surfaces and measure ID/OD of piston and bore, report on findings and recommend repair options if applicable;
    b. Replace piston rings;
    c. Final blast and coat as applicable;
    d. Provide as-repaired report of prior and final component dimensions.
6. Wicket gates, disassemble component(s):
    a. Inspect wicket gate bearing and seal journal surfaces, shaft run-out, upper/lower sealing surface-to-gate clearances and gate-to-gate sealing surfaces; report on findings and recommend repair options (to include resultant weld repair needed to correct cracking, cavitation damage and seal surface repair, sleeving or re-sleeving of shaft bushing and seal journal OD's)if applicable;
    b. Provide as-repaired report of prior and final component dimensions.
    c. Final blast and coat gate leaves;

Part B:

1. As separate items, provide the shop rate and number of hours to perform the repair of item(s) referenced in Bid Item No. 6, Part A, Section 1.
2. As separate items, provide the shop rate and number of hours to perform the repair of item(s) referenced in Bid Item No. 6, Part A, Section 2.

3. As separate items, provide the shop rate and number of hours to perform the repair of item(s) referenced in Bid Item No. 5, Part A, Section 3.
4. As separate items, provide the shop rate and number of hours to perform the repair of item(s) referenced in Bid Item No. 5, Part A, Section 4.
5. As separate items, provide the shop rate and number of hours to perform the repair of item(s) referenced in Bid Item No. 5, Part A, Section 5.
6. As separate items, provide the shop rate and number of hours to perform the repair of item(s) referenced in Bid Item No. 5, Part A, Section 6.

Bid Item No. 7:

Work under this section shall consist of labor, materials, and equipment necessary for the following items, continuing to disassemble, test, and repair the lower portion of the Kaplan turbine unit:

Part A:

1. Runner, disassemble component(s):
    a. (Prior to disassembly with runner still in place, measure and record gap between runner blades and discharge ring);
    b. Visually inspect runner components (hub and nose-cone, blades, blade angle selection block, levers and links); report on findings including NDT results and resultant recommendation for weld repair needed to correct cracking and cavitation damage if applicable, blade-to-discharge ring as-found dimensions and the need to weld-build-up and line-bore discharge ring; blade main and blade angle selection and lever journal and bushing condition and the need for repair.
    c. Provide as repaired report of prior and final component dimensions.
2. Lower ring, disassemble component(s):
    a. Visually inspect and provide report along with repair recommendations; if applicable (determine if lower wicket gate bushings need to be upgraded to grease-free bushings Thordon, CIP, Orkott, etc); should galling of sealing surfaces be present note need for weld repair.
    b. Provide as-repaired report of prior and final component dimensions.
3. Stay Vanes, disassemble component(s):
    a. Visually inspect and provide report along with repair recommendations; if applicable.
    b. Final in-place blast and coat.
4. Head cover vs lower ring sealing surface flatness and parallelism (head cover installed with runner and wicket gates removed):
    a. Visually inspect and provide report along with repair recommendations; if applicable.
    b. Provide repair report of prior and final dimensions.
5. Wicket gate bushing line boring (head cover installed with runner and wicket gates removed):
6. Discharge ring:
    a. If applicable based upon inspection noted in Bid Item No. 6, Part A, Section 6, weld build-up and line bore discharge ring bore to close excessive gap between runner blades and discharge ring.
    b. Report on findings with repair recommendations;

c. Provide as-repaired report of prior and final component dimensions.

Part B:

1. As separate items, provide the shop rate and number of hours to perform the repair of item(s) referenced in Bid Item No. 7, Part A, Section 1.
2. As separate items, provide the shop rate and number of hours to perform the repair of item(s) referenced in Bid Item No. 7, Part A, Section 2.
3. As separate items, provide the shop rate and number of hours to perform the repair of item(s) referenced in Bid Item No. 7, Part A, Section 3.
4. As separate items, provide the shop rate and number of hours to perform the repair of item(s) referenced in Bid Item No. 7, Part A, Section 4.
5. As separate items, provide the shop rate and number of hours to perform the repair of item(s) referenced in Bid Item No. 7, Part A, Section 6.

Bid Item No. 8: Reassembly of the Kaplan turbine unit:

Work under this section shall consist of labor, materials, and equipment necessary for the following items:

1. Reassemble turbine and generator components in reverse order of disassembly, setting up all components to OEM-recommended settings.
2. Work will not be deemed complete until the unit has run at 100% for at least one week with stator temperatures, bearing temperatures, packing, runout etc. within limits. Measure and report conditions at start-up, during different load applications, and at end of test period.

3.3 SPECIAL CONDITIONS FOR WORK

There are circumstances of the work space and crane that must be considered to complete the work successfully. The following need to be considered and included, but not limited to, as part of the cost of performing the Bid Items:

1. The work space is very limited inside the powerhouse building when the unit is being disassembled. The contractor should plan to temporarily relocate some parts of the unit (probably larger components) to clean, dry, enclosed storage to facilitate more work space inside the powerhouse building during the project. It is possible to store some items inside other facility buildings on site. The contractor is responsible for the loading, transporting, and unloading of any components for the disassembly and reassembly of the unit. Special consideration must be given to the access points available, relative to the component sizes, to accomplish this.
2. The 20 ton crane inside the powerhouse building does not fully reach the access hatch in the floor of the powerhouse. Special rigging is required in order to safely lift components from or to the lower deck location through the panel. The contractor is responsible for rigging such a system to safely accommodate the lifting procedures through the floor access panel when necessary.

4.0 PROJECT MANAGEMENT AND COORDINATION

This section includes requirements for Project Meetings, Contractor's Project Manager, coordination of project activities and requirements of the Contractor's Work Plan and Work Schedule.

4.1 SUBMITTALS

1. Provide the required submittals in accordance with Submittals Section of these specifications. Contractor shall keep Submittal Log current and up to date, including any additional submittals required in each Section. Submit updated or corrected listings to Owner.
2. Detailed Work Plan (Work Plan) with Project Construction Schedule: Submit a Work Plan with a detailed project construction schedule 20 days after project award, or 5 days prior to a Pre-Construction Meeting, whichever comes first. Show at minimum Contractor's mobilization, submittals necessary for material and equipment procurement, and required construction activities. Submit a Work Plan that:
    a. Contains a Critical Path Milestone (CPM) schedule that identifies major tasks and subtasks. All tasks shall be broken down to activities of less than one week in duration. The CPM will identify the anticipated duration of the estimated work force by craft for each activity and/or task. In addition, each activity shall be given an alphanumeric designation. Further requirements of the CPM Schedule are included in subsection 4.2.
    b. Contains a narrative logic, incorporating the alphanumeric activity designations, describing the relationship of the above activities, and tasks in the scheduling of work (e.g., installing upper rotor covers [E-7] will precede cleaning and installing upper guide bearing checking the clearance of 1D [E 8]).
    c. Incorporates the delivery, unloading, and installation of materials and equipment.
    d. Identifies major equipment that will be used for each activity.
    e. Identifies all subcontractors to be used for each activity.
    f. Identifies all activities at the beginning of which required interaction or coordination with Owner.
    g. Identifies all activities which may not begin without some approval by Engineer or Owner (such as submittals, hold and witness points, etc.).
    h. Identifies completed pay items associated with each activity.

3. CPM Schedule Updates: Prepare and submit biweekly Critical Path Schedule updates and whenever changes occur that have potential to delay substantial or physical completion by 3 or more working days. When required, a written narrative describing the project schedule status, the critical path and any revisions to the schedule shall be included with the updates:
    a. Milestone Summary Table: Provide list of key milestones and target completion dates. Highlight any changes to the target completion dates.
    b. Look Ahead Schedule: At each weekly progress meetings, the Contractor shall submit a look-ahead schedule showing the Contractor's, and all subcontractors' proposed Work activities and any Owner activities for the next 2 weeks. Include the description, duration and sequence of Work, and highlight any deviations between planned and regular hours of Work. The 2-week look-ahead may be reduced to a 1-week look-ahead with the approval of the Engineer. Unless otherwise specified in the Contract, the Contractor shall notify the Engineer at least 2 Working Days in advance of changing Work as shown in the look-ahead schedule; an updated look-ahead schedule shall be submitted with the notification.
    c. Dry Work Area Water Control Plan: Submit a Dry Work Area Water Control Plan include at a minimum the following items:

i. Proposed control measures to keep work area dewatered from tailwater conditions. The control measures must provide protection when tailwater reaches el. 1903' and above.
ii. Identify any spare equipment, materials, methods, and locations to be available in the event dewatering or sealing must occur.
iii. Identifies the planned work area limits to be dewatered should the need arise.

4.1 CRITICAL PATH SCHEDULE

4.2.1 GENERAL REQUIREMENTS

1. The scheduling of the Work shall be the responsibility of the Contractor. This project will be planned and tracked by use of a conventional Critical Path Method (CPM) schedule.
2. The Engineer's review and acceptance of any critical path schedule shall not transfer any of the Contractor's responsibilities to the Owner or to the Engineer. Acceptance implies only that the Engineer has determined that the Critical Path Schedule submittal with any noted exceptions is within reasonable conformity to the requirements of the Contract. Acceptance of any schedule shall not relieve the Contractor of its responsibility to complete the work within the required Contract Time.
3. The "critical path" is the series of sequentially-linked activities in a project schedule that will take the longest total amount of time to complete. Therefore, at any point in time, the critical path will be the path with the least amount of total float. The critical path does not have to follow the same logic path from start to finish and does not have to have zero total float. A critical task is a discrete work activity within a critical path. "Total Float" is the number of days that a scheduled activity can be delayed without affecting a given intermediate milestone or Physical Completion Date. A milestone is a zero-duration task marking the completion of a significant body of work or important date/event associated with the Contract.
4. The baseline CPM Schedule and each Critical Path Schedule update shall conform to the following guidelines:
    a. Schedules shall be prepared, viewed, and printed utilizing standard Gantt-chart format.
    b. Show all activities necessary to complete the Work.
    c. Each task shall have a descriptor sufficiently detailed to understand the scope of work encompassed by that task. Overly-broad descriptors (e.g. "disassembling", "electrical", "cleaning", etc.) may be rejected by the Engineer, especially when in conjunction with long durations.
    d. Activities shall be assigned durations consistent with the activity's scope of work, assuming that work will be done continuously over the entire task duration. Float time shall not be represented as a part of the task duration.
    e. Sequential work activities shall be linked logically by precedent/successor activities.
    f. Display the Critical Path as a red-colored sequence within the project schedule. Multiple parallel critical paths will not be allowed unless the

Contractor can demonstrate that each of the parallel paths has minimal total float time.

g. Show duration in Working Days.

h. Show Contract milestones including the following:
   i. Notice to Proceed Date
   ii. Substantial Completion Date
   iii. Physical Completion Date
   iv. Any milestones at the discretion of the Contractor

i. Show required submittals for significant activities. Establish discrete work activities for provision and review of submittals, ensuring durations conform to the time allowed by the Contract.

j. Identify special labor or equipment needs that may constrain or limit the Contractor's ability to perform project tasks simultaneously. These may be shown as "Resources" within the CPM schedule, or described separately in narrative format.

k. Show procurement, manufacture and delivery activities for significant material items of Work that affect the schedule.

l. Show significant elements of the Dry Work Area Water Control Plan and temporary site control. These elements may include but are not limited to the installation and removal of temporary lifting mechanisms, racks, stands, and water control.

m. Include project close-out items such as punch-list items, and as-repaired drawings.

5. Unless otherwise specified in the Contract, the Contractor shall allow the Engineer a reasonable amount of time to perform his activities. Reasonable will be defined as "customary or normal" for the type of work involved.

6. Float available in the CPM Schedule, at any time, shall not be considered for the exclusive use of either the Contractor or the Owner's Site Representative. However, any float used by the Owner that is later needed by the Contractor and results in delay to the critical path will be considered an excusable non-compensable delay.

7. The Contractor, or its Subcontractor(s), shall not deviate from the projected start and completion times for major phase(s) of the Work shown on the accepted CPM Schedule without providing at least fourteen (14) Days advance notice to the Engineer. Failure to notify the Owner's Site Representative of a deviation from projected start and completion times for a major phase of the Work shown on the schedule may impact costs to the Owner. Resulting costs due to this "failure to notify" shall be the responsibility of the Contractor. The Owner will deduct these costs from any payment due or to become due to the Contractor.

4.3 PROJECT MEETINGS

1. Preconstruction Meeting: After the Notice of Award (NOA) has been executed a preconstruction meeting will be scheduled for the Contractor, Owner and Engineer. The meeting would be planned to be approximately 2 weeks after NOA and will take place at Owner's office at the project location. A preliminary agenda is included below:

a. Review the Work Plan, CPM Schedule and Milestone Summary Table. Identify major work activities including the order and duration of work activities, milestones and time frames required in the Contract, and the critical path.
b. Discuss and review Contractor's breakdown of bid items.
c. Establish a working understanding among the various parties affected by the Work.
d. Establish and review procedures for progress estimates and cut-off dates, notifications, approvals, reviews, submittal delivery methods, etc.
e. Establish normal working hours for the work.
f. Review safety standards and maintaining cleanliness.
g. Review the Dry Work Area Water Control Plan as applicable.
h. Review material sources as may be applicable.
i. Discuss other related items as may be pertinent to the Work.

2. Weekly Progress Meetings: Weekly progress meetings will be held at the Owner's office at the Operations Control Building. In addition to representatives of the Owner and the Contractor, attendees will include each subcontractor or entity concerned with the current progress or involved in planning, coordination or performance of future activities. These meetings will be used to coordinate work and review progress. The Milestone Summary Table, project CPM and look ahead schedule will be reviewed. Owner's Site Representative will establish conference call-in information for representative not on-site.

4.4 SITE COORDINATION

1. The Contractor is responsible for the coordination of their own work with the work of their subcontractors. The Owner's Site Representative will be responsible for coordinating the Contractors' activities with all other entities involved with the project.
2. Contractor will be required to have a qualified Project Manager on site at all times throughout the term of the contract. The Contractor's Project Manager will also be responsible for all coordination of the work of multiple trades and subcontractors, quality control and records documentation required by the contract and their qualifications will be subject to review and approval by the Owner. Project Manager's duties include, but are not limited to:
   a. Preparation of Project Status Reports.
   b. Coordination of inspections by the Owner's Site Representative the project activities.
   c. Coordination of project to assure efficient and orderly disassembly, repair, and reassembly of each part of the Work.
   d. Participation in weekly progress meetings
   e. Being on site any time work is being performed.
   f. Being on site or appointing a Contractor representative whenever work by a subcontractor is being performed.

4.5 COOPERATION WITH OTHER CONTRACTORS

Contractor shall cooperate with all other contractors who may be performing Work on behalf of the Owner or any Work in the vicinity of the Site. Contractor shall not delay or interfere with the Work or storage of materials and equipment of Owner or other contractors.

4.6 PLANT AND EQUIPMENT

Contractor shall provide plant and equipment of adequate capacity and efficiency to accomplish the Work on schedule and in a safe and workmanlike manner. All plant and equipment shall be maintained in good working order. Owner reserves the right to prohibit the use of any plant and/or equipment by Contractor, the use of which, in Owner's opinion, would affect the quality of the Work, and/or the safety of life and property.

4.7 CONDUCT AND IDENTIFICATION OF CONTRACTOR'S EMPLOYEES

1. Employees of Contractor shall not be permitted to enter upon Owner's premises unless and until they shall have identified themselves in the manner and to the extent agreed upon between Owner and Contractor. Owner reserves the right to require all Contractor employees to identify themselves with photo ID badges provided by the Contractor before they enter upon Owner's premises unless another manner of identification is agreed upon between Owner and Contractor. Contractor shall also be required to sign into the job site each day prior to the start of work.
2. Upon admission to Owner's premises, Contractor's employees shall comply with directions of Owner's employees and/or representatives while on the premises.
3. The Contractor's Project Manager or his designated appointee, shall also serve as a "Security Liaison" that will be available on a 24/7 basis for the duration of the project to address any security related issues. The Contractor shall maintain a daily log of all Contractor personnel, including subcontractors, equipment operators and visitors at all Work Sites related to the project. The daily log shall be provided to the Owner monthly in an electronic format approved by the Owner. The Owner reserves the right to deny or to revoke access onto the site or sites to any Subcontractor, temporary or short-term Contractor personnel or visitor at any time.
4. Contractor shall issue instructions to his employees covering the foregoing requirements and he undertakes that he will, at all times, cooperate with Owner to the extent necessary to bring about compliance therewith.

4.8 ACCESS BY OTHERS

1. Do not restrict the movement of Owner's authorized personnel and equipment in the performance of their Work at Site. Coordinate and obtain approval from Owner for any proposed blockages of the Powerhouse Access Road, entrances, and exits.
2. Contractor will be required to cooperate with other contractors performing Work for Owner and to coordinate and arrange the sequence of his Work to conform to the progressive operations of the Work already under Contract or to be put under Contract. Cooperation and adjustments with other contractors engaged in work on the Site is essential to properly coordinate the construction efforts of all contractors.

5.0 SUBMITTAL PROCEDURES

1. Schedule of Submittals: Within 10 calendar days after the effective Notice to Proceed, the Contractor shall submit a completed submittal schedule and list of products for all items requiring the Owner's Site Representative's review and approval as follows:

a. Submittals, including description of the item and name of manufacturer, trade name, and model number.
b. Specification reference.
c. Intended submission/resubmission date(s).
d. Order release date.
e. Lead time to delivery/anticipated delivery date(s)
f. Highlight any items that require expedited review to meet project schedule.

2. The Submittal Schedule shall be presented in a form acceptable to Owner's Site Representative in electronic version (PDF) and shall be updated and sent to the Owner's Site Representative on a monthly basis. Identify all submittals that are required by the Contract Documents and determine the date on which each submittal will be submitted in conformance with project progress schedules.
3. Submittals from subcontractors, suppliers, and sellers, will not be accepted.
4. Notify Owner's Site Representative in writing at time of submittal, of any deviations from requirements of Contract Documents.
5. Review Period:
   a. Prepare submittals a minimum of 5 days in advance of planned work so that approval may be given before commencement of related work.
   b. Owner's Site Representative will endeavor to review and process submittals in a timely manner, with response to submittals and Requests for Information (RFI) targeted to be completed and returned within 5 working days of receipt. If upon review of the submittal or RFI, this time frame is found to not be achievable, a target date for completed review will be provided.
   c. Submittals that indicate high priority will be expedited.
6. Transmittal Delivery:
   a. Shop Drawings and Product Data Submittals: Transmit electronically to Owner's Site Representative in PDF format using the Owner's Site Representative's selected project documentation file management system, as selected during pre-construction meeting.
   b. Samples: Ship samples prepaid to Owner's Site Representative with a hardcopy of the transmittal form.
   c. Other Submittals and RFIs: Transmit electronically to Owner's Site Representative in PDF format using the Owner's Site Representative's selected project documentation file management system, as selected during preconstruction meeting.
7. Transmittal Form: Transmit submittals and RFIs to Owner's Site Representative under electronic transmittal form (PDF). Unless a form is provided by Owner's Site Representative, include the following information:
   a. Contractor's name, address, and telephone number;
   b. Submittal or RFI number, title and date;
   c. Contract title and number;
   d. Supplier's, Manufacturer's, or Subcontractor's name, address, and telephone number;
   e. Subject identification including Contract Drawing and Specification reference.
   f. Provide space for Owner's Site Representative review stamps.
   g. For RFIs include a description of item needing clarification. Reference appropriate drawings and specifications. Provide space for Owner's Site Representative's response.
8. Identify high priority submittals that request expedited review.
9. After Owner's Site Representative's review of submittal, revise and resubmit as required, identifying changes made since previous submittal.

10. Distribution of Submittals after Review: Distribute copies of approved submittals to concerned persons. Instruct recipients to promptly report any inability to comply with provisions.
11. Changes in Approved Submittals: Changes in approved submittals will not be allowed unless those approved submittals with changes have been resubmitted and approved, in the same manner as the original submittal.
12. Supplemental Submittals: Supplemental submittals initiated by the Contractor for consideration of corrective procedures shall contain sufficient data for review. Make supplemental submittals in the same manner as initial submittals.
13. Submittal Return by Owner's Site Representative:
    a. Shop Drawings and Product Data Submittals: One marked up electronic (PDF) copy of the reviewed submittal will be returned to Contractor using the Owner's Site Representative's selected project documentation file management system.
    b. Samples: Samples will not be returned to contractor.

5.1 OWNER'S SITE REPRESENTATIVE REVIEW

1. Submittals shall be understood as being made for approval, unless otherwise specified, for example, as being made for information, or record. The Owner's Site Representative will indicate its reviews of submittals and the action taken (approvals and non-approvals) by means of its review stamp. The review stamp will be affixed by the Engineer, the action block will be marked, and the stamp will signed and dated.
2. The review stamp action block marks will have the following meanings:
    a. The review grade "APPROVED" is an acceptance, and means that the submittal appears to conform to the respective requirements of the Contract Documents; that fabrication, assembly, manufacture, installation, and application of the illustrated and described product or procedure may proceed; and that the submittal need not be resubmitted.
    b. The review grade "APPROVED AS NOTED – RESUBMISSION IS NOT REQUIRED" is an acceptance, and means that the submittal appears to conform to the respective requirements of the Contract Documents upon incorporation of the reviewer's corrections, and that fabrication, assembly, manufacture, installation, application, and erection of the illustrated and described product may proceed. Submittals so marked need not be resubmitted unless Contractor challenges the reviewer's exception.
    c. The review grade "NOT APPROVED" is a disapproval, and means that the submittal is deficient to the degree that the reviewer cannot correct the submittal with a reasonable degree of effort, has not made a thorough review of the submittal, and that the submittal needs revision and is to be corrected and resubmitted.

5.2 SHOP DRAWINGS

1. When requested by Owner's Site Representative, Contractor supplied drawings shall be accompanied by calculations.
2. All drawings shall be of a high standard with respect to neatness, clarity, and legibility. Owner's Site Representative will reject drawings of unsuitable standard and these shall be redrawn and resubmitted by Contractor.

3. Drawings shall be limited to the following standard sizes in inches: Minimum size shall be 8.5” x 11”; Maximum size shall be 22” x 34”.
4. Each drawing shall have the following information in the title block:
    a. Drawing number, date, title, revision number, and sheet number.
    b. Project name, Owner’s name
    c. Contract number, Contract sheet number, Contract page number.
    d. Contractor’s name.
    e. Subcontractor/manufacturer name (if applicable).
    f. Name of installation location.
5. Each drawing shall include details necessary for the procurement, installation, maintenance, and repair of all components or facilities equipment provided. Change Order notices that are attached to drawings shall not constitute revised drawings. Each drawing shall include all changes and be upgraded to reflect the latest configuration.

5.3 PRODUCT DATA

1. Submit only pages which are pertinent. Mark each copy of standard printed data to identify pertinent products, referenced to specification section and article number. Show reference standards, performance characteristics, and capacities; wiring and piping diagrams and controls; component parts; finishes; dimensions, and required clearances.
2. Modify product data by deleting information that is not applicable to the Work or by marking each copy to identify pertinent data.
3. Supplement standard information, if necessary, to provide additional information applicable to the Work.
4. Provide manufacturer's storage and handling, preparation, assembly and installation instructions.
5. Submittals shall include the following:
    a. Date and revision dates.
    b. Contract title and number
    c. Reference Contract Drawing numbers.
    d. Applicable Contract Specification Section numbers
    e. Identification of product by either description, model number, style number, or serial number.
    f. The names of the Contractor, Subcontractors, Suppliers, and manufacturers as applicable.
    g. Applicable standards, such as ASTM or Federal specification numbers.
6. Certificates of Compliance:
    a. The Owner’s Site Representative may permit the use of certain materials prior to sampling and testing if accompanied by a certificate of compliance stating that the materials involved comply in all respects with the requirements of the Contract Documents. The certificate shall be signed by the manufacturer of the material. A certificate of compliance shall be furnished with each lot of material delivered to the Work, and the lot so certified shall be clearly identified in the certificate.

b. All materials used on the basis of a certificate of compliance may be sampled and tested at any time. The fact that material is used on the basis of a certificate of compliance shall not relieve the Contractor of responsibility for incorporating material in the Work which conforms to the requirements of the Contract Documents. Any such material not conforming to such requirements shall be subject to rejection whether in place or not.

c. The Owner's Site Representative reserves the right to refuse the use of material submitted for approval solely on the basis of a certificate of compliance.

d. The form of the certificate of compliance and its disposition shall be as approved by the Owner's Site Representative.

5.4 SAMPLES

1. Submit samples in accordance with requirements of each Specification section. Samples shall show the quality, type, finish and texture of the material. Materials for which samples are required shall not be used in the Work until approved in writing by the Owner's Site Representative.
2. Sample Label: Each sample shall be labeled with the following data:
   a. Project name, Owner's name;
   b. Name, number, and part on project;
   c. Name of Contractor;
   d. Material or equipment represented in the project;
   e. Name of producer, brand, trade name if applicable, and place of origin;
   f. Date of submittal.

5.5 OTHER SUBMITTALS

1. Submittals other than Drawings, Product Data, and Samples shall be furnished per Article 4.1 above.
2. Other submittals shall be furnished upon request for the Owner's Site Representative's approval to verify compliance of all equipment, materials, and methods with the Contract Documents. These submittals shall include in addition to drawings: catalog cuts, certifications of compliance, or any other substantiating information for methods or samples of material items as necessary.

5.6 SUBSTITUTIONS

Contractor may submit a request for substitution in writing. However, Contractor must provide the necessary background information to fully evaluate the request.

5.7 HEALTH AND SAFETY

This Section covers the requirements for compliance with health and safety precautions and controls for projects without hazardous waste operations.

6.1 SUBMITTALS

1. Health and Safety Plan: Include with the Work Plan a site specific Health and Safety Plan addressing health and safety management methods specific to the project. The Plan shall, at a minimum, include:
   a. Name of the Lead Safety Person at the jobsite responsible for implementation and compliance with this Plan.

b. Description of tasks to be undertaken, and equipment mobilized for this project.
c. Description of evacuating injured personnel from the Work Area.
d. Temporary Emergency Action Plan that describes the communications methods for monitoring water levels and need to evacuate the Work Area, notification methods for evacuating personnel, and procedures for evacuating the Work Area.
e. Daily tailgate meetings with Contractor, Owner's Site Representative and Upriver Powerhouse operator.
f. List of all known safety or health hazards, problems, and proposed control mechanisms.
g. Material Safety Data Sheets (MSDSs) of and procedures for using, disposing of, or storing for all chemicals, products, or materials regulated by WAC 296-62 to be used by the Contractor.
h. List of personal protective equipment, monitoring devices, and hazard-specific plans as appropriate and required by State and Federal regulations. Description of emergency response measures, equipment available for emergency response to address accidents and releases of materials, including, but not limited to, first aid, eye wash/showers, and fire extinguishing equipment, and location of this equipment at the jobsite.
i. Emergency phone numbers contacts, and location of the nearest medical facility.
j. Monitoring and inspection plan and record keeping measures to ensure that equipment and work practices comply with this Plan.
k. Personnel names, training and notification procedures as appropriate to ensure that all jobsite personnel are familiar with the Plan elements. Include copies of training certificates.
i. Cell phone numbers and emergency home and office phone numbers for all Contractor's key personnel (Project Manager, Superintendent, Lead Foreman, etc.).
l. Proposed communication equipment and methods for Contractor communication with Contractor's personnel in the Work Areas, with Upriver Powerhouse Operators and with Owner's Site Representative.
m. Brief description of planned safety meetings and frequency of meetings.
n. Procedures for safe storage and handling of flammable liquids, in accordance with WAC 296-24-330.
o. If applicable the Contractor shall include procedures for safe storage and handling of compressed gasses in accordance with WAC 296-24-295, Compressed Gas General Requirement.
p. Other issues which the Contractor determines are appropriate and necessary to protect worker safety and health.

6.2 SAFETY – GENERAL

1. Worker safety and protecting the environment is a high priority. Contractor shall strictly enforce adherence to training and safety rules.

2. Contractor shall comply with any safety program required by Federal, State, Local, Owner, Engineer and Contractor safety policies. Where there is a difference between policies, the more stringent rule shall govern. The program shall also include filing of all accident and injury reports with Contractor's Project Manager and Owner's Site Representative.
3. It is the responsibility of Contractor to supply his own employees with all necessary personal protective equipment (PPE).
4. Contractor shall designate a project site staff member as its lead safety person during this project. The lead safety person shall have current, validated first-aid and safety training and shall be in control of all safety related issues, in their area of responsibility, throughout the project.
    a. Designate personnel with qualifications to administer first aid. Contractor shall notify Owner's Site Representative of all injuries and first aids within 24 hours that the injury occurs. In the event of an injury requiring off-site medical attention, Contractor is required to notify Owner immediately. Contractor shall be responsible for making prompt arrangements with local ambulance/rescue team services and hospitals for transportation and treatment of employees with major injuries.
    b. Procure, maintain, and display on Site, a list of local first aid and medical services which includes services' phone numbers.
5. Provide and maintain a fully stocked first-aid equipment center, sufficient to address first-aids and medical emergencies, at the work site. Contractor shall provide for the treatment of minor injuries to his employees.
6. Conduct daily tailgate with Contractor personnel, Owner's Site Representative and Upriver Powerhouse operator to review at a minimum the planned work for the day, identify specific work hazards, forecasted river flows and health and safety systems to be implemented for the day.
7. Contractor shall provide and maintain air horns or other similar means for emergency use for all his personnel.

6.3 COMMUNICATION AT SITE

1. Facilitate direct communication between Lead Safety Person, Owner's Site Representative and Upriver Powerhouse Operators. If Contractor deems that work conditions are unsafe at any time during the work period due to the rate of increasing river flows and meteorological forecasts such that a rise in the tailwater to above el. 1903' is pending within 48 hours, he/she shall have full authority to stop all work in the powerhouse and order personnel to evacuate the powerhouse area immediately.
    a. Contractor may check out and use an Owner supplied radio for direct communication with Upriver Powerhouse Operator for 24-hr communication with Owner's operating staff.
    b. Upriver Powerhouse Operators will operate facility to provide a minimum 1 to 2 hour period for evacuation of the powerhouse work area in the event that tailwater elevation is to increase beyond el. 1903'. Operators will notify Contractor immediately if spillway operation is imminent.
2. Provide long-range digital pager and/or cell phone and/or radio to the Lead Safety Person and require that they carry communications equipment with them

at all times for emergency contact purposes. Contractor's key personnel (Project Manager, Superintendent, Lead Foreman, etc.) shall have cell phones and/or radios with them at Site. Provide key personnel cell phone numbers to Owner.

3. Provide and maintain a constant and reliable form of communication to all personnel located in the powerhouse during all Work tasks so that constant communication with the Contractor's safety personnel can be maintained at all times.
4. Provide and maintain a constant and reliable form of communication to Owner's Site Representative and with Contractor's Safety Inspectors.

7.0 QUALITY ASSURANCE

1. When referenced herein, the term "Owner" may include at Owner's discretion, the representatives of the Owner's independent materials testing lab/service, Engineer or the Owner's Site Representative. The term "Contractor" shall include subcontractors, suppliers, sub-suppliers, and sellers.
2. The requirements for Quality as outlined in this Section and elsewhere in these documents shall apply to Contractor as well as its subcontractors or to any tier of supplier who shall furnish material, components or services as part of the Work covered by these documents.
3. Owner may subcontract with independent materials testing services to perform testing and quality control inspection and materials testing services. Coordinate with Owner and their subcontractors in scheduling and executing testing services if applicable.
4. All materials and Work activities covered by the reference drawings and specifications will be subject to inspection and acceptance by Owner.
5. Owner's inspection program will include a system for controlling materials and work which are found to be in nonconformance with the drawings and/or specifications. This program will include the use of Non-Conformance Reports (NCR) to document non-conformances and their resolution.
6. Observations and inspections performed or witnessed by Owner or his designated representative shall not relieve Contractor and all subcontractors of their responsibility to satisfy the quality control requirements of these specifications and all applicable referenced codes and standards.
7. Whenever disputes may occur during the course of the Contract, the Owner will be the sole judge of the acceptability of the materials and the workmanship for the Work provided by Contractor.

7.1 PROCUREMENT QUALITY

1. General: These requirements pertain to inspections and tests necessary to substantiate product conformance to contractual requirements.
2. Description:
   a. Contractor shall allow Owner access to his premises for the purpose of quality surveillance and verification. Contractor shall also arrange for access to subcontractors/suppliers facilities at Owner's request.
   b. Contractor shall notify Owner at least five working days prior to the date of the following, except as noted:
      i. When the order has been released to manufacturing for fabrication or machining;
      ii. At in-process inspection/test "Witness" points pre-identified by Owner, if any;

iii. At inspection/test “Hold” points pre-identified by Owner, if any;
iv. Material or equipment is ready for final or witness inspection test, if any. Failure to do so may be cause for rejection and/or repetition of the activity at Contractor’s expense;
v. Points designated “Hold”, if any, are mandatory for Owner’s witnessing, unless waived in writing. Points designated “Witness”, if any, will be witnessed at the convenience of Owner and Contractor is not obligated to delay his inspection/test or subsequent processing at “Witness” points.

c. Contractor shall ensure that documentation controlling the Work, such as drawings, procedures, purchase orders, and specifications are readily available at the location where the Work is performed.
d. Contractor shall provide Owner with documented notification of all deviations from contractual requirements, such as deviations from specifications, codes, and drawings and shall undertake repair only after concurrence by Owner.
e. Owner may periodically monitor Contractor’s (and/or his subcontractor’s) conduct of work to assure compliance with this specification and applicable procurement documents.
f. Material, equipment, and services shall be subjected to all tests and inspections required by the applicable codes and standards in addition to those explicitly called for in this specification and applicable procurement documents.
g. Owner shall inspect the Work at Contractor’s and/or Owner’s facility for compliance with the specification and applicable procurement documents. Deficiencies noted during this inspection may be cause for rejection of the Work and its return to Contractor at Contractor’s expense.
h. Inspections performed by Owner do not relieve Contractor or his subcontractors of their obligation to maintain an adequate test, inspection, and documentation program of their own.
i. Contractor shall be responsible to assure that applicable quality and technical requirements specified in the procurement documents are passed on to and implemented by subcontractors.
j. Contractor is responsible to review and determine that all sub-vendor procedures for special fabrication and testing meet the applicable requirements.
k. Items shipped to another contractor en route to Owner shall be accompanied by specific instructions as to the required maintenance, storage, handling, shipping, installation, operation, preservation, and packaging of the items during this transient period.

7.2 PROJECT WORK QUALITY

1. General: Owner’s Inspection Program for the construction phase of the project will include documented inspections in the areas of material receiving, storage, installation, and testing activities associated with the Work.
2. Description:
   a. The Owner’s Site Representative may visit and inspect the Work at all times during its progress, and Contractor shall provide all proper access facilities that may be necessary for a complete and safe inspection.
   b. Owner shall have the right to order the cessation or modification of Work whenever in his judgment such work is contrary to the terms of the contract or is, or may become, a danger, provided, however, that neither

the presence nor absence of Owner's Site Representative(s), nor any action or failure to act on their part, shall relieve Contractor of any obligation or liability elsewhere imposed in the Contract.

c. Work and materials which are found to be in nonconformance with the drawings and/or specifications will be reported by NCRs to Owner for disposition. The NCR will include Contractor's recommended disposition of the nonconforming condition, i.e., "Reject," "Repair," or "Rework." Contractor's recommended disposition must be accepted by Owner in writing prior to its implementation. If Contractor's recommended disposition is unacceptable, Owner will specify the required disposition and Contractor shall implement this disposition. Such nonconforming materials will be identified by colored "QC Hold" tags traceable to the NCR and use of the materials will not be permitted until the QC Hold is removed by Owner's Site Representative. Owner may require that nonconforming materials be segregated from acceptable materials or removed from the Site to prevent their inadvertent use in the Work. In the event that the disposition of materials or completed Work is "Rejected", the nonconforming condition shall be classified as "defective work" and promptly replaced in accordance with this specification.

d. Colored tags will be removed by Owner's Site Representative only after completed repair or rework has been re-inspected and accepted in writing by Owner.

e. Prior to machine shop work, machine shop facilities shall be certified and approved by Owner.

7.3 CONTRACTOR REQUIREMENTS

Contractor's responsibilities for quality shall include, but not be limited to, the following:

1. Ensure that materials received by Contractor or his subcontractors for use in the Work conforms to the requirements of the reference drawings and/or specifications and purchase order.
2. Ensure that all Work conforms to the requirements of the drawings and/or specifications.
3. A system for collecting and filing QA records. Meticulous notes shall be recorded by the contractor during disassembly and reassembly of the unit to ensure proper procedure is followed.
4. Assignment of individuals directly responsible for 1, 2, and 3 above.
5. Contractor shall allow Owner's Site Representative(s) free access to all areas of the Work at Site or in the shops where the Work is being performed.
6. Contractor shall promptly remove from the Work all materials (whether or not already incorporated into any installation of the Work) and any part or parts of the Work condemned by Owner's Site Representative or by any federal, state, or municipal agency having authority in respect thereof, as failing to conform to the requirements of the Contract. Contractor shall thereupon promptly replace such materials and re-execute such part or parts of the Work in accordance with the Contract without any cost or expense to Owner.
7. Contractor shall implement and utilize an assembly/disassembly checkout form system. The format of the checkout form shall be acceptable to Owner. A

checkout form for each bid item or main turbine component shall be initiated by Contractor at the start of mechanic work. The mechanical assembly/disassembly checkout form shall have provision for sign-off by the responsible craft foreman/superintendent attesting to proper mechanical practices, alignment and condition; component testing and preparation; lifting preparation; flanged fitting installation; disassembly and reassembly alignment checks for installation; lubrication installation; and cleanup. The form shall also have provision for sign-off by Owner's Site Representative (after sign-off by the responsible craft foreman/superintendent) verifying that Contractor has completed each of these activities in accordance with the drawings and/or specifications. The completed checkout form shall be forwarded to Owner for final acceptance. Work shall not commence and removing or placing operations shall not be started until Owner's Site Representative has accepted Contractor's preparations and signed the checkout form.

7.4 SUBMITTALS

Within 10 days after Notice of Award, Contractor shall submit the following information to Owner for review and acceptance. Any information not available at the required time shall be scheduled to the satisfaction of the Owner:

1. A list of subcontractors that are proposed to be used in this Work for the Owner's review and approval.
2. Provide unpriced copies of all contracts and purchase orders issued for Work to Owner's Site Representative for attachment to their inspection reports.
3. Copy of blank mechanical assembly/disassembly checkout form.

8.0 TEMPORARY FACILITIES AND CONTROLS

8.1 TEMPORARY WATER

Provide and maintain adequate water for domestic use.

8.2 TEMPORARY SANITARY FACILITIES

Provide and maintain adequate temporary sanitary facilities for the work force. Comply with all applicable health codes.

8.3 TEMPORARY LIGHTING

Contractor shall provide, install and maintain temporary artificial lighting for areas where natural light does not meet the minimum requirements for construction work. The lighting equipment shall be standard products meeting UL standards.

8.4 FIELD OFFICES

1. Field Office Location: Coordinate proposed field office with Owner.
2. Contractor shall provide and maintain a field office for his own use. Contractor shall maintain in his field office, one copy of all drawings and specifications, Material Safety Data Sheets (MSDS) and other pertinent information relating to the Work. Such information shall be available to Owner during construction and shall be delivered to him upon acceptance of the Work.
3. Contractor shall provide and maintain telephones in his field office and all necessary connections to local communication providers for his own use.

8.5 BREAK AREA

Contractor is responsible to provide break / change trailer, if necessary, for Contractor personnel, if applicable.

8.6 FIRE PROTECTION

1. Contractor shall be responsible for fire protection in his Work, office and staging areas and shall supply and maintain all necessary fire protection equipment. The type of equipment and its relative position to the Work areas shall be in conformance with all regulations and to the Owner's Site Representative's satisfaction. Contractor personnel must be trained in operation / use of fire extinguishers. Fire-fighting equipment shall be maintained in operable condition at all times.
2. In general, the applicable practices of the National Fire Protection Association shall form the basis of the fire safety requirements for the project. Contractor's fire protection system shall include the use of water.

8.7 HANDLING OF MATERIALS

Contractor shall receive, unload, store, and handle all materials to be used or installed in the Work.

8.8 PROTECTION OF PROPERTY

1. Contractor shall be responsible for providing and maintaining proper protection from all damage resulting from the performance of the Work as specified and/or carried out for all properties, structures, underground and overhead utilities which are within or adjacent to the Work area or to the staging areas. Any damage resulting from lack of proper protection of the Work shall be repaired at the expense of the Contractor and be subject to the acceptance of Owner.
2. All utilities, equipment, and structures adjacent to the Work shall be kept clear of all debris and Contractor's equipment at all times, except by prior agreement with Owner.
3. Caution shall be exercised in the movement of equipment and personnel under, around, and over existing structures in the immediate work area. Where it is unsafe for Contractor to perform the Work because of inadequate clearances from existing structures or power installations, Contractor shall notify Owner in writing, at least two weeks in advance of commencing work, for Owner to arrange for the temporary removal from service and/or relocation. All Work performed under these conditions shall be in accordance with scheduling and arrangements, as mutually agreed upon by Contractor prior to the commencement of related operations. Contractor shall comply with the instruction of Owner in all matters dealing with Work in the vicinity of energized or de-energized equipment and lines.
4. Contractor shall at all times protect and preserve all materials, supplies and equipment of every description (including property which may be Owner - furnished or owned), and all Work performed. For this purpose, Contractor shall provide all protection against deterioration and damage as required to the satisfaction of Owner's Site Representative. Protection shall specifically include, but not be limited to, air-tight protection against demolition debris, dust , welding and cutting sparks, and slag, for all existing and new (installed or stored) electrical and mechanical equipment.
5. Wherever in this Specification Contractor is required to provide protection for materials, equipment, property or completed or partially completed Work, it shall

be understood that such protection shall include protection from damage resulting from the performance of the Work or other acts.

8.9 ALIGNMENT BENCHMARKS

1. Prior to commencement of the Work, Contractor shall establish alignment benchmarks for the turbine installation.
2. Contractor shall be responsible for all other reference lines and benchmarks required for controlling his Work.
3. Contractor shall preserve all alignment benchmarks (and survey lines if any). In the event of destruction or damage through his own cause, Contractor shall immediately reestablish the benchmarks to the satisfaction of Owner's Site Representative and at no additional cost to Owner. Under these circumstances, Contractor shall also be responsible for delays, errors, and damage which may be caused by such destruction of the benchmarks.
4. Contractor shall cooperate with Owner's Site Representative in making the results of all benchmark establishment work available for review and in assisting Owner's Site Representative in the verification of all benchmark work. All benchmark notes shall be recorded in project notes/field books.

8.10 DISPOSAL OF MATERIALS

1. All debris shall become property of Contractor and shall be disposed of offsite.
2. Contractor shall obtain all necessary permits and shall also obtain written permission from the property owner on whose property the disposal is to be made and shall send the permits, or copies to Owner before any material is removed from the Site. The location of the disposal site and the manner of disposal will be subject to the prior acceptance by Owner. In addition, Contractor shall obtain from the property owner, upon completion, a written statement of acceptance of this disposal work.

8.11 CONTRACTOR'S WORK AND OPERATING AREAS

1. Contractor's operation areas are those areas assigned by Owner to Contractor for his various operational activities. They will encompass all of his areas of project activity, including work areas, shop, storage areas, and field office.
2. Contractor shall, under regulations prescribed by Owner, use only established roads on Owner's premises. When it is necessary to cross curbs and sidewalks, Contractor shall provide protection against damage and shall be obligated to replace or repair any damaged roads, curbing, and walkways at his expense.
3. Contractor shall be allowed to provide all temporary modifications to any of the Owner's facilities or structures to facilitate work on this project only after submittal in writing of any such proposed changes is made to and approved in writing by the Owner. The cost to make any of these changes shall be included in this item and be available for detailed scrutiny by the Owner before approval is given to proceed with the temporary change. All temporary changes shall be restored to original condition or left in place for future work as directed by the Owner at no cost to the Owner.
4. Contractor shall provide and maintain adequate barricades, metal signs, and personnel for the proper protection and control of his operations.

5. The removal of snow and ice from all access roadways, parking lots, and walks during the progress of the Work, shall be provided by Owner.
6. Access to the Work areas by Owner and authorized contractors shall be maintained at all times.

8.12 SECURITY SITE

1. Contractor shall be responsible for security of his own plant and equipment.
2. Entrance to the powerhouse is via double doors on the west side of the building. Public access is not permitted unless accompanied by city personnel.
3. Vehicular and equipment access to the site is controlled by an electronic gate to the main parking area. The gate is open Monday through Friday, from 6 am to 5 pm. Contractor personnel will be required to sign in/out upon entry/exit from work site.

8.13 ACCESS ROAD

1. Contractor is responsible for repair of access roads due to damage from his equipment or work. At the completion of the Work, repair any damaged areas to return all permanent access roads to the existing lines and grades.

8.14 PARKING

1. Available parking areas for Contractor personnel will be coordinated with the owner.

8.15 GARBAGE COLLECTION

1. Contractor shall provide garbage collection services to include all construction-related debris. Keep work areas and site free of construction debris.
2. Contractor is responsible to collect and properly dispose of all trash generated by Contractor personnel.

9.0 CLOSEOUT PROCEDURES

1. Notify the Owner's Site Representative when Contractor believes work is substantially complete. See General Conditions for requirements to be included with the request for substantial completion inspection.
   a. The request shall be made in writing, addressed to the Owner's Site Representative, at least seven days in advance of the requested date of the substantial completion inspection.
   b. The Owner's Site Representative will perform the substantial completion inspection within three days of the requested date.
2. Final Site Cleanup:
   a. Prior to Final Inspection, thoroughly clean the entire site and put it into a clean and neat, acceptable condition. Remove from the site all construction waste and unused materials and debris of any description resulting from the Work.
3. From the information gathered from this substantial completion inspection, the Owner's Site Representative will prepare a punch list of work to be performed, corrected, or completed.

4. All work on the punch list shall be completed by the Contractor prior to requesting the final inspection.

9.1 FINAL INSPECTION

1. When all requirements of the above prepared punch list have been completed, the Contractor shall request the final inspection to determine eligibility for issuance of the Certificate of Substantial Completion. The request shall be made in writing, addressed to the Engineer, at least seven days in advance of the requested date of the final inspection.
2. The Contractor shall be represented by its principal superintendent and such Subcontractors and Suppliers as may be necessary to verify the completion of the Work including punch list items.
3. Depending on the extensiveness of the punch list items, certain elements of the Work may be scheduled separately for final inspection at appointed times.
4. Prior to the requested date of the final completion inspection, provide the following, as applicable:
    a. Record drawings, specifications, and work logs shall be completed, signed, and submitted to the Engineer.
    b. Operating instructions for equipment shall be properly mounted and posted.
    c. Guaranties and warranties shall be submitted to the Owner's Site Representative, as specified in the General Conditions and various sections of the Specifications, along with required operations and maintenance manuals.

9.2 ACCEPTANCE OF THE WORK AND FINAL PAYMENT

1. Upon completion of the Substantial Completion punch list items, the Owner's Site Representative will issue a Certificate of Substantial Completion.

10.0 PROJECT RECORD DOCUMENTS

1. Maintain at the job site one copy of the following documents for record purposes:
    a. Contract documents
    b. Change orders
    c. Approved submittals
    d. Clarifications of explanatory details and specifications
    e. Contractor's QA reports
    f. Contractor's activity log
    g. Laboratory test records
    h. Field test reports and records
    i. Factory test reports and records
2. Maintain for record purposes at a location approved by the Owner's Site Representative, electronic files for those shop drawings and other documents which are required to be submitted electronically. Ensure the backups of electronic files are made on a regular basis and stored at a remote location.
3. Store documents used for record purposes in the Contractor's field office or other approved location, apart from documents used for construction. Do not use record documents for construction or fabrication purposes.

4. Maintain documents in a clean, dry, legible condition.
5. Label each document “Project Record”.
6. Make documents available at all times for inspection by Owner’s Site Representative. Make copies of electronic or hardcopy documents available upon Owner’s Site Representative’s request.

10.1 DRAWINGS

1. Maintain record ("as-built") drawings of all work and subcontracts, continuously as the job progresses. A separate set of prints, for this purpose only, shall be kept at the Contractor's field office at all times. As-built drawings will be checked weekly at a minimum by Owner’s Site Representative and sometimes daily.
2. These drawings shall be kept up-to-date and are required to be so certified by the Owner’s Site Representative at the time invoices are submitted for progress payments. The Owner’s Site Representative may withhold progress payments if record drawings are not kept current.
3. Deviations from the drawings, utilities and services, mechanical and electrical lines, details, and other work shall be incorporated on the record ("as-built") prints in red ink, or in red pencil if sharp, neat, and clearly legible.
4. During the course of construction, identify actual locations to scale in red ink on the Contract Drawings for runs of mechanical and electrical work, including utilities and services, installed in walls, or otherwise concealed. Deviations from the Drawings shall be shown in detail. Locate main runs, whether wiring, piping, conduit, ductwork, or drain lines by dimension and elevation. Shop Drawings may be used to reflect record ("as-built") conditions, in which case the appropriate Contract Document shall be marked to refer to such Shop Drawings as part of the record ("as-built") configuration.
5. No work shall be permanently concealed until the required information has been recorded and Owner’s Site Representative has signed checkout form from Sectoin7.3 part 10 of these Specifications.
6. Where the Contract Drawings are not of sufficient size, scale, or detail, the Contractor shall furnish its own drawings for incorporation of details and dimensions.
7. The final submittal of record ("as-built") drawings shall be stamped "Project Record ", signed and dated in blue ink by the Contractor, and shall be delivered to the Owner’s Site Representative prior to the final inspection
8. Change orders:
    a. Changes to the Contract Drawings as the result of Change Orders shall be incorporated on the prints, and these changes shall be identified by Change Order number and effective date.
    b. When revised Contract Drawings are issued as the basis of, or along with, Change Orders, these revised drawings shall be incorporated into the record ("as-built") set with appropriate annotation. Drawings deleted by Change Order will not be part of the record ("as-built") set. The Owner will furnish the Contractor with reproductions of such revised Owner-furnished Contract Drawings.
9. Submittals:

a. One complete set of approved Submittals, including shop drawings, product data, manufacturers' printed catalog cuts and data, shall be collected and maintained for record purposes.
b. Pages of catalog cuts shall be clear, legible, and permanent. These drawings and catalog cuts shall become the property of the Owner.
c. Submittals shall be filed and maintained separate from Contract Drawings and Shop Drawings.

10. Electronic Documents: Record ("as-built") information, as applicable, shall be recorded on an electronic copy of those documents which are required to be submitted electronically.
    a. For those drawings which are required to be submitted electronically, submit one complete set of full size (22 by 34 inch, unless otherwise required) hard copy originals.
    b. Record documents for each submittal which was required to be prepared and submitted electronically shall include two CD-ROMs of the electronic version. Electronic files shall include a matrix or document showing how the files are set up and how to access them. Include no extraneous files. Folder arrangement must be clear and understandable and subfolders are to be used only when necessary.

10.2 SPECIFICATIONS

1. The specifications for record purposes shall be filed in one or more 3-ring binder or binders.
2. Information, changes, and notes shall be recorded in the specifications in blank areas, such as page margins or the backs of opposite pages, or on separate sheets inserted in the binder. All such information, changes, and notes shall be legibly recorded with red pen or red printing as appropriate.
3. In applicable specification sections, record the manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually furnished and installed, including manufacturer and supplier's address and telephone number.
4. The record specifications shall be complete and shall include all applicable Contract Documents other than drawings.
5. Change orders:
    a. Change Orders shall be incorporated into the front of the record specifications in reverse chronological order. Use appropriate page dividers to identify Change Orders and to separate Change Orders from the Specifications.
    b. In addition, changes to the Specifications effected by Change Order shall be legibly annotated on the affected page or pages of the Specifications or adjacent thereto.

10.3 SUBMISSION OF DOCUMENTS

1. At completion of the Work, and before requesting final inspection, deliver record documents to the Owner's Site Representative.
2. For record ("as-built") drawings, submit the blackline print (full size) with revisions incorporated on the prints in red ink. For those documents which are required to

be maintained electronically, submit full size plot of drawings, hard copies of 8 1/2 by 11 inch documents, and electronic files on CD-ROM.

3. Record documents, separate from Contract Drawings and Shop Drawings, shall be delivered neatly and efficiently filed and packaged. These documents include activity logs and contractor QA reports.
4. Submission of record documents shall be accompanied with a transmittal letter containing the following information:
    a. Date of submission
    b. Project title and number
    c. Contractor's name and address
    d. Title and number of each record document.
    e. Certification that each document as submitted is complete and accurate.
    f. Signature of Contractor, or its authorized representative.

BID PROPOSAL

To: Honorable Mayor
Members of the City Council
City of Spokane, Washington

PROJECT: #4498-18 Upriver Dam Power House #1 Kaplan Generator
Detailed Maintenance and Repair

BIDDER'S DECLARATION.
The undersigned bidder certifies that it has examined the site, read and understands the specifications for the above project, and agrees to comply with all applicable federal, state and local laws and regulations. The bidder is advised that by signature of this bid proposal it has acknowledged all bid requirements and signed all certificates contained herein.

BID OFFER.
The price(s) listed in this bid proposal is tendered as an offer to furnish all labor, materials, equipment and supervision required to complete the proposed project in strict accordance with the contract documents. The bidder proposes to do the project at the following price:

BID ITEM #1: $_____
(Work Plan – Pg #13):

BID ITEM #2: $_____
(Mobilization – Pg #13)

BID ITEM #3A: $_____
(Labor, materials & equipment
To disassemble the top portion
Of the Turbine #1 unit – Pg #13)

BID ITEM #3B: $_____
(Shop rate and number of hours
to repair items referenced in Bid
Item 3A, Section 4 – Pg #13) $_____ _____
Shop rate # of hours

BID ITEM #4A: $_____
(Labor, materials & equipment
To continue disassembling top
Portion of Kaplan Turbine Unit –
Pg #14)

BID ITEM 4B.1: $_____ _____
(Shop rate and number of hours Shop rate # of hours
To perform the repair of item
Referenced in Bid #4 Part a
Section 1 - Pg #14)

BID ITEM 4B.2: $_____ _____
(Shop rate and number of hours Shop rate # of hours

To perform the repair of item
Referenced in Bid #4 Part a
Section 3 - Pg #14)

BID ITEM 4B.3: $_____ _____
(Shop rate and number of hours Shop rate # of hours
To perform the repair of item
Referenced in Bid #4 Part a
Section 4 - Pg #14)

BID ITEM #5A: $_____
(Labor, materials & equipment
necessary to disassemble, test
and repair the lower portion of
Kaplan turbine unit – Pg #15)

BID ITEM #5B.1: $_____ _____
(Shop rate and number of hours Shop rate # of hours
To perform the repair of item
Referenced in Bid #5 Part a
Section 3-a - Pg #15)

BID ITEM #5B.2: $_____ _____
(Shop rate and number of hours Shop rate # of hours
To perform the repair of item
Referenced in Bid #5 Part a
Section 3-b-i- Pg #15)

BID ITEM #5B.3: $_____ _____
(Shop rate and number of hours Shop rate # of hours
To perform the repair of item
Referenced in Bid #5 Part a
Section 3-b-ii- Pg #15)

BID ITEM #5B.4: $_____ _____
(Shop rate and number of hours Shop rate # of hours
To perform the repair of item
Referenced in Bid #5 Part a
Section 3-b-iii- Pg #15)

BID ITEM #5B.5: $_____ _____
(Shop rate and number of hours Shop rate # of hours
To perform the repair of item
Referenced in Bid #5 Part a
Section 3-c - Pg #15)

BID ITEM #5B.6: $_____ _____
(Shop rate and number of hours Shop rate # of hours
To perform the repair of item
Referenced in Bid #5 Part a
Section 3-d- Pg #16)

BID ITEM #6A: $_____
(Labor, materials & equipment
Necessary for continuing to
Disassemble, test & repair the
Lower portion of the Kaplan
Turbine unit – Pg #16)

BID ITEM #6B.1: $_____ _____
(Shop rate and number of hours Shop rate # of hours
To perform the repair of item
Referenced in Bid #6 Part A
Section 1 - Pg #16)

BID ITEM #6B.2: $_____ _____
(Shop rate and number of hours Shop rate # of hours
To perform the repair of item
Referenced in Bid #6 Part A
Section 2 - Pg #16)

BID ITEM #6B.3: $_____ _____
(Shop rate and number of hours Shop rate # of hours
To perform the repair of item
Referenced in Bid #6 Part A
Section 3 - Pg #17)

BID ITEM #6B.4: $_____ _____
(Shop rate and number of hours Shop rate # of hours
To perform the repair of item
Referenced in Bid #6 Part A
Section 4 - Pg #17)

BID ITEM #6B.5: $_____ _____
(Shop rate and number of hours Shop rate # of hours
To perform the repair of item
Referenced in Bid #6 Part A
Section 5 - Pg #17)

BID ITEM #6B.6: $_____ _____
(Shop rate and number of hours Shop rate # of hours
To perform the repair of item
Referenced in Bid #6 Part A
Section 6 - Pg #17)

BID ITEM #7A: $_____
(Labor, material & equipment
Necessary for continuing to
Disassemble, test and repair
Lower portion of Kaplan turbine
Unit – Pg #18)

BID ITEM #7B.1: $_____ _____
(Shop rate and number of hours Shop rate # of hours
To perform the repair of item
Referenced in Bid #7 Part A

Section 1 - Pg #18)

BID ITEM #7B.2: $_____ _____
(Shop rate and number of hours Shop rate # of hours
To perform the repair of item
Referenced in Bid #7 Part A
Section 2 - Pg #18)

BID ITEM #7B.3: $_____ _____
(Shop rate and number of hours Shop rate # of hours
To perform the repair of item
Referenced in Bid #7 Part A
Section 3 - Pg #18)

BID ITEM #7B.4: $_____ _____
(Shop rate and number of hours Shop rate # of hours
To perform the repair of item
Referenced in Bid #7 Part A
Section 4 - Pg #18)

BID ITEM #7B.5: $_____ _____
(Shop rate and number of hours Shop rate # of hours
To perform the repair of item
Referenced in Bid #7 Part A
Section 5 - Pg #18)

BID ITEM #8: $_____
(Labor, materials & equipment
Necessary for Items #1 and
#2 – Pg #19)

TRENCHING SYSTEM $:_____
(When a trench excavation will
exceed a depth of four feet)

TOTAL OF ITEMS 1, 2, 3, 4A,
5A, 6A, 7A & 8 and Trenching
System Charge $_____

SALES TAX (8.8 %) $_____

TOTAL BASE PRICE: $:_____

ADDENDA.
The undersigned acknowledges receipt of addenda number(s) _____ and agrees that their requirements have been included in this bid proposal.

CONTRACT COMPLETION TIME.
The bidder agrees to start the work under this contract within ten (10) days of the Notice to Proceed and **to substantially complete the specified work by _January 31, 2020_**.

LIQUIDATED DAMAGES.
In the event the bidder is awarded the contract and fails to complete the work within the time

limit or any agreed upon time extensions, liquidated damages shall be paid to the City of Spokane in the amount of **__$1,126.08_____** per working day until the work is satisfactorily completed.

BIDDER RESPONSIBILITY.

Washington State Contractor's Registration No. _____
(must be in effect at time of bid submittal)

U.B.I. Number _____

Washington Employment Security Department Number _____

Washington Excise Tax Registration Number _____

City of Spokane Business License Number _____
(The successful bidder and all subcontractors shall be licensed or have applied for a license to do business in the City of Spokane prior to proceeding with the proposed project.)

BID SECURITY.
A bid security in the amount of FIVE PERCENT (5%) of the total project bid as indicated above, is attached to this bid proposal. If the bidder is awarded the contract and fails to enter into a construction contract and/or furnish payment / performance bond(s) and proof of insurance within the required time period, the bid security shall be forfeited to the City of Spokane.

NON-COLLUSION.
The undersigned authorized representative of the undersigned firm, being first sworn on oath, certifies that the firm has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with the project for which this bid proposal is submitted.

The undersigned Bidder hereby certifies that, within the three-year period immediately preceding the bid solicitation date for this Project, the bidder is not a "willful" violator, as defined in RCW 49.48.082, of any provision of chapters 49.46, 49.48, or 49.52 RCW, as determined by a final and binding citation and notice of assessment issued by the Department of Labor and Industries or through a civil judgment entered by a court of limited or general jurisdiction.

I certify (or declare) under penalty of perjury under the laws of the State of Washington that the foregoing is true and correct.

Name of Bidder: _____

_____
Signature of Bidder's Authorized Representative

_____
Title

_____
Address

_____
Phone

IF INDIVIDUAL

Signed and Sworn To (or Affirmed) Before Me On _____
date

(Seal Or Stamp)

_____
Signature of Notary Public

My appointment expires _____

IF PARTNERSHIP

I certify that I know or have satisfactory evidence that the above named person signed this bid proposal, on oath stated that he/she was authorized to sign it and acknowledged it as the partner(s) of the bidder, a partnership, to be the free and voluntary act of such party for the uses and purposes herein mentioned.

Signed and Sworn To (or Affirmed) Before Me On _____
date

(Seal Or Stamp)

_____
Signature of Notary Public

My appointment expires _____

IF CORPORATION

I certify that I know or have satisfactory evidence that the above named person signed this bid proposal, on oath stated that he/she was authorized to sign it and acknowledged it as the representative of the bidder, a corporation, to be the free and voluntary act of such party for the uses and purposes herein mentioned.

Signed and Sworn To (or Affirmed) Before Me On _____
date

(Seal Or Stamp)

_____
Signature of Notary Public

My appointment expires _____

SUBCONTRACTOR LIST

UPRIVER DAM POWER HOUSE #1 KAPLAN GENERATOR

DETAILED MAINTENANCE AND REPAIR

This form is to be submitted with the Bid Proposal, or within one (1) hour after the published bid submittal time.

RCW 39.30.060 (as amended) states:

"Every invitation to bid on a prime contract that is expected to cost one million dollars or more for the construction, alteration, or repair of any public building or public work … shall require each prime contract bidder to submit as part of the bid, or within one (1) hour after the published bid submittal time, the names of the subcontractors with whom the bidder, if awarded the contract, will subcontract for performance of the work of: HVAC (heating, ventilation, and air conditioning); plumbing as described in chapter 18.106 RCW; and electrical as described in chapter 19.28 RCW, or to name itself for the work.

***The prime contract bidder shall** not list more than one (1) subcontractor for each category of work identified, unless subcontractors vary with bid alternates, in which case the prime contract bidder must indicate which subcontractor will be used for which alternate. Failure of the prime contract bidder to submit as part of the bid the names of such subcontractors or to name itself to perform such work or the naming of two or more subcontractors to perform the same work **shall render the prime contract bidder's bid nonresponsive and, therefore, void**." (emphasis added)*

Subcontractor Named (List prime contract bidder if prime contract bidder intends to self-perform the work):

_____

Work to be performed:

_____

_____

Subcontractor Named: **(List prime contract bidder if prime contract bidder intends to self-perform the work))**

_____

Work to be performed:

_____

_____

Subcontractor Named (List prime contract bidder if prime contract bidder intends to self-perform the work):

_____

Work to be performed:

_____

_____

Subcontractor Named (List prime contract bidder if prime contract bidder intends to self-perform the work):

_____

Work to be performed:

_____

_____

Subcontractor Named (List prime contract bidder if prime contract bidder intends to self-perform the work):

_____

Work to be performed:

_____

_____

MINORITY AND WOMEN'S BUSINESS ENTERPRISE GOALS

The City of Spokane has established laudatory goals for the procurement of supplies, materials and services, or for subcontracting work for this project from Minority Business Enterprises (MBE) and Women's Business Enterprises (WBE) as follows:

EITHER MBE OR WBE OR A COMBINATION OF BOTH IN THE AMOUNT OF THREE PERCENT (3%) OF THE TOTAL PROJECT BID AMOUNT

The current list of the Washington State Office of Minority and Women's Business Enterprises shall be used for all public works construction projects administered by the City.

ACHIEVEMENT OF THE ABOVE GOALS IS ENCOURAGED. WHETHER OR NOT THE BIDDER ATTAINS THE ABOVE SPECIFIED GOALS WILL NOT BE USED TO DETERMINE THE RESPONSIVENESS OF THE BIDDER'S BID PROPOSAL.

The bidder shall take the following affirmative steps in considering award of subcontracts to the fullest extent possible to qualified minority and women owned businesses:

(1) including qualified minority and women's businesses on solicitation lists;

(2) insuring that minority and women's businesses are solicited whenever they are potential sources;

(3) dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation of minority and women's businesses;

(4) establishing delivery schedules, where requirements of the work permit, which will encourage participation of minority and women's businesses;

(5) using the services and assistance of the Small Business Administration and the Washington State Office of Minority and Women's Business Enterprise as appropriate.

MINORITY AND WOMEN'S BUSINESS ENTERPRISE UTILIZATION

The bidder has contacted minority and women's business enterprises (MBE/WBE) and, if the successful bidder on this project, it may award subcontracts to or enter into supply agreements with the following firms as indicated *(use additional sheets if necessary):*

NAME OF MBE/WBE* WA. STATE CERTIFICATION NO.	IDENTIFICATION & VALUE OF SUBCONTRACTS / SUPPLIES

MINORITY BUSINESS SUBCONTRACTING GOAL $_____ MBE TOTAL $ _____

WOMEN'S BUSINESS SUBCONTRACTING GOAL $_____ WBE TOTAL $ _____

COMBINATION GOAL: $_____ MBE/WBE TOTAL $_____

*Designate MBE or WBE

Mr./ Mrs./ Ms. _____ has been designated as the liaison officer for the administration of the dollar value of contract work to be performed by MBE/WBE firms.

BID DEPOSIT

Herewith find the bid deposit in the form of cash, cashier's check or certified check in the amount of $_____, which is equal to or more than five percent (5%) of the total bid.

Signature_____

Deposit returned on _____ by _____
(Date) (Name)

BID BOND

We, _____ as Principal, and _____ as Surety, are held and firmly bound unto the CITY OF SPOKANE, a Washington State municipal corporation, in the penal sum of FIVE PERCENT (5%) OF THE TOTAL AMOUNT BID, for the payment of which we jointly and severally bind ourselves, and our legal representatives and successors.

THE CONDITIONS OF THE OBLIGATION are that if the City of Spokane shall make timely award to the Principal for the

Upriver Dam Power House #1 Kaplan Generator Detailed Maintenance and Repair

according to the terms of the bid made by the Principal; and the Principal shall, within the specified time, enter into a contract with the City of Spokane and furnish bond(s) acceptable to the City, if required, then this obligation shall be null and void; otherwise it shall remain in full force and effect; but in no event will the surety's liability exceed this bond's face amount.

SIGNED AND SEALED on _____

_____
AS PRINCIPAL

By: _____

Title: _____

A valid POWER OF ATTORNEY must accompany this bond.

_____
AS SURETY

By: _____
Attorney in Fact

AIA DOCUMENT A201
"GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION"

By reference, the printed document "General Conditions of the Contract for Construction, AIA Document A201, 2007edition, is hereby included and shall be part of the Contract Documents. Copies of AIA Document A201 are available for review at the offices of the Owner. Copies may also be purchased from the American Institute of Architects or its local distributor.

SUPPLEMENTARY GENERAL CONDITIONS OF THE CONTRACT

The following supplements modify the "General Conditions of the Contract for Construction," AIA Document A201, 2007. Where a portion of the General Conditions is modified or deleted by these Supplementary Conditions, the unaltered portions of the General Conditions shall remain in effect.

ARTICLE 1 - GENERAL PROVISIONS

1.1 BASIC DEFINITONS

1.1.1 Change the last sentence in paragraph 1.1.1 to read:

The Contract Documents include Request for Bids, Instructions to Bidders, Bid Proposal Forms, Bid Bond, Performance Bond, Payment Bond and Contractor's Bid.

1.1.1 Add the following to paragraph 1.1.1:

It shall be the responsibility of the Contractor and each subcontractor to appraise themselves of all conditions, limitations and requirements of these documents which are considered a part of each section of each division of this specification as if printed therein.

1.1.1.2 Add a subparagraph 1.1.1.2 to read:

Should conflict occur in or between drawings and specifications, Contractor is deemed to have estimated the more expensive way of doing work unless he asked for and obtained written decision by addenda as to which method or materials will be required.

1.1.1.3 Add a subparagraph 1.1.1.3 to read:

Where the word "similar" occurs on drawings, it shall be used in its general sense and not as meaning identical, and all details shall be worked out in relationship to their location and their connection to other parts of the work.

1.1.1.4 Add a subparagraph 1.1.1.4 to read:

Where used in conjunction with the Architect's response to submittals, requests, applications, inquiries, reports and claims by the Contractor, the meaning of the term "approved" will be held to the limitations of the Architect's responsibilities and duties as specified in the Conditions of the Contract. In no case will "approval" by the Architect be interpreted as an assurance to the Contractor that the requirements of the contract documents have been fulfilled.

1.1.5 Add the following to paragraph 1.1.5

Where on any drawings a portion of work is drawn out and remainder is indicated in outline, the drawn out parts shall apply also to other like portions of the work. Where detail is indicated by starting only, such details shall be continued throughout the courses or parts in which it occurs and shall also apply to all other similar parts in the work unless otherwise indicated.

Drawings are in general diagrammatic and do no necessarily show complete details of the work, or materials, and do not necessarily show the construction sequence that may affect the Contractor means and methods. The Contractor shall coordinate to sequence the parts to a completed whole.

1.1.6 Add the following to paragraph 1.1.6:

These specifications are of the abbreviated or "streamlined" type and frequently include incomplete sentences. The word "product" includes materials, systems and equipment. The word "selected" means "selected by the Architect". The word "coordinate" means "satisfactorily combine the work of all trades for a complete and operating installation." Words such as "shall", "the Contractor shall", "shall be", and similar mandatory phrases shall be supplied by inference in the same manner as they are in a note on the drawings. The Contractor shall provide all items, articles, materials, and operations listed, including all labor, materials, equipment and incidentals required for their completion.

1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

1.2.1 Add a subparagraph 1.2.1 to read:

Conflicts in the documents shall be brought to the Architect's attention. In the event of conflicts or discrepancies among the contract documents, interpretations will be made by the Architect in accordance with this principle of complementary relationship among documents, with reference to the following priorities if necessary to reach a conclusion:

a. Modifications.
b. Agreement.
c. National, State and Local Codes and Ordinances.
d. Supplementary Conditions.
e. General Conditions of the Contract for Construction.
f. Project Manual and any Addenda. Addenda of later date take precedence over those of earlier date.
g. Drawings. Drawings of larger scale and greater detail take precedence over drawings of smaller scale and less detail.

1.2.2 Add the following to Paragraph 1.2.2:

Such organization shall not operate to make the Architect an arbiter to establish subcontract limits between Contractor and Subcontractor.

1.2.4 Add a subparagraph 1.2.4 to read:

Conditions of the Contract shall be read by all prime contractors and by each subcontractor or sub-subcontractor and shall be considered a part of each section of the Technical Specifications. Provisions of Contract Documents are binding on the contractors, subcontractor and sub-subcontractors for all work shown or indicated on the original Contract Documents plus any additional work authorized by change order, interpretation or field orders.

1.2.5 Add a subparagraph 1.2.5 to read:

The Contractor shall notify the Architect of any condition he finds where, in his judgment, it will be desirable to modify the requirements to produce the best results. If the Contractor fails to make such request, it is deemed to have accepted the specified and/or detailed method of installation as being adequate to produce first class, satisfactory work. Should conflict occur in or between drawings and specifications, the Contractor is deemed to have estimated on the more expensive way of doing the work unless it shall have asked for, and obtained a written decision seven (7) calendar days before submission of proposal as to which method or materials will be required. Manufacturer's equipment specifications are based on models and/or construction and installation methods prevailing at the date of invitation and/or advertisement to submit to manufacturer's model and/or construction changes and other variations from the items specified shall be furnished and installed at no additional cost to Owner.

1.2.6 Add a subparagraph 1.2.6 to read:

Requests by the Contractor for written interpretations and/or detail drawings shall be made to the Architect in a timely manner such as will allow ample time for their preparation and delivery without causing delays in the work. Failure of the Contractor to request needed clarifications and/or its proceeding with affected work prior to receiving same shall indicate its acceptance of any and all costs and/or delays required on account of necessary corrections.

ARTICLE 2 - OWNER

2.1 GENERAL

2.1.1 Add a new sentence to read:

The Owner is the City of Spokane, Washington.

2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

2.2.5 Delete subparagraph 2.2.5 and replace with:

The Contractor will be furnished free of charge three (3) copies of drawings and project manuals. Unless otherwise agreed, additional sets will be furnished at the cost of reproduction, postage and handling.

ARTICLE 3 - CONTRACTOR

3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

3.2.1 Add the following to subparagraph 3.2.1:

If the Contractor observes any errors, discrepancies or omissions in the Contract Documents, it shall promptly notify the Architect, requesting clarification. If the Contractor proceeds with Work affected by such errors, discrepancies or omissions without receiving such clarification, it does so at it own risk. Any adjustments involving such circumstances made by the Contractor, prior to approval by the Architect, shall be at the Contractor's risk and the settlement of any complications or disputes arising therefrom shall be at the Contractor's sole expense.

3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

3.3.4 Add a subparagraph 3.3.4 to read:

The Contractor shall be solely responsible for any claims for wages or compensations by the Contractor's employee, agents, representatives, including subcontractors.

3.3.5 Add a subparagraph 3.3.5 to read:

All grades, levels, bench marks, locations and corners shall be correctly verified by the Contractor.

3.3.6 Add a subparagraph 3.3.6 to read:

In accordance with RCW 39.06.020, the Contractor must verify responsibility criteria for each first tier subcontractor, and a subcontractor of any tier that hires other subcontractors must verify responsibility criteria for each of its subcontractors. Verification shall include that each subcontractor, at the time of subcontract execution, meets the responsibility criteria listed in RCW 39.04.350(1) and possesses an electrical contractor license, if required by chapter 19.28 RCW, or an elevator contractor license, if required by chapter 70.87 RCW. This verification requirement, as well as the responsibility criteria, must be included in every public works contract and subcontract of every tier.

3.4 LABOR AND MATERIALS

3.4.1 Add the following to subparagraph 3.4.1:

The Contractor shall be solely responsible for all materials and equipment until the completed project is delivered and accepted by the Owner. The Contractor shall, at its own expense, secure and maintain a storage area for his materials and equipment."

3.4.2 Add the following to subparagraph 3.4.2:

After the Contract has been executed the Owner and the Architect will consider a formal request for the substitution of products in place of those specified only under the following conditions set forth in the General Requirements (Division 1 of the Specifications).

a. Required product cannot be supplied in time for compliance with Contract time requirements.
b. Required product is not acceptable to governing authority, or determined to be non-compatible, or cannot be properly coordinated, warranted, or insured, or has other recognized disability as certified by Contractor.
c. Substantial advantage is offered Owner after deducting offsetting disadvantages including delays, additional compensation to Architect for redesign, investigation, evaluation, and other necessary services, and similar considerations.

By making requests for substitutions based on the above paragraph, the Contractor:

a. represents that it has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified;
b. represents that it will provide the same warranty for the substitutions as it would have for the product specified;
c. certifies that the cost data presented is complete and includes all related costs for the substituted product and for Work that must be changed as a result of the substitution, except for the Architect's redesign costs, and waives all claims for additional costs related to the substitution which subsequently become apparent; and
d. will coordinate the installation of the accepted substitute, making such changes as may be required for the work to be complete in all respects.

3.5 WARRANTY

3.5 Revise the third sentence to read:

Work not conforming to these requirements, including substitutions not properly approved and authorized, shall be considered defective.

Revise the last sentence to read;

The Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

3.5.1 Add a subparagraph 3.5.1 to read:

The Contractor guarantees all work, labor and materials for one (1) year following final acceptance of the Work. If any unsatisfactory condition or defect develops within that time, the Contractor shall immediately place the Work in a satisfactory condition and repair all damage caused by the condition or defects at its sole expense. This guarantee does not apply to Work which has been abused or neglected by the Owner. This guarantee shall be separate from and in addition to any more extensive warranty requirements specified for certain elements and products used in the Work.

3.6 TAXES:

3.6.1 Add a subparagraph 3.6.1 to read:

The Washington Department of Revenue has issued special rules designed to assist the Contractor in accurately reporting to the Department of Revenue the Contractor's tax liability. Although the Owner may furnish information in the specification regarding the application of state taxes to a particular contract or bid item, it shall be the Contractor's responsibility as to the correct interpretation of the laws and regulations relating to such taxes. Adjustments will not be made in the amount to be paid by the Owner under the contract because of any misunderstanding by the Contractor as to the Contractor's liability for, or the amount of, any taxes. If the Contractor is in doubt as to the tax procedures in any particular case, the Contractor shall consult with the Washington State Department of Revenue.

3.6.2 Add a subparagraph 3.6.2 to read:

The contract sum and any agreed variations thereof shall include all taxes imposed by law, and properly chargeable to the project except Sales Tax. Sales Tax applicable to the contract sum will be collected from the Owner and shall be paid to the State Department of Revenue by the Contractor in conformance with the law. State of Washington Sales Tax shall not be included in the bid price, <u>except</u> that the retail sales tax upon sales and rentals to prime contractors and subcontractors of tools, machinery and equipment, and consumable supplies, such as hand and machine tools, cranes, air compressors, bulldozers, lubricating oil, sandpaper and form lumber which are primarily for use by the Contractor rather than for resale as a component part of the finished structure, shall be included in the bid price. (WAC-458-20-170).

3.7 PERMITS, FEES AND NOTICES

3.7.1 Add the following to subparagraph 3.7.1:

Below is a list of permits that may be required on typical projects, and where they may be obtained. The list is included for the Contractor's benefit and is not considered exhaustive:

Building Permit, Building Services	625-6300
Electrical Permit, Building Services	625-6300
City Business License, Taxes and Licenses	625-6070
Hydrant Permit, Hydrant Foreman	625-7800
Hydrant Permit, Engineering Services	625-6300
Obstruction Permit, Engineering Services	625-6300
Sewer Permit, Engineering Services	625-6300
Water Service Application, Engineering Services	625-6300

3.7.6 Add a subparagraph 3.7.6 to read:

The Contractor and every subcontractor (and suppliers when legally required) shall obtain a City business license prior to beginning their work.

3.7.7 Add a subparagraph 3.7.7 to read:

The Contractor shall pay for the use of municipal or private property for storage of materials, parking, temporary obstructions, enclosures, opening and patching of streets, etc., off of the property arising from construction and completion of work. The Contractor shall furnish to the Owner and the Architect no later than the preconstruction conference the permit numbers for mechanical, electrical, plumbing and any other required permits that must be obtained through governing agencies.

3.9 SUPERINTENDENT

3.9.1 Delete subparagraph 3.9.1 and replace with:

The Contractor shall employ a competent superintendent and necessary assistant who shall be in attendance at the Project site during the progress of the Work. The superintendent shall be satisfactory to the Owner and the Architect and shall not be changed except with the consent of the Owner and the Architect, which shall not be unreasonably withheld, unless the superintendent proves to be unsatisfactory to the Contractor and ceases to be in his employ. The superintendent shall represent the Contractor and all communication given to the superintendent shall be as binding as if given to the Contractor. Important communications will be confirmed in writing. Other communications will be so confirmed on written request in each case.

3.9.4 Add a subparagraph 3.9.4 to read:

Contractor shall be responsible to fully inform its superintendent of all project progress, problems, decisions, changes, and deficiencies as they happen.

3.11 DOCUMENTS AND SAMPLES AT THE SITE

3.11.1 Add a subparagraph 3.11.1 to read:

Record drawings shall be kept clean, and notations shall be made using clear, concise drafting techniques acceptable to the Architect.

The Contractor shall also maintain at the site for availability of the Owner and/or Architect one copy of all inspection reports and other written communications from the Architect and/or subcontractors, other prime contractors, materials suppliers, etc.

3.18 INDEMNIFICATION

3.18.2 Add the following to subparagraph 3.18.2:

The Contractor recognizes that this waiver was specifically entered into pursuant to the provisions of RCW 4.24.115 and was the subject of mutual negotiation.

ARTICLE 4 - ADMINISTRATION OF THE CONTRACT

4.2 ADMINISTRATION OF THE CONTRACT

4.2.1 Add the following to subparagraph 4.2.1:

If the Owner has not designated an Architect to provide Contract Administration, the word “Architect” shall be read as the Owner’s

ARTICLE 5 - SUBCONTRACTORS

5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

5.2.1 Delete subparagraph 5.2.1 and replace with:

The Bidder shall at time of bid opening submit the names of the subcontractors with whom the Bidder, if awarded the contract, will subcontract for performances of the work. The Bidder shall not list more than one subcontractor for each category of work identified, unless the subcontractors vary with bid alternates, in which case the Bidder must indicate which subcontractor will be used for which alternate. As circumstances change during the Work, the Contractor shall submit the names of all person or entities (including those who are to furnish materials or equipment fabricated to a special design).

Not later than seven (7) days after the date of Notice to Proceed, the Contractor shall furnish in writing to the Owner through the Architect the names of persons or entities proposed as manufacturers for each of the products identified in the General Requirements (Division 1 of the Specifications) and, where applicable, the name of the installing subcontractor.

The Contractor shall submit as part of the bid, or within one (1) hour after the published bid submittal time, the names of the subcontractors with whom the bidder, if awarded the contract, will subcontract for performance of the work of HVAC (heating, ventilation and air conditioning); plumbing as described in chapter 18.106 RCW; and electrical as described in chapter 19.28 RCW; or to name itself for the work. The prime contract bidder shall not list more than one (1) subcontractor for each category of work identified unless subcontractors vary with bid alternates, in which case the prime contract bidder must indicate which subcontractor will be used for which alternate. Failure of the prime contract bidder to submit as part of the bid the names of such subcontractors or to name itself to perform such work or the naming of two (2) or more subcontractors to perform the same work shall render the prime contract bidder's bid nonresponsive and, therefore, void.

5.3 SUBCONTRACTUAL RELATIONS

5.3.1 Add a subparagraph 5.3.1 to read:

It is the responsibility of any subcontractor whose work must be applied or installed on or within work of other trades to examine conditions affecting its work. The subcontractor should notify the Contractor, in writing, with copy to the Architect, of any unsuitable or improperly prepared surfaces or conditions. Commencing work or absence of notification in writing constitutes acceptance of surfaces or conditions by a subcontractor, and it will be its responsibility to correct any defect in its work appearing thereafter.

ARTICLE 7 - CHANGES IN THE WORK

7.1 GENERAL

7.1.4 Add a new subparagraph 7.1.4 to read:

The combined overhead and profit included in the total cost to the Owner for a change in the Work shall be based on the following schedule:

a. For Contractor, for any work actually performed by Contractor's own forces, fifteen percent (15%) of the direct cost of material and labor up to $50,000 or ten percent (10%) of direct costs of changes exceeding $50,000.

b. For Contractor, for any work performed by its subcontractor(s), eight percent (8%) of the amount due each subcontractor up to $50,000 or six percent (6%) of the cots due each subcontractor for costs exceeding $50,000.

c. For each subcontractor (including lower tier subcontractors), for any work actually performed by its own forces, fifteen percent (15%) of the direct cost of materials and labor up to $50,000 or ten percent (10%) of direct costs of changes exceeding $50,000.

d. For each subcontractor, for any work performed by its subcontractor(s) of any lower tier, eight percent (8%) of the amount due the sub-subcontractor up to $50,000, or six percent (6%) of the costs due each subcontractor for costs exceeding $50,000.

7.2 CHANGE ORDERS

7.2.2 Add a subparagraph 7.2.2 to read:

Any Change Order prepared, shall constitute a final and full settlement of all matters relating to or affected by the change in the Work, including, but not limited to, all direct, indirect, and consequential costs associated with the change and any and all adjustments to the Contract Sum and Contract Time. In the event a Change Order increases the Contract Sum, the Contractor shall include the work covered by such Change Order in the Application for Payment as if such work were originally part of the Project and Contract Documents.

7.2.3 Add a subparagraph 7.2.3 to read:

Contractor shall promptly respond to Change Order request for proposal within fifteen (15) days or such longer period as may be mutually acceptable for complex changes.

7.2.4 Add a subparagraph 7.2.4 to read:

The Contractor shall provide a cost breakdown for all adjustments in the contract sum, i.e. Change Orders, Proposals, and Construction Change Directives.

7.3 CONSTRUCTION CHANGE AUTHORIZATION

7.3.6 Revise the last sentence in subparagraph 7.3.6 to read:

Such agreement shall be effective immediately and shall be incorporated into a future Change Order.

7.3.11 Add a subparagraph 7.3.11 to read:

Overhead is defined as costs for all noncraft labor, temporary construction facilities, field engineering, schedule updating, as-built drawings, home office cost, B&O taxes, office engineering, estimating costs, small tools, safety, insurance and any other cost incidental to the change in the Work.

ARTICLE 8 - TIME

8.3 DELAYS AND EXTENSIONS OF TIME:

8.3.1 Delete paragraph 8.3.1 and replace with:

If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner, or by changes ordered in the Work, or by labor disputes, fire, unavoidable casualties or other causes beyond the contractor's control, or by delay authorized by the Owner pending mediation and arbitration or by other causes which may justify delay as determined both by the Architect and Owner, then the Contract Time shall be extended by Change Order for such reasonable time.

8.3.4 Add a subparagraph 8.3.4 to read:

The Contract time shall be adjusted only for changes in the work pursuant to Article 7, and excusable delay pursuant to this Paragraph 8.3 as determined by the Architect. In the event the Contractor requests an extension of the contract time, it shall furnish the justification and supporting evidence as the Architect may deem necessary for a determination as to whether the Contractor is entitled to an extension of time under this Contract. After receipt of such documentation, the Architect shall make its findings of fact and so advise the Contractor in writing. The determination shall be based upon the approved Contractor's schedule current at the time of the delay.

8.4 Add a new section to read:

8.4 LIQUIDATED DAMAGES

8.4.1 Time is of the essence of the contract. Delays inconvenience the traveling public, obstructing traffic, interfere with daily commerce, and increase risk to the traveling public. Delays also cost taxpayers undue sums of money, adding time needed for administration, engineering, inspections and supervision.

8.4.2 Because the Owner finds it impractical and extremely difficult to calculate the actual damages which will be suffered by the Owner as a result of the Contractor's failure to complete the work on time, the Owner has adopted liquidated damages for this Work as set forth in the bid proposal.

ARTICLE 9 - PAYMENTS AND COMPLETION

9.1 CONTRACT SUM

9.1 Delete paragraph 9.1 and replace with:

The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents. The Contract Sum and adjustment thereof shall include all taxes imposed by law except the Washington State Sales Tax, which will be paid by the Owner to Contractor, who shall pay tax to the State of Washington in accordance with the law.

9.3 APPLICATIONS FOR PAYMENT

9.3.4 Add a subparagraph 9.3.4 to read:

The Owner will pay ninety-five percent (95%) of the amount due the Contractor on account of progress payments. Five percent (5%) will be held as retainage pursuant to chapter 60.28 RCW.

9.4 CERTIFICATES FOR PAYMENT

9.4.2 Add the following to subparagraph 9.4.2:

Payment will not constitute a waiver of any claims by the Owner that the Work fails to comply with the Contract Documents.

9.6 PROGRESS PAYMENTS

9.6.8 Add a subparagraph 9.6.8 to read:

Pursuant to chapter 60.28 RCW there will be reserved and retained from monies earned by the Contractor on estimates during the progress of the Work a sum not to exceed five percent (5%) of the monies earned by the Contractor. The retainage shall be used as a trust fund for the protection and payment: (1) to the State with respect to taxes imposed pursuant to Title 82, RCW which may be due from such Contractor, and (2) of any person or persons, mechanic, subcontractor or material supplier who shall perform any labor upon the contract or the doing of the work, and all persons who shall supply such person or persons or subcontractor with provisions or supplies for carrying on the work. Release of retainage will be made forty five (45) days following final acceptance of the work provided the following conditions are met:

a. The City has received from the Contractor and each subcontractor a copy of a "Statement of Intent to Pay Prevailing Wages" and an "Affidavit of Wages Paid", approved by the State Department of Labor and Industries.
b. On contracts greater than $35,000, the City has received a release of liability from the State Department of Employment Security.
c. On contracts greater than $35,000, the City has received a release of liability from the State Department of Labor and Industries.
d. On contracts greater than $35,000, the City has received a release from the State Department of Revenue.
e. No claims, as provided by law, have been filed against the retainage.

In the event a claim is filed, the Contractor shall be paid a portion of the retainage which is less an amount sufficient to pay the claim and potential legal costs.

9.6.9 Add a subparagraph 9.6.9 to read:

Before payment is made, the Owner shall require the Contractor and each subcontractor to submit a Statement of Intent to Pay Prevailing Wages to the Owner's Accounting Department which has been approved by the State Department of Labor and Industries before submittal. Unless otherwise authorized by the Department of Labor and Industries, each voucher claim (invoice) submitted by a Contractor for payment on a project estimate shall have a certification which states that the prevailing wages have been paid in accordance with the prefiled Statement(s) of Intent to Pay Prevailing Wages. Below is an example of the certification which is to appear on each voucher claim (invoice) submitted by the Contractor for payment.

CERTIFICATE

I certify that wages have been paid in accordance with the Statement (s) of Intent to Pay Prevailing Wages previously certified and filed pursuant to this contract.

By:_____ Date: _____

The fee for the approval of Statements of Intent to Pay Prevailing Wages and Affidavits of Wages is forty dollars ($40.00) for each form. The Contractor is responsible for payment of these fees and shall make all application directly to the Department of Labor and Industries. Reimbursement for the fees paid by the Contractor will be added to the amounts due the Contractor. In order to receive this reimbursement the Contractor will be required to submit to the Owner prior to final acceptance of the Work a list of its subcontractors at all tiers and have their Statements of Intent to Pay Prevailing Wages on file with the Owner.

ARTICLE 10 - PROTECTION OF PERSONS AND PROPERTY

10.1 SAFETY PRECAUTIONS AND PROGRAMS

10.1.1 Add a subparagraph 10.1.1 to read:

If the Work involves trench excavation which will exceed a depth of four feet, the Contractor shall provide adequate safety systems for the trench excavation that meet the requirements of the Washington industrial safety and health act (chapter 49.17 RCW).

10.2 SAFETY OF PERSONS AND PROPERTY

10.2.4 Add the following to subparagraph 10.2.4:

The Contractor shall give the Owner reasonable advance notice of the use or storage.

ARTICLE 11 – INSURANCE AND BONDS

11.1 CONTRACTOR'S LIABILITY INSURANCE

11.1 Delete paragraph 11.1 and replace with:

During the term of the contract, the Contractor shall maintain in force at its own expense, the below insurance:

a. Worker's Compensation Insurance in compliance with RCW 51.12.020, which requires subject employers to provide workers' compensation coverage for all their subject workers and Employer's Liability or Stop Gap Insurance in the Amount of one million ($1,000,000);

b. General Liability Insurance on an occurrence basis, with a combined single limit of not less than two million ($2,000,000) each occurrence for bodily injury and property damage. It shall include premises and operations, independent contractors, products and completed operations, personal injury liability and contractual liability coverage for the indemnity provided under the contract. It shall provide that the City, its officers, and employees and the Architect are additional insureds but only with respect to the Contractor's services to be provided under the contract;

c. Automobile Liability Insurance with a combined single limit, or the equivalent of not less than $1,000,000 each accident for bodily injury and property damage, including coverage for owned, hired and non-owned vehicles.

There shall be no cancellation, material change, reduction of limits or intent not to renew insurance coverage(s) without thirty (30) days written notice from the Contractor or its insurer(s) to the City. The Contractor shall furnish acceptable insurance certificates to the City at the time it returns the signed contract. The certificate shall specify all of the parties who are additionally insured; and include applicable policy endorsements, the thirty (30)-day cancellation clause, and the deduction or retention level. Insuring companies or entities are subject to City acceptance.

11.3 PROPERTY INSURANCE

11.3.1 Revise "Owner" to "Contractor" in subparagraph 11.3.1.

11.3.1.2 Delete subparagraph 11.3.1.2.

11.3.1.3 Revise "Owner" to "Contractor" in subparagraph 11.3.1.3.

11.4 PERFORMANCE AND PAYMENT BOND

11.4 Delete entirely and revise to read:

The Contractor shall furnish at its sole cost, a performance bond and a payment bond to the Owner on the form to be provided by the Owner, each equal to one hundred percent (100%) of the contract price. The bonds are to insure faithful and complete performance of the contract and payment of all obligations to laborers and material men arising from the project. The bonds are to be executed by a surety company authorized to do business as a surety in Washington State, and shall remain in effect for one (1) year following the Owner's final acceptance of the Work. Unless approved by the Owner, the surety's name shall appear on the United States Treasury Department's list of authorized sureties - Circular 570 as amended.

ARTICLE 13 - MISCELLANEOUS PROVISIONS

13.5.1 Add the following to subparagraph 13.5.1:

The Owner shall employ and pay for the services of an independent agency, testing laboratory or other qualified firm to perform services which are the Owner's responsibility as defined by the International Building Code and the "Special Inspection Manual" for the International Building Code.

13.8 Add a paragraph 13.8 to read:

NONDISCRIMINATION. No individual shall be excluded from participation in, denied the benefit of, subjected to discrimination under, or denied employment in the administration of or in connection with this agreement because of age, sex, race, color, religion, creed, marital status, familial status, sexual orientation, national origin, honorably discharged veteran or military status, the presence of any sensory, mental or physical disability, or use of a service animal by a person with disabilities. The Contractor agrees to comply with, and to require that all subcontractors comply with, Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act, as applicable to the Contractor.

13.9 Add a paragraph 13.9 to read:

ANTI-KICKBACK. No officer or employee of the City of Spokane, having the power or duty to perform an official act or action related to this agreement shall have or acquire any interest in the agreement, or have solicited, accepted or granted a present or future gift, favor, service or other thing of value from or to any person involved in this agreement.

13.10 Add a paragraph 13.10 to read:

APPRENTICES. For all public works estimated to cost six hundred thousand dollars ($600,000.00) or more, the Contractor is required to have no less than fifteen percent (15%) of the labor hours performed by apprentices.

13.11 Add a paragraph 13.11 to read:

WORKERS' HOURS. Notwithstanding the provisions of RCW 49.28.010 through 49.28.060, a contractor or subcontractor in any public works contract subject to those provisions may enter into an agreement with his or her employees in which the employees work up to ten hours in a calendar day. No such agreement may provide that the employee work ten-hour days for more than four calendar days a week. Any such agreement is subject to approval by the employees. The overtime provisions of RCW 49.28.020 shall not apply to the hours, up to forty hours per week, worked pursuant to agreements entered into under this section.

13.12 Add a paragraph 13.12 to read:

PREVAILING WAGES **-** LOCAL AND STATE ASSISTED CONSTRUCTION.

A. The prevailing rate of wages to be paid to all workmen, laborers or mechanics employed in the performance of any part of this contract shall be in accordance with the provisions of Chapter 39.12 of the Revised Code of Washington (RCW) and the rules and regulations of the Washington State Department of Labor and Industries. The schedule of prevailing wage rates for the locality or localities where this contract will be performed will be determined by the

Industrial Statistician of the Department of Labor and Industries.

B. The State of Washington prevailing wage rates applicable for this public works project, which is located in Spokane County, may be found at the following website address of the Department of Labor and Industries:
https://fortress.wa.gov/lni/wagelookup/prvWagelookup.aspx.
Based on the bid submittal deadline for this project, the applicable effective date for prevailing wages for this project is MONDAY, October 22, 2018.

C. As the successful Bidder and its subcontractors will be held responsible for paying the prevailing wages, it is imperative that all contractors familiarize themselves with the current wage rates before submitting bids based on these specifications.

D. Questions about current prevailing wage data may be directed to the City of Spokane Office of Contract Administration/Compliance, (509) 625-6065 or Washington State Department of Labor and Industries, (509) 324-2586.

E. If apprentices are to be used, they must be registered with the State Apprenticeship Council; otherwise, they are to be paid prevailing journeyman wages.

ARTICLE 15 - CLAIMS AND DISPUTES

15.1 CLAIMS

15.1.5.2 Add the following to subparagraph 15.1.5.2:

Source of the weather data to be used in documenting weather delays will be the National Oceanic and Atmospheric Administration (NOAA).

15.2 INITIAL DECISION

15.2.8 Delete subparagraph 15.2.8.

15.4 ARBITRATION

15.4.4 Delete Subparagraph 15.4.4.

END OF SUPPLEMENTARY GENERAL CONDITIONS

City of Spokane, Washington
Supplemental Bidder Responsibility Criteria

After bid opening and prior to award, the apparent low bidder shall complete, sign and submit this form with attachments to the City (See instructions at the end of this form). The form shall be submitted within twenty four (24) hours after the notification, unless a different time and date is required by the specifications or otherwise mutually agreed upon.

Project Name: **Upriver Dam Power House #1 Kaplan Generator Detailed Maintenance and Repair** ___

	Project #4498-18

Part A: General Company Information

Company Name	
Address	
Contact Name and Title	
Contact Phone	Contact E-mail
Years in business as a Prime Contractor	Years in business as a sub-contractor
Years in business under present Name	
List any former company names under which the company, its owners, and/or its principals has operated in the past five (5) years	
Explain reason for name change(s) in the past five (5) years	

Part B: Work Experience

Previous Work Experience

- List four (4) or more hydroelectric vertical kaplan turbine unit refurbishing, maintenance, overhaul, or construction projects at least 2 megawatts in size\capacity completed by the company in the past ten (10) years.
- Provide information regarding the proposed project team's recently completed projects including name, location, physical description, delivery method, completion date, cost and owner reference, including name and current phone number.
- Provide information specifically regarding the proposed project team's experience in working on other projects of similar scope.

Part C: Personnel and Organization

- Identify key personnel staff, including project principal, project manager, construction superintendent, and any others to be assigned to this project team.
- List any subcontractors to be employed on this project and the services they will perform and the number of years associated with you.
- Indicate the projects listed in Item A in which they were involved.
- On attached sheets provide resumes of each person (or subcontractor), describing specific experience and qualifications that will indicate ability to perform work required on this Project. Also include all current professional certifications held by each of those persons.
- Provide information regarding your current and projected workload.
- Include current equipment and labor rates.

Part D: Project Approach

Describe your firm's approach to:

- Providing continuity between the construction staff and project management team.
- Means of completing the project by January 31, 2020.
- Constructability review and value engineering to control costs and maintain budget.
- Communication with the project team.
- Quality control.
- Method of record keeping during construction.
- Project closeout and commissioning.

Part E: Financial

- Provide a record of Change Orders on previous projects.

Part F: Other Information

Please feel free to include any other information that may help us understand your company and its approach to a project of this type and size

Part G: Performance Evaluation

Under past or present names does the bidder have a history of receiving "deficient" or "inadequate" evaluations on two (2) or more contracts from the City or other municipalities or another governmental agency on a public works project within the last five (5) years?

□ Yes □ No

If "Yes" attach a separate, signed / dated statement listing the projects and an explanation.

Part H: Record of Debarment / Disqualification

Has the bidder (including the primary contractor, any firm with which any of the primary contractor's owners, officers, or partners was associated) been debarred, disqualified, removed or has been otherwise prevented from bidding on, or completing any governmental agency or public works projects, including debarment by the federal, state or other municipal government during the last five (5) years?

□ Yes □ No

If "Yes", attach a separate signed / dated statement listing any debarments, disqualifications, removal, etc. from any governmental public works project and the basis for the action.

Part I: Safety

In the last five (5) years, has the bidder received willful or repeat violations of safety or health regulations by the OSHA or other agencies responsible for safety oversight?

□ Yes □ No

If "Yes," attach a separate signed /dated statement describing each willful or repeat violation, including information about the dates and nature of the violations, the project on which the citation(s) was or were issued, the amount of penalty paid, if any. If the citation was appealed and a decision has been issued, state the case number and the date of the decision.

Part J: Environmental

In the last five (5) years, has the bidder received serious citations from government environmental enforcement agencies on projects for which the bidder was the contractor?

□ Yes □ No

If "Yes," attach a separate signed / dated statement describing each serious citation, including information about the dates of the citations, the nature of the violation, the project on which the

citation(s) was or were issued, the amount of penalty paid, if any. If the citation was appealed and a decision has been issued, state the case number and the date of the decision.

Part K. Utilization Requirements

In the last five (5) years, has it been determined by a government agency that the bidder did not comply with disadvantaged business enterprises, apprenticeship or other similar utilization requirements on public works projects?

□ Yes □ No

If "Yes", attach a separate signed / dated statement listing the violations or failures to meet utilization requirements along with a detailed explanation of the extenuating circumstances surrounding the violation and/or failure.

Part L: Discrimination

Has the bidder or any of its owners, officers or partners been found guilty of violating or failing to comply with discrimination laws in contracting, employment or provision of public services?

□ Yes □ No

If "Yes", attach a separate signed / dated statement identifying the type of violation, who was involves, the name of the public agency, year of the investigation, the resolution in court or administrative process, and the grounds for the findings.

Part M. Prevailing Wage

In the last five (5) years, has the bidder received prevailing wage violations as determined by the applicable state or federal government agency monitoring prevailing and/or Davis Bacon wage compliance?

□ Yes □ No

If "Yes," attach a separate signed/dated statement listing the prevailing wage violations, along with an explanation of each violation and how it was resolved. The City shall evaluation these explanations and the resolution of each violation to determine whether the violations demonstrate a pattern of failure to pay prevailing wages to workers unless there are extenuating circumstances acceptable to the City.

Part N: Public Bidding Crime (Criminal Convictions)

Has the bidder been convicted of a crime involving bidding on a public works contract within the last five (5) years?

□ Yes □ No

If "Yes", attach a separate signed / dated statement listing the dates of conviction(s), the offense(s) convicted of, the punishment, and a brief statement of the facts underlying the conviction(s)

Part O. Claims Against Retainage and Bonds

Does the bidder have a record of multiple claims filed against the retainage or payment bonds for public works projects during the previous three (3) years?

□ Yes □ No

If "Yes", attach a separate signed / dated statement listing the claims filed against the retainage and/or payment bond for any completed public works projects and include for each project a written

explanation of the circumstances surrounding the claim and the ultimate resolution of the claim. The City shall evaluate the statement to determine if it demonstrates a lack of effective management by the bidder of making timely and appropriate payments, unless there are extenuating circumstances acceptable to the City in its sole discretion.

Part P. Termination for Cause

Has the bidder had any public works contract terminated for cause by any government agency during the previous five (5) years?

□ Yes □ No

If "Yes", attach a separate signed / dated statement listing each contract terminated, the government agency terminating the contract and the circumstances involving the termination for cause. The City will determine if there are extenuating circumstances acceptable to the City in its sole discretion.

Part Q: Litigation

Has the bidder been involved in lawsuits (or arbitrations for those instances where arbitration is completed in lieu of a lawsuit) with judgments entered against the bidder for failure to meet terms on contracts in the previous five (5) years?

□ Yes □ No

If "Yes", attach a list of lawsuits and/or arbitrations with judgments / arbitration awards entered against the bidder along with a written explanation of the circumstances surrounding each lawsuit and/or arbitration. The City will evaluate the explanations to determine whether the lawsuits and/or arbitrations demonstrate a pattern of failing to meeting terms of conditions of contracts, unless there are extenuating circumstances acceptable to the City in its sole discretion.

Part R: Delinquent State Taxes

Does the bidder owe delinquent taxes to the Washington State Department of Revenue without a payment plan approved by the Department before the date of contract award?

□ Yes □ No

If "Yes", attach a separate signed / dated statement describing the circumstances and stating that the bidder is not on the Washington State Department of Revenue's "Delinquent Taxpayer List".

Part S: Subcontractor Responsibility

Does the bidder's standard subcontract form include the subcontractor language required by RCW 39.06.020? Does the bidder have an established procedure which it uses to validate the responsibility of each of its subcontractor? Does the subcontract form require that each of the bidder's subcontractors have and document a similar procedure for sub-tier subcontractors?

□ Yes □ No

If "Yes" or "No", provide a copy of its standard subcontract form and a copy of the procedures used to validate the responsibility of subcontractors.

Signature

The undersigned certifies that the information and data contained herein is correct and complete. Failure to disclose information or submitting false or misleading information may result in rejection of my bid, revocation of award, contract termination, or may impact my firm's ability to bid on future

projects by the City of Spokane.	
Signature of Authorized Representative	Date
Printed Name of Authorized Representative	Title

Instructions for the Supplemental Bidder Responsibility Form

After bid opening and prior to award, the apparent low bidder shall complete, sign and submit this form with attached documentation to the City of Spokane Purchasing Section by one of the methods listed below within twenty four (24) hours of notification.

The City's evaluation may include further investigations to establish the responsibility, qualifications, financial resources and experience of a bidder to complete the work of this contract. The City may contact previous owners or others to validate the information provided by the bidder. The City will assess the information provided and other information gathered in determining whether a bidder is responsible. List all information you feel is relevant to the City making an informed decision. The City reserves the right to request additional information from the bidder.

For criteria with check boxes, the bidder will check either "Yes" or "No. " For each "Yes" answer on the form, the Bidder shall provide a signed and dated statement providing the project information requested and explaining the extenuating circumstances.

Form Submittal:

Submit this form to Purchasing Department by one of the following methods within twenty four (24) hours after the time of notification (unless the specifications provide a different time or date)

Email (preferable)	tprince@spokanecity.org
	with the Email Subject line: Supplemental Bidder Form for Upriver Dam Power House #1 Kaplan Generator Detailed Maintenance and Repair
	Hand Delivered or Mailed: Supplemental Bidder Form for Upriver Dam Power House #1 Kaplan Generator Detailed Maintenance and Repair
Street Address	Purchasing Department
	808 West Spokane Falls Boulevard, 4th Floor, Spokane, WA 99201
	Attention: Thea Prince
	Supplemental Bidder Form for Upriver Dam Power House #1 Kaplan Generator Detailed Maintenance and Repair

Questions: Please call (509) 625-6403

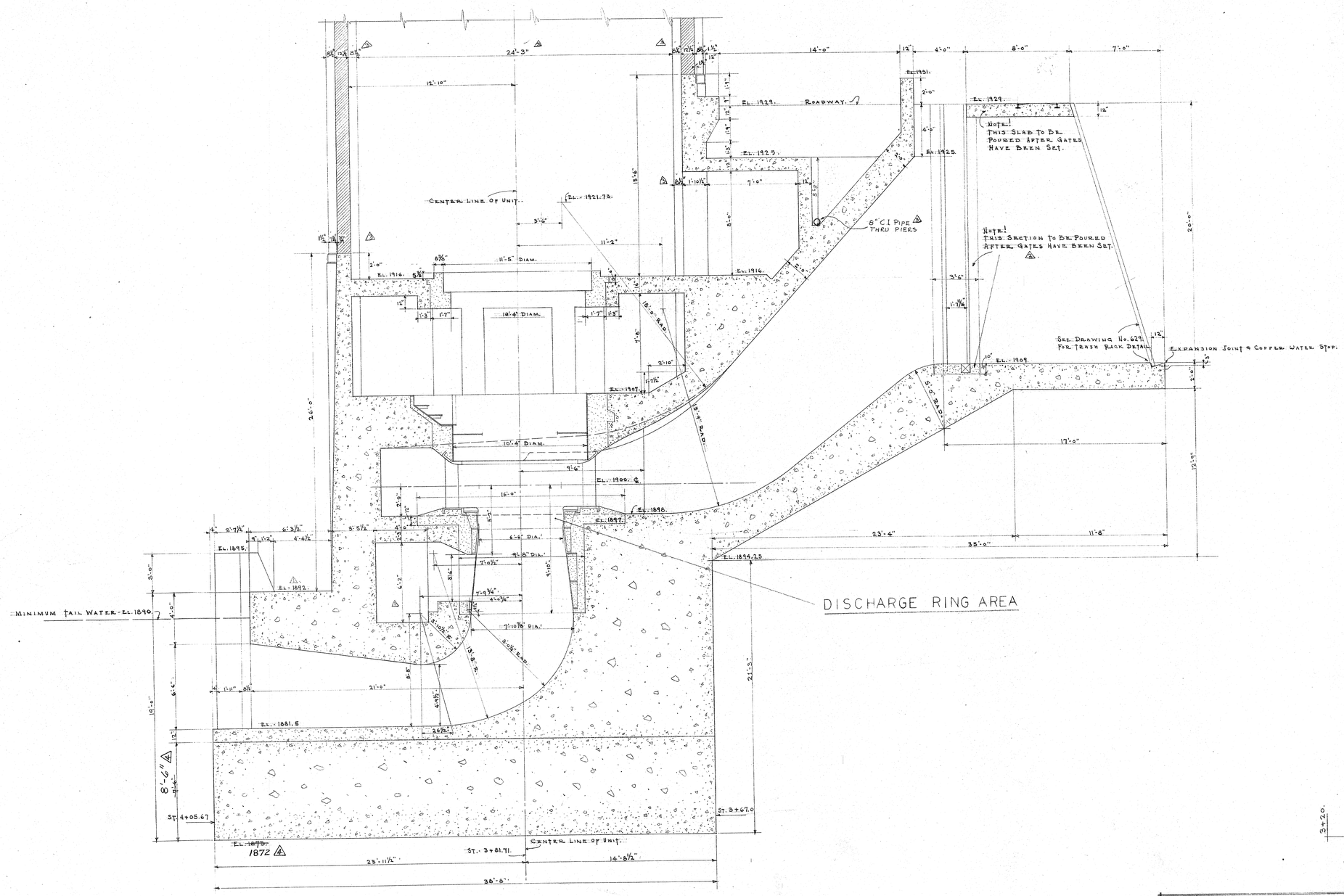
Attachment to Supplemental Bidder Responsibility Criteria

Work Experience Form

Please complete one form per project and include the minimum number of projects (and forms) as requested. You may include any additional work experience you deem relevant in determining bidder responsibility. Please be sure to provide a thorough description of the work in order to demonstrate how your firm meets any required experience detailed in the specifications. You may attach additional documentation if needed.

PROJECT DETAIL

Bidder's Company Name		Bidders Contact Name & Phone Number	
Project Name		Project Contract Number:	
Project Owner		Project Location	
Project Owner Contact Name & Title		Owner's Telephone Number	
Notice to Proceed Date	Final Completion Date	Awarded Contract Value	Final Contract Price
Prime Contractor Name (If Not Bidder)		Contractor Contact Name & Phone Number (If Not Bidder)	
Brief Project Description			
Brief Summary Of Technical Work Completed By Bidder, Including Any Relevant Details To Demonstrate Similar Experience And Any Required Experience Detailed In the Specifications			



SECTION

TAKEN ON CENTER LINE OF UNIT.

SCALE - 1/4" = 1'-0".

Note!
CHAMPHER ALL INTERIOR, EXPOSED CORNERS 1½"

Note!
THIS SHEET SUPERSEDES SHEET No. 520.

No.	REVISION	DATE	BY	APPR.
4	TRIMIE AS BUILT	7/8/36	RCB	
3	DIMENSIONS & OUTLINE CORRECTED	5/12/36	G.F.B.	J.B.F.
2	SECOND POUR @ GATES.	2/27/36	B.L.W.	J.B.F.
1	INCREASE WIDTH OF TUNNEL - CUT BEAM OVER D.T. TO EL. 1892.	2/21/36	B.L.W.	J.B.F.

CITY OF SPOKANE
WATER DIVISION
UPRIVER STATION
POWERHOUSE & HEADWORKS.

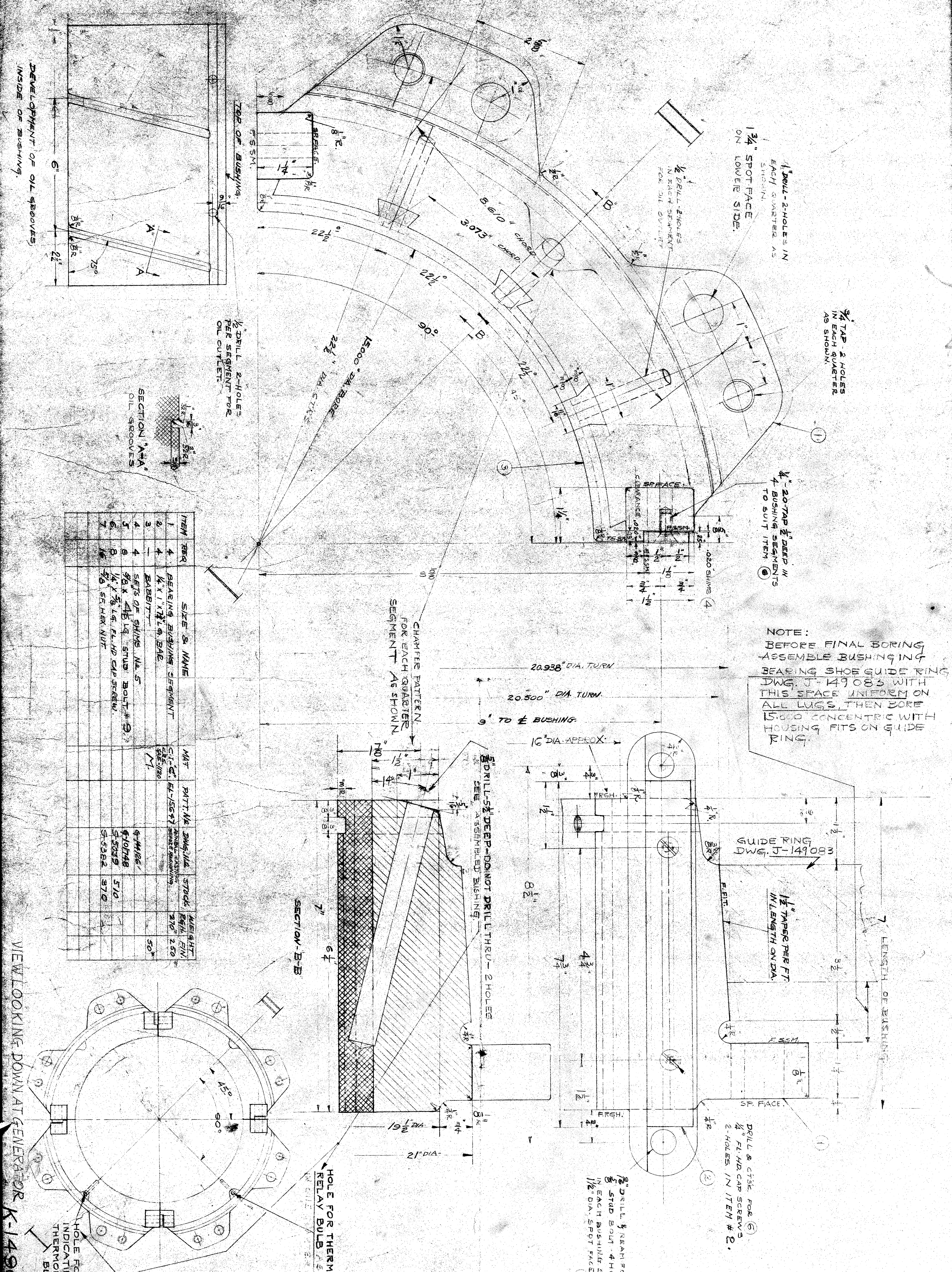
GENERAL SECTION

SCALE 1/4" = 1'-0" | DATE JAN. 8, 1936.

APPROVED BY: WATER SUPT. / ENGINEER | DRAWN BY: B.L. WILKINSON | CHECKED BY: J.B.F.

FILE No. 621.

(CHANGES MADE BY WILKE.)



ITEM	REQ.	SIZE & NAME	MAT.	PATT. No.	DWG. No.	STOCK	WEIGHT RGH.	WEIGHT FIN.
1	4	BEARING BUSHING SEGMENT	C.I.-"C"	EL-15647	ANNEAL CASTING BEFORE MACHINING		270#	250#
2	4	1/4"x1"x7 3/4" LG. BAR	C.R.S. SAE-1120					
3	—	BABBITT	M.				50#	
4	4	SETS OF SHIMS No. 5			S-14126			
5	8	5/8 x 4 5/8 LG. STUD BOLT #9			S-10748			
6	8	1/4" x 5/8" LG. FL. HD CAP SCREW			S-5039	510		
7	16	5/8 SF. HEX. NUT			S-5382	370		

1	5-25-36 W.H. 5/8 DRILL FOR INDICATING THERM. BULB ADDED. ITEM # 3 WAS C-H BABBIT. E.O. 2E-18274
2	6-5-36 W.H.

ALLIS-CHALMERS MFG. CO. MILWAUKEE, WIS., U. S. A.
ELECT. DEPT.
DRAWN SRO DATE 5/14/36
TRACED DATE
CHECKED DATE
O.K. DATE 5-25
SIMILAR TO K-146550
SCALE 12"=3" 1 = 12"

GUIDE BRG BUSHING LOWER.

2E-18274 D/E13591
CITY OF SPOKANE
AV36 1149 1/2

K-149092

AC GENERATOR
NEUTRAL LEADS
3-LEADS
ONE TERMINAL PER LEAD. 1.064 DIA. HOLE IN TERMINAL

DOWNSTREAM SIDE

THRUST BRG. COOLING PIPE-OUTLET-1¼" PIPE CONN.

HAND OPERATED FISH PRESSURE OIL JACK PUMP WITH SUMP, FURNISHED BY ELECTRICAL DEPT. ALLIS-CHALMERS MFG. CO.

NOTE:- THIS APPARATUS IS TO BE MOUNTED ON COLUMNS BELOW FLOOR.

SOLENOID OPERATED AIR BRAKE VALVE FURNISHED BY HYDRAULIC DEPT. ALLIS-CHALMERS MFG. CO.

THRUST BRG. COOLING WATER PIPE INLET 1¼ PIPE CONN.

DETAIL OF SOLE PLATE.
6 PLATES REQUIRED.

12" HOLES FOR 1¼" DIA. FOUNDATION BOLTS. EQ. SPACED.

8 HOLES FOR 1½" DIA. FOUNDATION BOLTS SPACED AS SHOWN

ROTATION

UPSTREAM SIDE

AC GENERATOR
MAIN LEADS
3-LEADS
ONE TERMINAL PER LEAD
1.084" DIA. HOLE IN TERMINAL

D.C. EXCITER:-
2-MAIN LEADS
ONE TERMINA PER LEAD
.657" DIA. HOLE IN TERMINAL
1-SHUNT LEAD
ONE TERMINAL
.285" DIA. HOLE IN TERMINAL
1-DISCHARGE LEAD
ONE TERMINAL
.511" DIA. HOLE IN TERM'L.

TOP OF SOLE PL.
TOP OF TILE FLOOR
EL-1916-2
GROUTING
DETAIL 'A'

TERMINAL BASE 'E'
GENERATOR STATOR TEMP. COILS
18-LEADS
OVERSPEED LIMIT SWITCH-2 LEADS
BEARING TEMP. RELAYS-6 LEADS
AC GENERATOR & DC EXCITER LEADS
LEADS FROM TERM'L BASE 'E'
SECTION C-C

TOP OF LIFTING PLATE

1¼" GLOBE VALVE FOR THRUST BRG. OIL DRAIN. HAND WHEEL TO BE REMOVED WHEN VALVE IS CLOSED

SEE DETAIL 'A'

TOP OF YOKE

TOP OF TILE FLOOR EL-1916-2"

ALLOWANCE FOR GROUTING.

FILL IN WITH CONCRETE AFTER HOUSING SUPPORTS ARE IN PLACE.

℄ COUPLING EL. 1911.25'
1911'-3"

5	5-27-36	6	8-5-36								
OUTLINE REDRAWN FROM DRAWING OF SAME NUMBER											
EPF 2E-18274											

ALLIS-CHALMERS MFG. CO.
MILWAUKEE, WIS., U. S. A.
ELECTRIC DEPT.
DRAWN DATE 8-5-36
TRACED DATE
CHECKED DATE
O. K. DATE
SIMILAR TO
SCALE 1" – 12"

A.C. GENERATOR OUTLINE
1625 K.V.A. 80% P.F. 2300 V.
3 PH. 60 CY. 200 R.P.M.

2E-18274 D/E 13591
CITY OF SPOKANE
WASHINGTON
AV 36 114 9½
IVC G 21 9
K-148989

K-148989

DOWN STREAM SIDE

A.C. GENERATOR
NEUTRAL LEADS.
3-LEADS.
ONE TERMINAL PER LEAD.
1.034" DIA. HOLE IN TERMINAL.

CABLE DUCT.
12"

10'-6" DIA. CTRS.
6'-1" RAD.
12' DIA. CTRS.
45°
15°
30°

DETAIL OF SOLE PLATE @ PLATES REQUIRED.
6'-3½" R.
6'-0" RADIUS
30°

12-HOLES FOR 1¼" FOUNDATION BOLTS - EQ. SPACED

8-HOLES FOR 1½" FOUNDATION BOLTS - SPACE AS SHOWN

DUCT FOR:- THRUST BRG. COOLING WATER PIPES, AIR BRAKE AND OIL JACK PIPES.

12'-7" DIA.
TOP OF SOLE PLATE
12'

DETAIL "A"

GROUTING
11'-5" DIA.
TOP OF TILE FLOOR
EL-1916'-2"

A.C. GENERATOR
MAIN LEADS.
3 LEADS.
ONE TERMINAL PER LEAD.
1.084" DIA. HOLE IN TERMINAL.

UP STREAM SIDE
20" CABLE DUCT.

TOP OF KAPLAN HEAD

D.C. EXCITER LEADS
2 MAIN LEADS
ONE TERMINAL PER LEAD
.651" DIA. HOLE IN TERM'L.
1 SHUNT LEAD.
ONE TERMINAL
.281" DIA. HOLE IN TERM.

LEADS FROM TERMINAL BASE "E"

4'-9 3/4"

TERMINAL BASE "E"
GEN. STATOR TEMP. COILS
18-LEADS.
OVERSP. LIM. SW. - 2-LEADS.
BEARING TEMP. RELAYS
6-LEADS.

AC. GEN. LEADS AND EXCITER LEADS.

SECTION "C-C"

11'-5" DIA. — 4½"

13'-11¼"

30°

CONDUITS
FOR EXCITER LEADS AND FOR LEADS FROM TERMINAL BASE "E"

SEE DETAIL "A"

℄ ROTOR

12'-7" DIA.
11'-5" DIA.
2'-6"
25"
10 3/8"
TOP OF TILE FLOOR
EL. 1916'-2"
ALLOWANCE FOR GROUTING
4 DIA.
FILL IN WITH CONCRETE AFTER HOUSING SUPPORTS ARE IN PLACE.
9'-7" DIA.
℄ COUPLING EL. 1911.25'
5 DIA.

K-148989

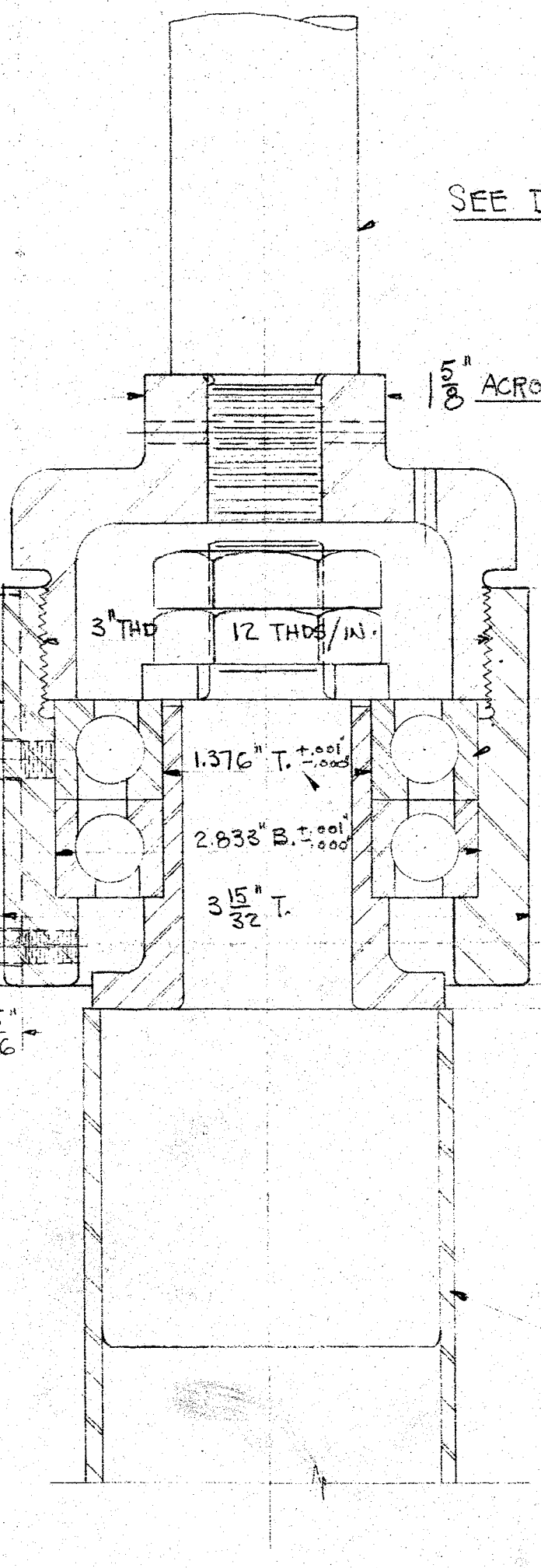
Rev'd		Rev'd		Rev'd	
1	4-4-36	2	4-15-36	3	4-20-36
C.W.F. DETAIL "A" ADDED DIM. AT △ (J-12) WAS 13'-8 1/2" DETAIL OF SOLE PLATE ADDED EFF. 2E-18274 W		W.H. SECTION "C-C" ADDED. DIM. AT △ (F-14) WAS 23 1/2". GROUTING AT △ (H-14) WAS 2". DUCTS FOR LEADS AND PIPES ADDED. A.C. GEN. AND EXCITER LEADS ADDED. TERMINAL BASE "E" ADDED. EFF. 2E-18274 W	W.H.	

ALLIS-CHALMERS MFG. CO.
MILWAUKEE, WIS., U. S. A.
ELECTRIC DEPT.

DRAWN C.W.T. DATE 4/4/36
TRACED ____ DATE ____
CHECKED ____ DATE ____
O. K. [illegible] DATE 4-4-36
SIMILAR TO ____
SCALE 1" = 12"

A.C. GENERATOR OUTLINE

1625 K.V.A. 80% P.F. 2300 V.
3 PH. 60 CY. 200 R.P.M.

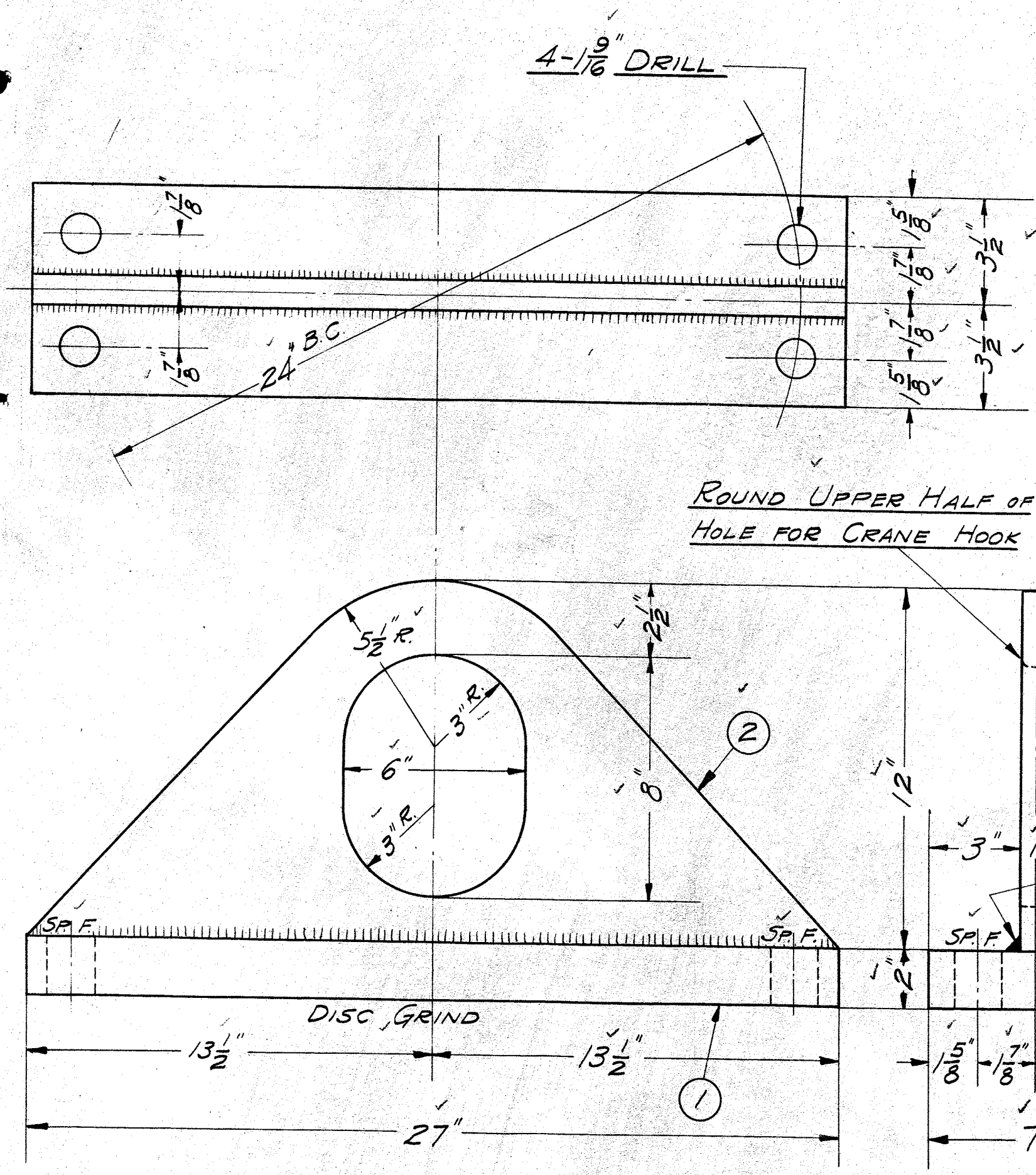


1	4-4-45				
SRB	JJR				

CITY OF SPOKANE, WASH.
WATER DIVISION
REDESIGN OF COUPLING
FOR
OIL DISTRIBUTOR HEAD

ALLIS-CHALMERS MFG. CO.
MILWAUKEE, WIS., U. S. A.
HYDR DEPT.
DRAWN SRB DATE 4-4-45
TRACED ____ DATE ____
CHECKED JJR DATE ____
O. K. JJR DATE ____
SIMILAR TO 859-366
SCALE 12" —12"

879
—
1982



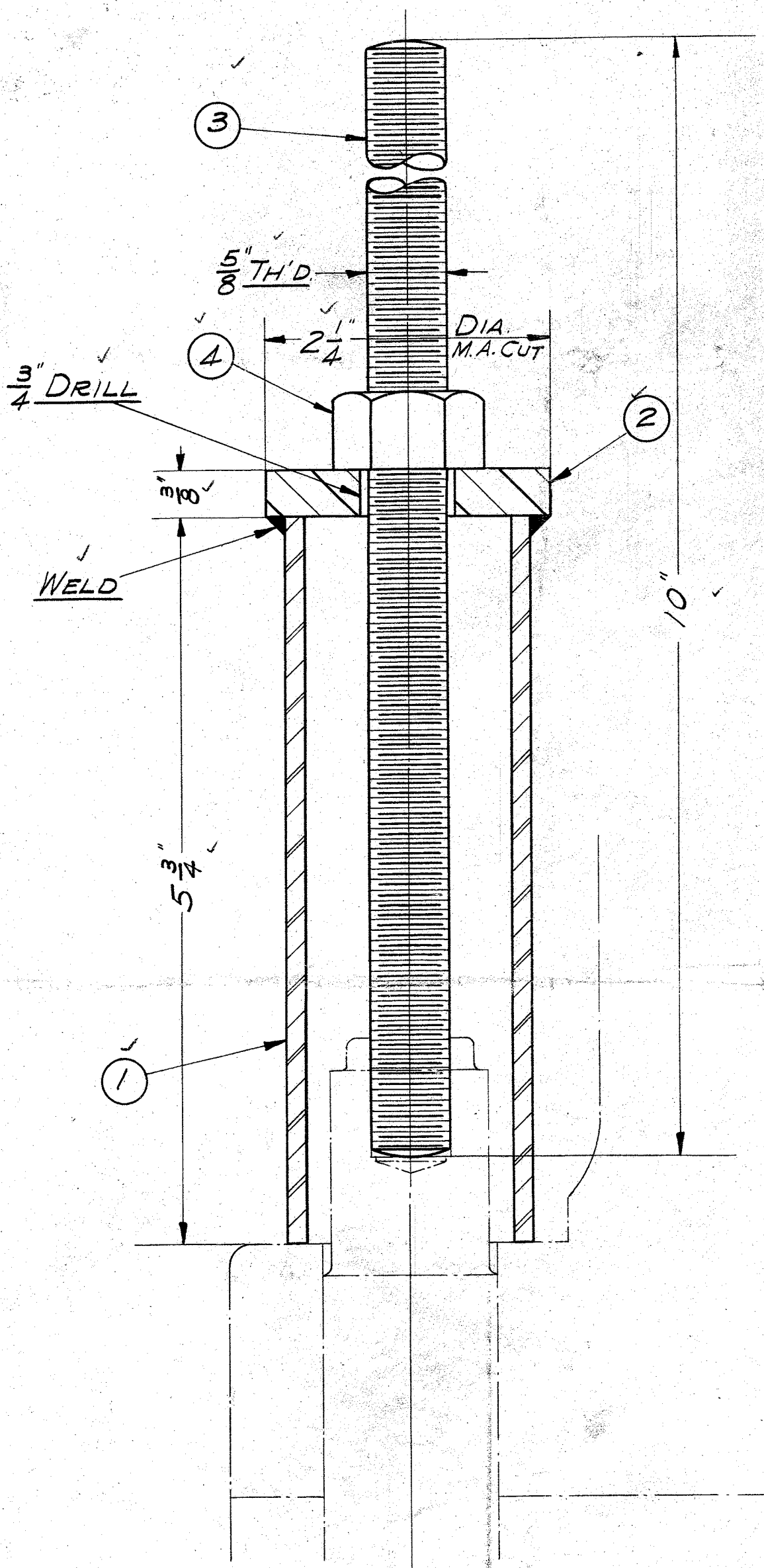
ITEM	REQ.	SIZE & NAME	MAT.	PATT. No.	DRG. No.	STOCK	RGH. WEIGHT	FIN.
5								
4								
3								
2	1	1" x 12" x 27" L'G. PLATE	A.S.T.M. A-113	M.A. CUT AS SHOWN				
1	1	2" x 7" x 27" L'G. PLATE	A.S.T.M. A-113					

1 | 3-10-36
H.I.

ALLIS-CHALMERS MFG. CO.
MILWAUKEE, WIS., U. S. A.
HYDRAULIC DEPT.
DRAWN H.I. DATE 3-10-36
TRACED [illegible] DATE 5-7-36
CHECKED H.I. DATE 3/10/36
O. K. [illegible] DATE 3-10-36
SIMILAR TO
SCALE 3" — 12"

LIFTING DEVICE FOR MAIN SHAFT USED ON HYDRAULIC TURBINE

868 — 285



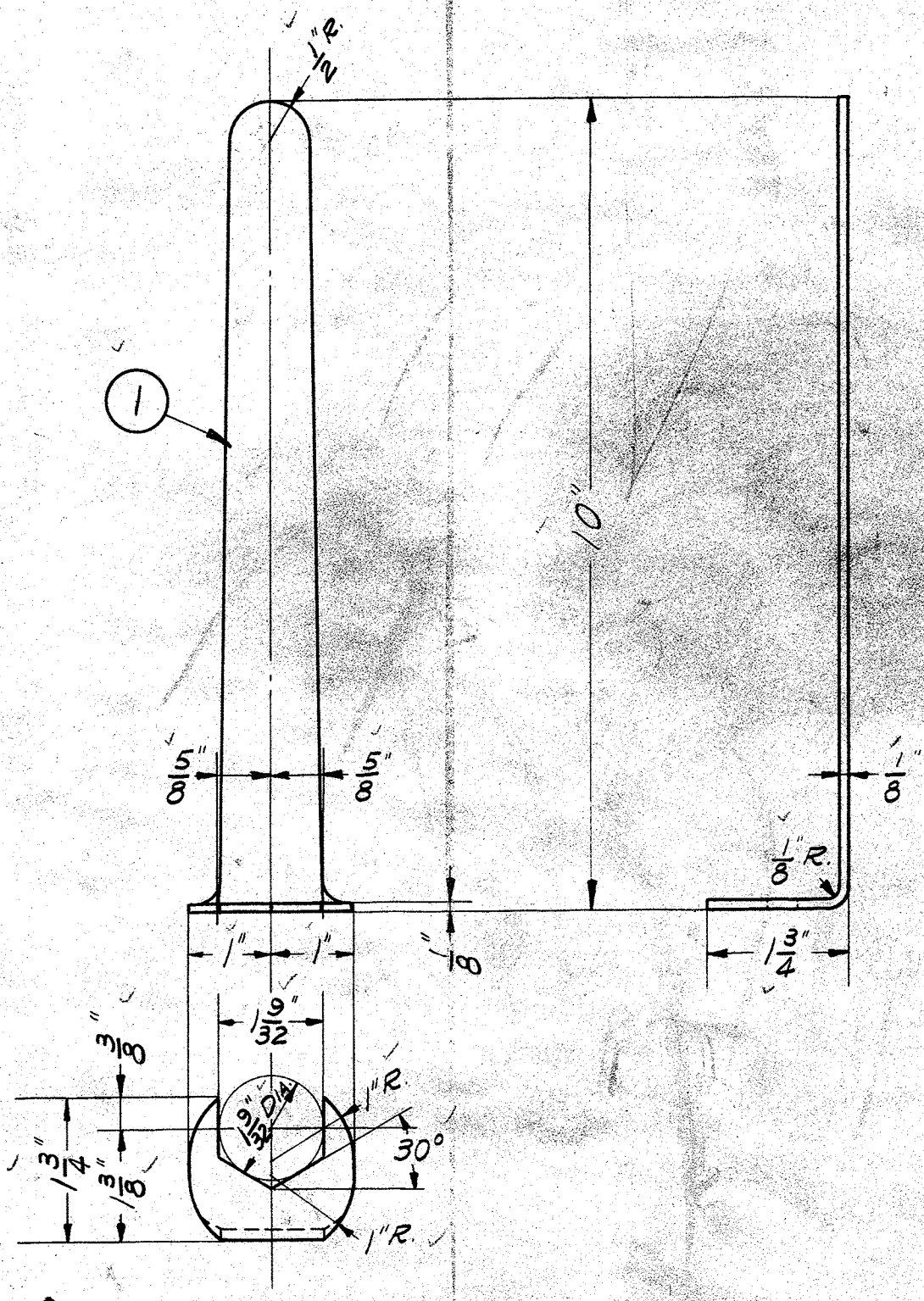
ITEM	REQ.	SIZE & NAME	MAT.	PATT. №	DRG. №	STOCK	RGH. WEIGHT	FIN. WEIGHT
5								
4	1	5/8" S.F. HEX. NUT	STEEL		S-5382	370		
3	1	5/8" x 10" L'G. STUD-THR'D. FULL	S.A.E. 1025	CUT FROM BAR				
2	1	3/8" x 2 1/4" DIA. M.A. CUT BAR	S.A.E. 1020	CUT FROM BAR				
1	1	1 1/2" ST'D. x 5 3/4" L'G. PIPE	BLACK WROT STEEL					

1	3-10-36			
H.I.				

ALLIS-CHALMERS MFG. CO.
MILWAUKEE, WIS., U. S. A.
HYDRAULIC DEPT.
DRAWN H.I. DATE 3-6-36
TRACED [illegible] DATE 5-7-36
CHECKED H.I. DATE 3-6-36
O. K. [illegible] DATE 3-10-36
SIMILAR TO
SCALE 12" —12"

COUPLING BOLT JACK
USED ON
HYDRAULIC TURBINE

B-18-284



ITEM	REQ.	SIZE & NAME	MAT.	PATT. No.	DRG. No.	STOCK	RGH. / FIN. / WEIGHT
(2)							
(1)	1	3/4" WRENCH	S.A.E. 1120	MAKE FROM 1-1/8" x 2" x 11 3/4" LG. BAR			

1	3-10-36	H.I.	

ALLIS-CHALMERS MFG. CO.
MILWAUKEE, WIS., U. S. A.
HYDRAULIC DEPT.
DRAWN H.I. DATE 3-4-36
TRACED TBH DATE 5-7-36
CHECKED H.I. DATE 3/4/36
O. K. DATE 3-10-36
SIMILAR TO
SCALE 6" — 12"

3/4" SPEC. WRENCH
USED ON
HYDRAULIC TURBINE

B68 — 283

USED FOR		NO.	ORD. NO	
CITY OF SPOKANE, WASH. WATER DISTRICT	3-5-36 C.F.A.	3	2B-11113	

MATERIAL FOR ITEM (2)

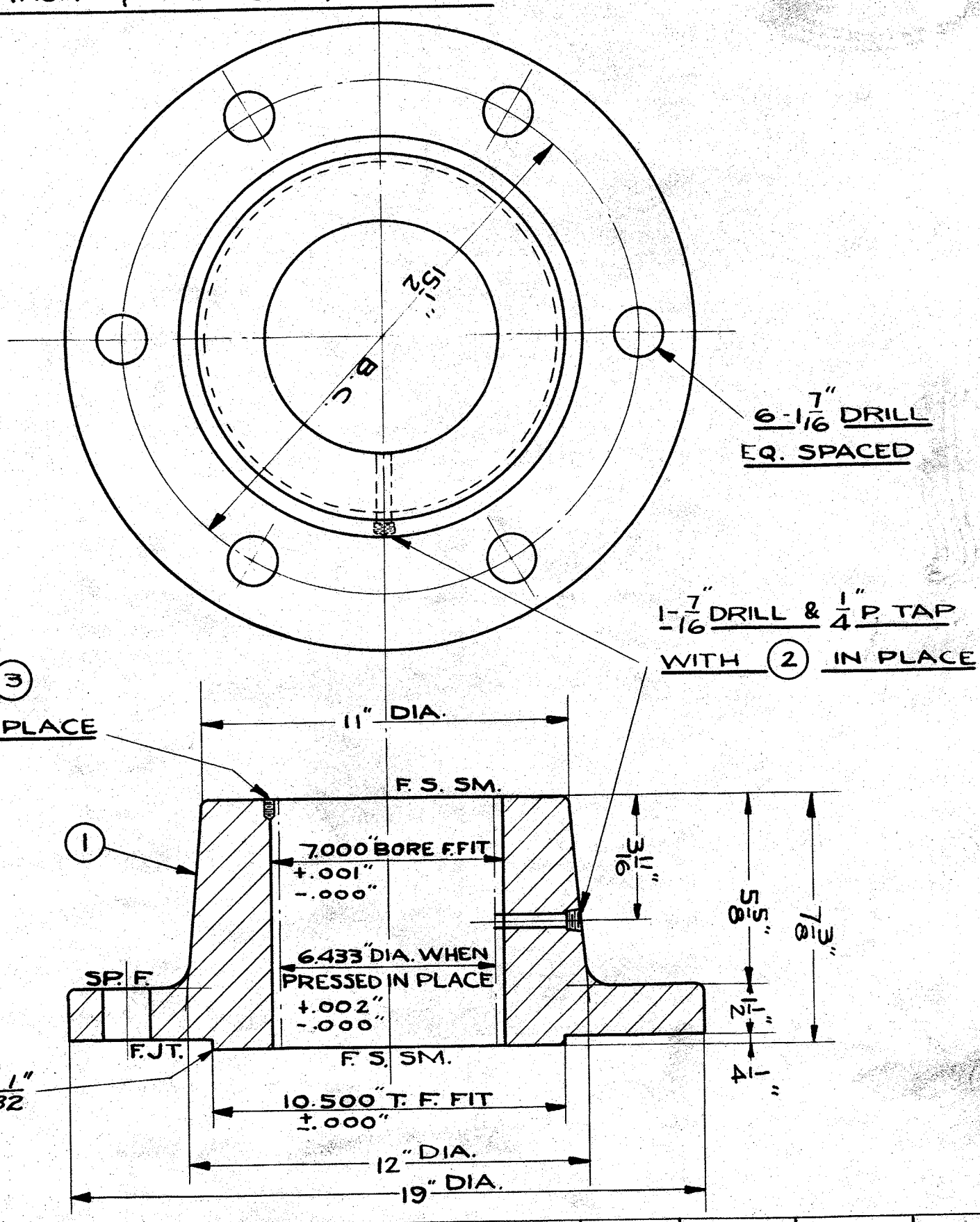
TO CONFORM APPROX. TO THE FOLLOWING SPECIFICATIONS:

COPPER	79-80 %
TIN	9.5-10 %
LEAD	9.5-10 %
ZINC	½-1 %

TRACE OF PHOSPHORUS

TENSILE STRENGTH - 25000 #/□"

ELONGATION (IN 2 INCHES) 8 % MIN.



ITEM	REQ.	SIZE & NAME	MAT.	PATT. NO.	DRG. NO.	STOCK	RGH. FIN. WEIGHT	
(3)	1	1/4" X 1/2" LG. GRUB SCREW	STEEL		S-5594	3909		
(2)	1	BUSHING 7 3/8" LG. (PART #54)	BR. SEE SPEC.	STD. #62	867-293	4881		
(1)	1	BEARING	C.I.-A.S.T.M. A-48-35T CLASS 25	2 WT-10591-6				

1	3-5-36	2	4-23-36	

C.F.A. MAT. FOR (1) WAS CLASS 40 △(9-A) ADDED NOTE

C.F.A.

ALLIS-CHALMERS MFG. CO.
MILWAUKEE, WIS., U. S. A.
HYDRAULIC DEPT.
DRAWN GJJ DATE 2-5-36
TRACED A.B. DATE 4-10-36
CHECKED C.F.A. DATE 2/13/36
O. K. DATE 3/9/36
SIMILAR TO 839-335
SCALE 3" -12"

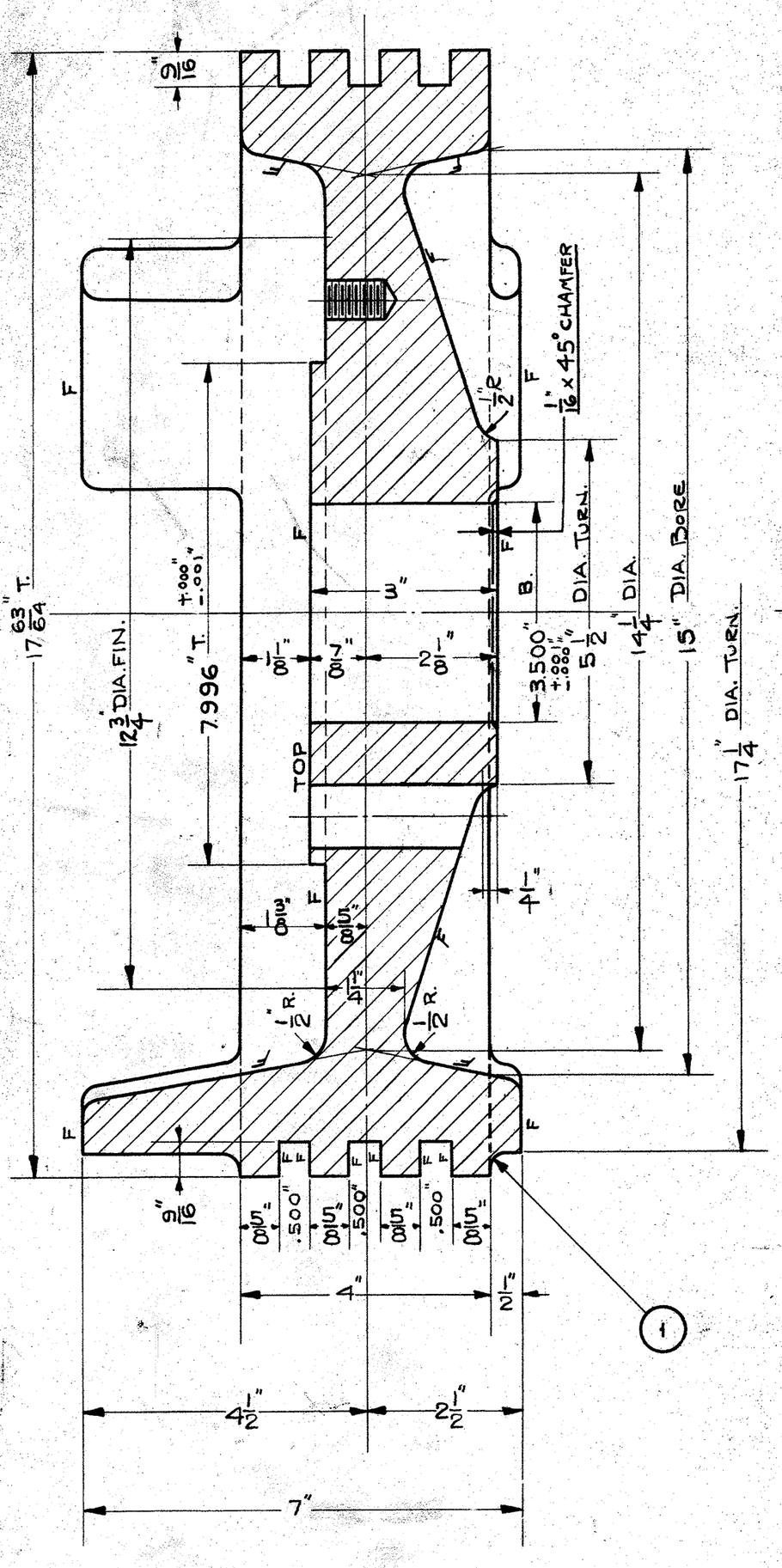
BEARING
USED ON
HYDRAULIC TURBINE

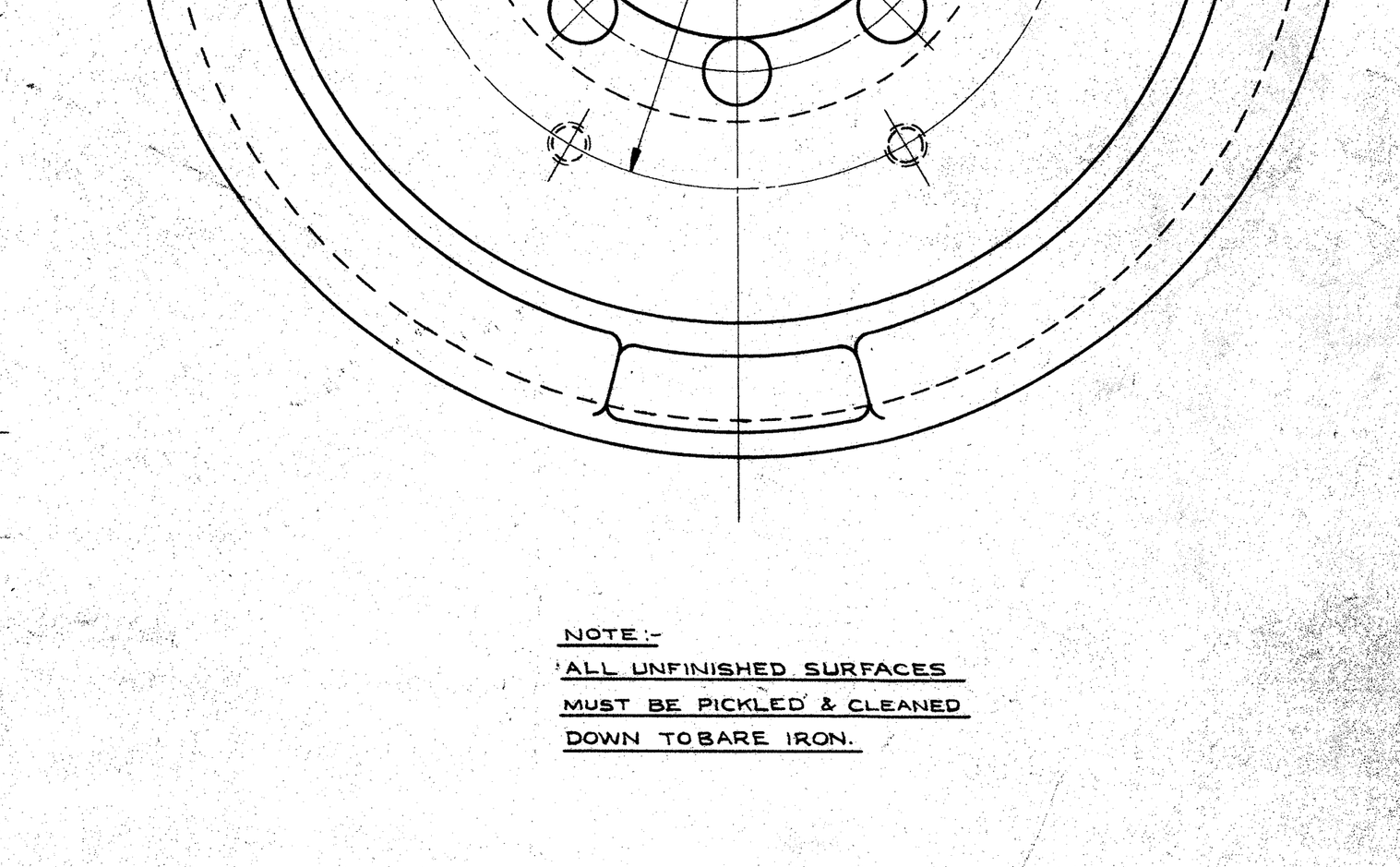
8688
27-1

USED FOR		NO.	ORD. NO.	
PASSAIC VALLEY WATER COMMISSION LITTLE FALLS PUMPING STATION	10/29-31 J.F.K.	1	28-10559	

$6-\frac{3}{4}$" TAP (3)
EQ. SPACED
AS SHOWN
DO NOT DRILL THRU.

8-1" DRILL
EQ. SPACED
AS SHOWN.





NOTE:-
ALL UNFINISHED SURFACES
MUST BE PICKLED & CLEANED
DOWN TO BARE IRON.

ITEM	REQ	SIZE & NAME	MAT.	PATT. NO.	DRG. NO.	STOCK	WEIGHT RGH.	WEIGHT FIN.
(1)	1	PISTON	C.I. "A"	2WT-6843-10				
(2)	3	PISTON RING - ORDER FROM:- THE MUSKEGON PISTON RING CO. - MUSKEGON, MICH.	C.I.	(PART #3)	867-13			
(3)	6	$\frac{3}{4}$" X $1\frac{3}{4}$" LG. HEX. HD. TAP BOLT	S.S. "C"		S-5040	3617		
(4)								
(5)								
(6)								

1	10/29-31	J.F.K.			

ALLIS-CHALMERS MFG. CO.
MILWAUKEE, WIS., U. S. A.
HYD. DEPT.
DRAWN H.J.I. DATE 10-20-31
TRACED DATE 10-28-31
CHECKED J.F.K. DATE 10-29-31
O.K. 11-3-31 DATE
SIMILAR TO 839-122
SCALE 6" -12"

18" PISTON
USED ON
HYDRAULIC TURBINE

839
371

"A"	"B"	"C"	USED FOR		NO	ORDER NO.	
12 3/4"	12 3/8"	9"	PASSAIC VALLEY WATER COMM. LITTLE FALLS PUMPING STATION	J.F.K. 10/30-31	1	2B-10586	
14 3/4"	14 3/8"	11"	CITY OF SPOKANE, WASH. WATER DIVISION, UPRIVER STATION	3-5-36 Edw. B.	3	2-B-11122	

ITEM	OPERATION	TOOL NO.
	2 3/8"-12 THD L.H. TAP	6423
	2 3/8"-12 THD L.H. PLUG GAUGE	6423
	2 3/8"-12 THD. L.H. RING GAUGE	6423

1/8" DRILL & C'TRS'K. FOR OIL HOLE

4

3/4" THREAD L.H. THREAD

6

5 FINISH ALL OVER

"A"

"B"

"C"

1.248" T. +.000" -.001"

1" UNDERCUT

3/4" THRD L.H.

1 1/16"

3/8"

1"

1-1/8" DRILL FOR (3) DURING ASSEMBLY

2

1

7

1 1/8" DIA.

1 5/8" ACROSS FLATS

1-1/8" DRILL FOR (3) TOGETHER WITH (5) DURING ASSEMBLY

4-1/8" DRILL EQ. SPACED

2 1/4" B.C.

3/4" THR'D. L.H. THR'D.

F

30°

1/4

1" R 7/8

1 3/4" DIA.

2 3/8" L.H. THR'D. 12 THR'DS/IN.

3 5/32" TURN

4-1/4" TAPS FOR (8) 2-OPPOSITE

2 3/8" L.H. THR'D 12 THR'DS/INCH

2 1/4" DIA. FINISH

5/16"

2 7/8"

3/16"

1/2"

3 1/4"

3/32"

.500"

1/4" R

1.500" B. +.001" -.000"

1.806"

3.468" TURN ±.001"

4- VERTICAL AND 1 CIRCULAR GROOVES 1/8" WIDE X 1/16" DEEP

1/16" CHAMFER

(2)

1/4"

.500"

(1) F.A.O.

PLAN VIEW OF ITEM (1)

(7) F.A.O.

1/32"

7/16"

1/4" R

ITEM	NO WANT.	SIZE & NAME	MAT.	PATT. NO	DRG. NO.	STOCK	WEIGHT RGH.	WEIGHT FIN.
(1)	1	COUPLING BODY	BR. E	2WT-20101			9#	
(2)	1	SPECIAL NUT	BR. E	2WT. 20102			3#	
(3)	1	1/8" DIA. X 1 3/4" LG. PIN	STEEL WIRE					
(4)	1	SOLID HEAD - L.H. THREAD	BR.	G.E-320	S-5196	2309		
(5)	1	1.248" T. X "B" LG. ROD	S.A.E. 1020					
(6)	1	3/4" S.F. HEX. HALF NUT - L.H. THREAD	STEEL		S-5382			
(7)	2	7/16" x .500" x 2 3/8" LG. STR. KEY	S.A.E. 1120					
(8)	4	1/4" x 3/4" LG. FL. HD. CAP SCREW	S.A.E. 1120		S-5039	511		

1 | 10/30-31 | J.F.K.

ALLIS-CHALMERS MFG. CO.
MILWAUKEE, WIS., U. S. A.
HYDRAULIC DEPT.

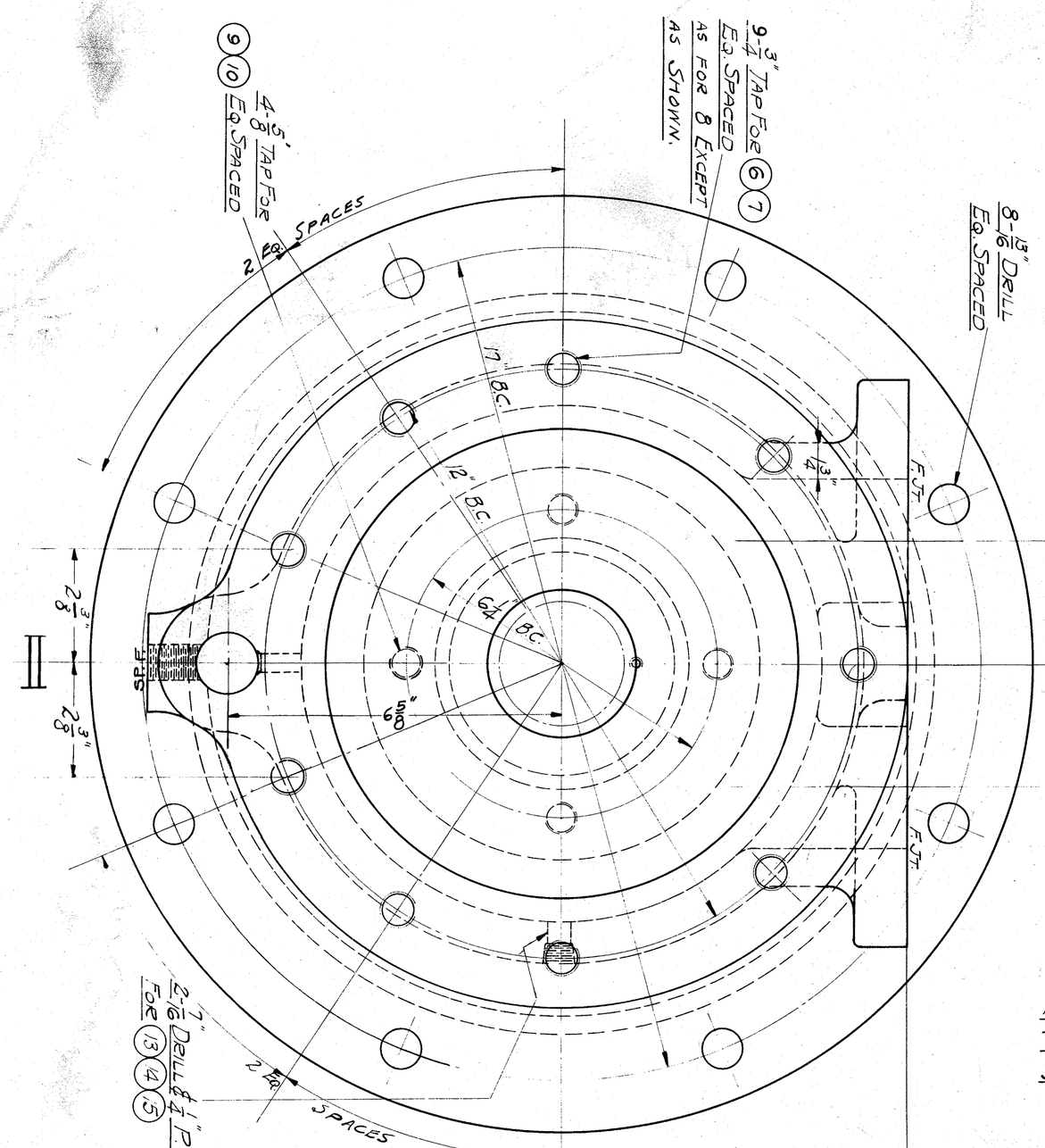
DRAWN J.F.K. DATE 10/22-31
TRACED FJW DATE 10-27-31
CHECKED J.F.K. DATE 10/28-31
O.K. 11-3-31 DATE
SIMILAR TO
SCALE 12" = 12"

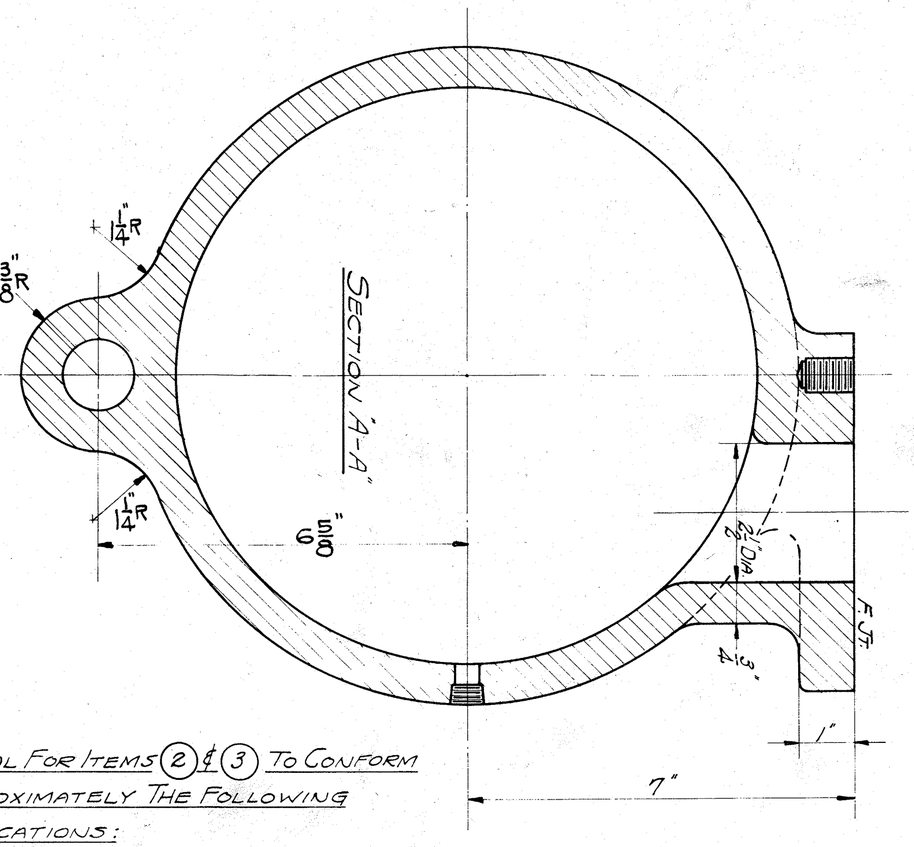
COUPLING FOR OIL DISTRIBUTER HEAD. USED ON HYDRAULIC TURBINE

B.O. 1 366

USED FOR		No.	ORD. No.	TEST PRESSURE
CITY OF SPOKANE, WASHINGTON WATER DIVISION UPRIVER STATION	3-5-36 Edw. B	3	28-11122	400#/□"

NOTE:-
CYLINDER CASTING TO BE OIL TIGHT UNDER 400#/□" TEST PRESSURE. ALL UNMACHINED SURFACES COMING IN CONTACT WITH OIL ARE TO BE CAREFULLY PICKLED & CLEANED TO BARE IRON. DO NOT USE CHAPLETS.

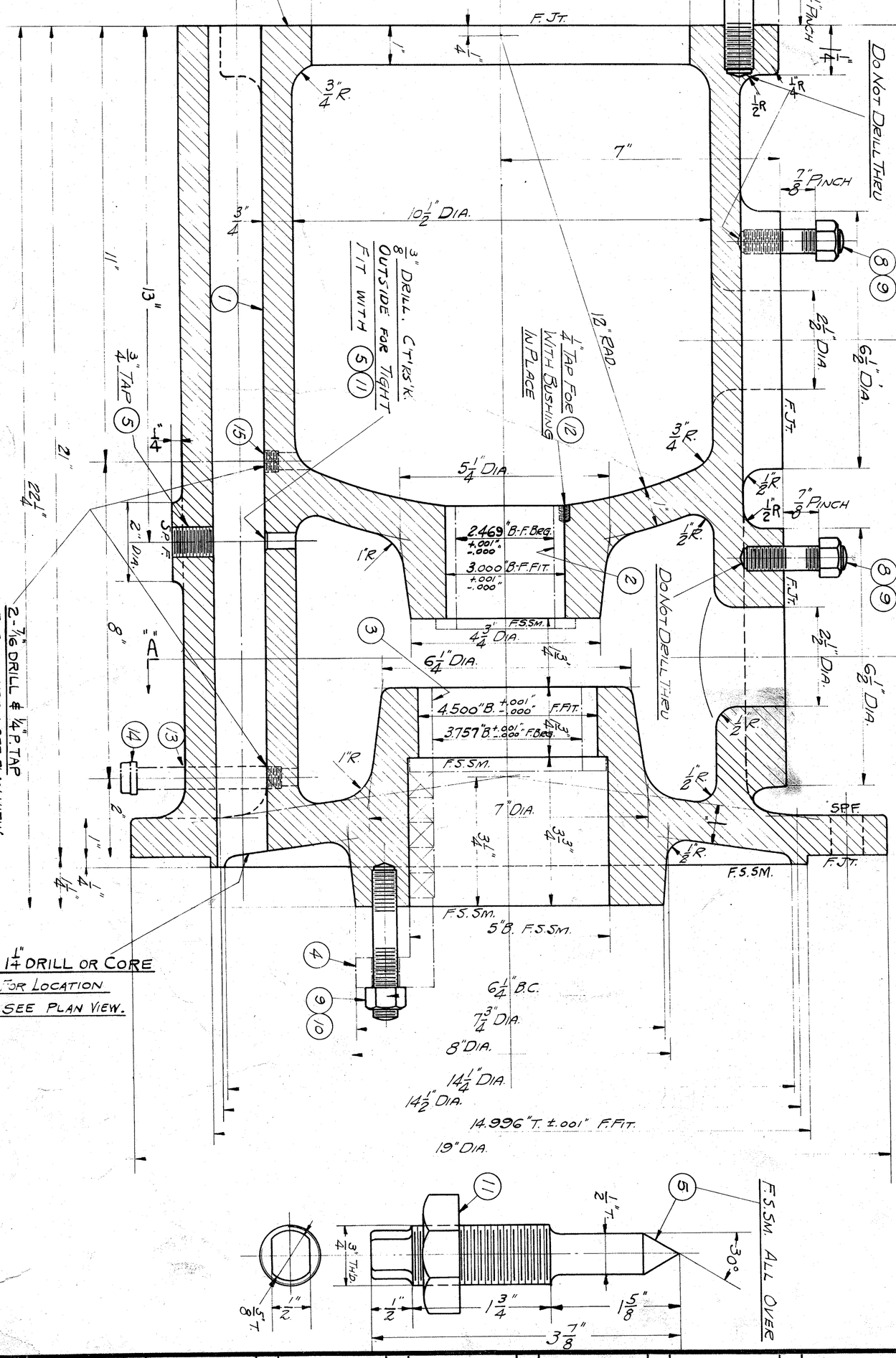


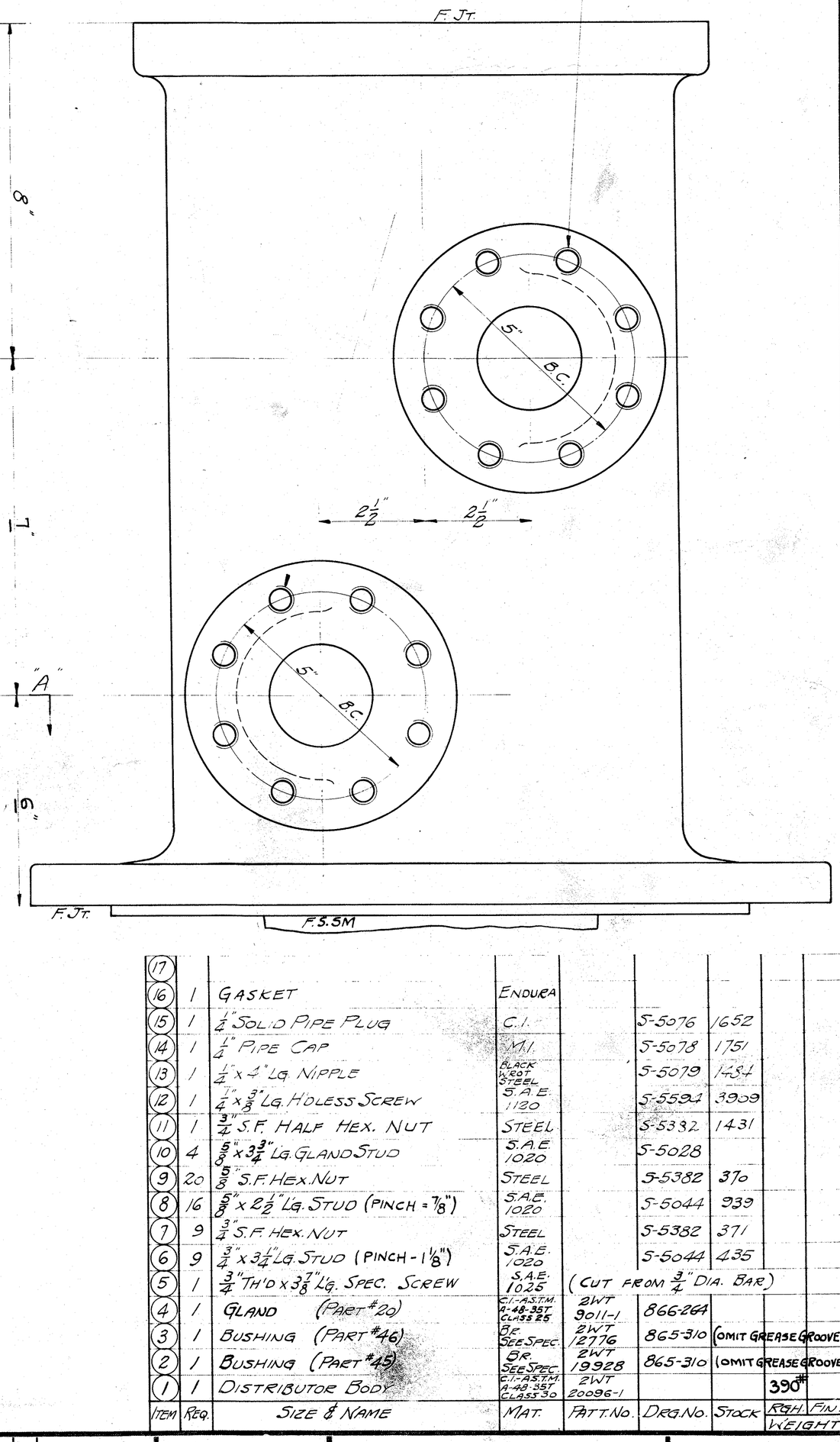


MATERIAL FOR ITEMS (2) & (3) TO CONFORM TO APPROXIMATELY THE FOLLOWING SPECIFICATIONS:

COPPER	79-80 %
TIN	9.5-10 %
LEAD	9.5-10 %
ZINC	1/2 - 1 %

TRACE OF PHOSPHORUS
TENSILE STRENGTH - 25000#/□"
ELONGATION (IN 2 INCHES) 8% MIN.





ITEM	REQ.	SIZE & NAME	MAT.	PATT. No.	DRG. No.	STOCK	RGH. FIN. / WEIGHT
(17)							
(16)	1	GASKET	ENDURA				
(15)	1	1/4" SOLID PIPE PLUG	C.I.		5-5076	1652	
(14)	1	1/4" PIPE CAP	M.I.		5-5078	1751	
(13)	1	1/4" x 4" LG. NIPPLE	BLACK WROT STEEL		5-5079	1484	
(12)	1	1/4" x 3/8" LG. HOLESS SCREW	S.A.E. 1120		5-5594	3909	
(11)	1	3/4" S.F. HALF HEX. NUT	STEEL		5-5382	1431	
(10)	4	5/8" x 3 3/4" LG. GLAND STUD	S.A.E. 1020		5-5028		
(9)	20	5/8" S.F. HEX. NUT	STEEL		5-5382	370	
(8)	16	5/8" x 2 1/2" LG. STUD (PINCH = 7/8")	S.A.E. 1020		5-5044	939	
(7)	9	3/4" S.F. HEX. NUT	STEEL		5-5382	371	
(6)	9	3/4" x 3 1/4" LG. STUD (PINCH - 1 1/8")	S.A.E. 1020		5-5044	435	
(5)	1	3/4" TH'D x 3 7/8" LG. SPEC. SCREW	S.A.E. 1025	(CUT FROM 3/4" DIA. BAR.)			
(4)	1	GLAND (PART #20)	C.I.-A.S.T.M. A-48-35T CLASS 25	2WT 9011-1	866-264		
(3)	1	BUSHING (PART #46)	BR. SEE SPEC.	2WT 12776	865-310	(OMIT GREASE GROOVES)	
(2)	1	BUSHING (PART #45)	BR. SEE SPEC.	2WT 19928	865-310	(OMIT GREASE GROOVES)	
(1)	1	DISTRIBUTOR BODY	C.I.-A.S.T.M. A-48-35T CLASS 30	2WT 20096-1			390#

1	MARCH, 5, 1936
	Edw. B.

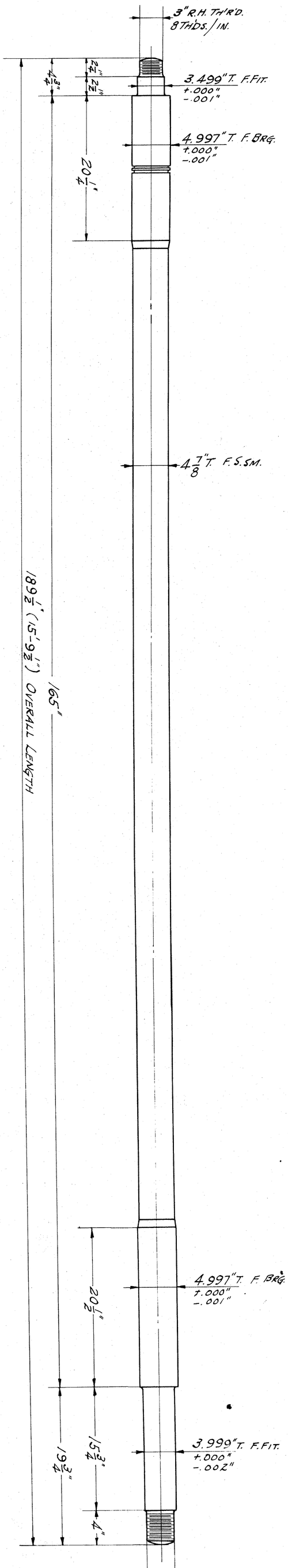
ALLIS-CHALMERS MFG. CO.
MILWAUKEE, WIS., U. S. A.
HYDRAULIC DEPT.

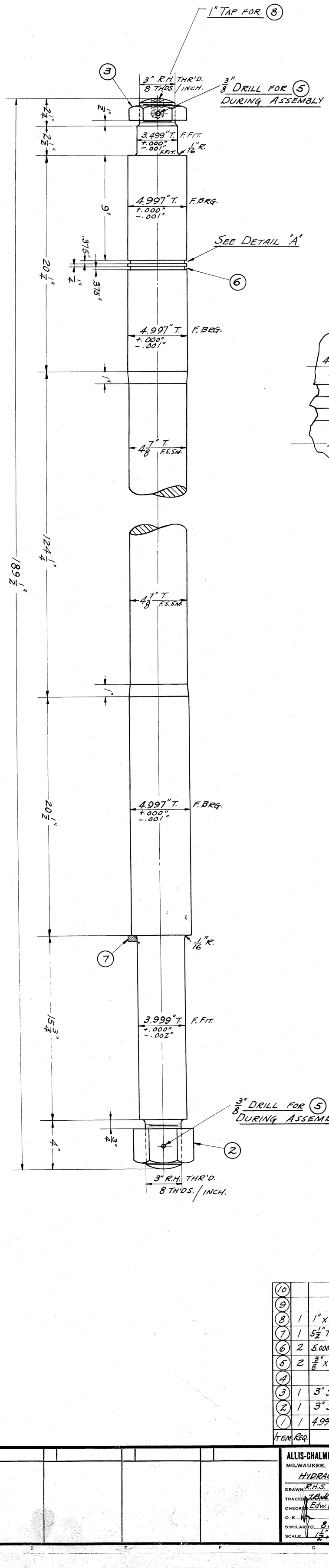
DRAWN	839-539	DATE	—
TRACED	H.I.	DATE	2/11/36
CHECKED	Edw. B.	DATE	3-5-36
O. K.		DATE	3-10-36
SIMILAR TO	839-539		
SCALE	6"		

DISTRIBUTOR BODY FOR OIL DISTRIBUTOR HEAD USED ON HYDRAULIC TURBINE

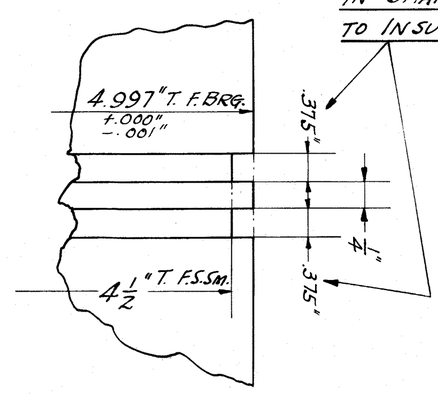
841 — 366

USED FOR		No.	ORD. NO.	
CITY OF SPOKANE, WASH. WATER DIVISION, UP RIVER STATION	3-4-36 Edw. B.	3	28-11103	



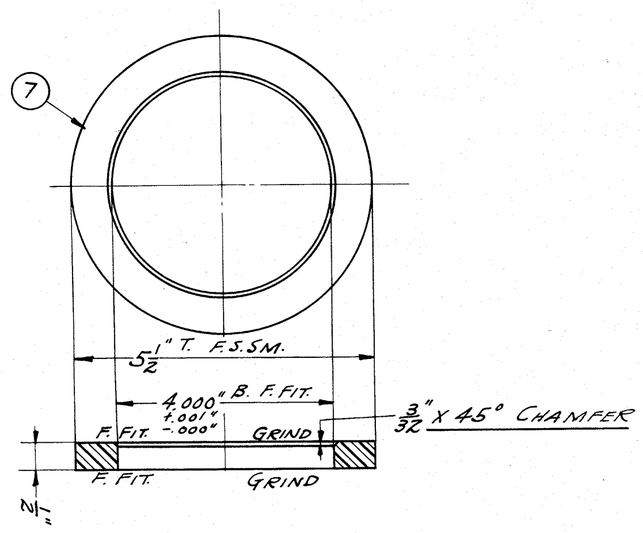


NOTE:-
PISTON RINGS (6) TO BE CALIPERED IN SHOP AND DIMENSION OF GROOVES IN SHAFT TO BE MADE TO SUIT, TO INSURE GOOD FIT.



DETAIL "A"

ITEM	OPERATION	TOOL NO.
(1)	3"-8 TH'D. R.H. RING GAUGE	MG-24-B



ITEM	REQ.	SIZE & NAME	MAT.	PATT. NO.	DRG. NO.	STOCK	RGH. FIN. WEIGHT
(10)							
(9)							
(8)	1	1" x 1½" LG. EYEBOLT	FORGE STEEL		S-5243	6535	
(7)	1	5½" T. x ½" THK. FINISHED WASHER	S.A.E. 1045	(QUENCHED & GROUND)			
(6)	2	5.000" O.D. x ⅜" WIDE PLAIN PISTON RING	C.I.	ORDER FROM SHADBOLT & BOYD CO. CAT. #73-A PAGE 427			
(5)	2	⅜" x 4¾" LG. PIN	S.A.E. 1020	CUT FROM BAR			
(4)							
(3)	1	3" S.F. HEX. HALF NUT (8 TH'DS/IN.)	STEEL		S-5382		
(2)	1	3" S.F. HEX. NUT (8 TH'DS./IN.)	STEEL		S-5382		
(1)	1	4.997" T. x 189½" LG. SHAFT	S.A.E. 1025				

1	3-4-1936									
Edw. B. DRAWING TRACED.										

ALLIS-CHALMERS MFG. CO.
MILWAUKEE, WIS., U. S. A.
HYDRAULIC DEPT.

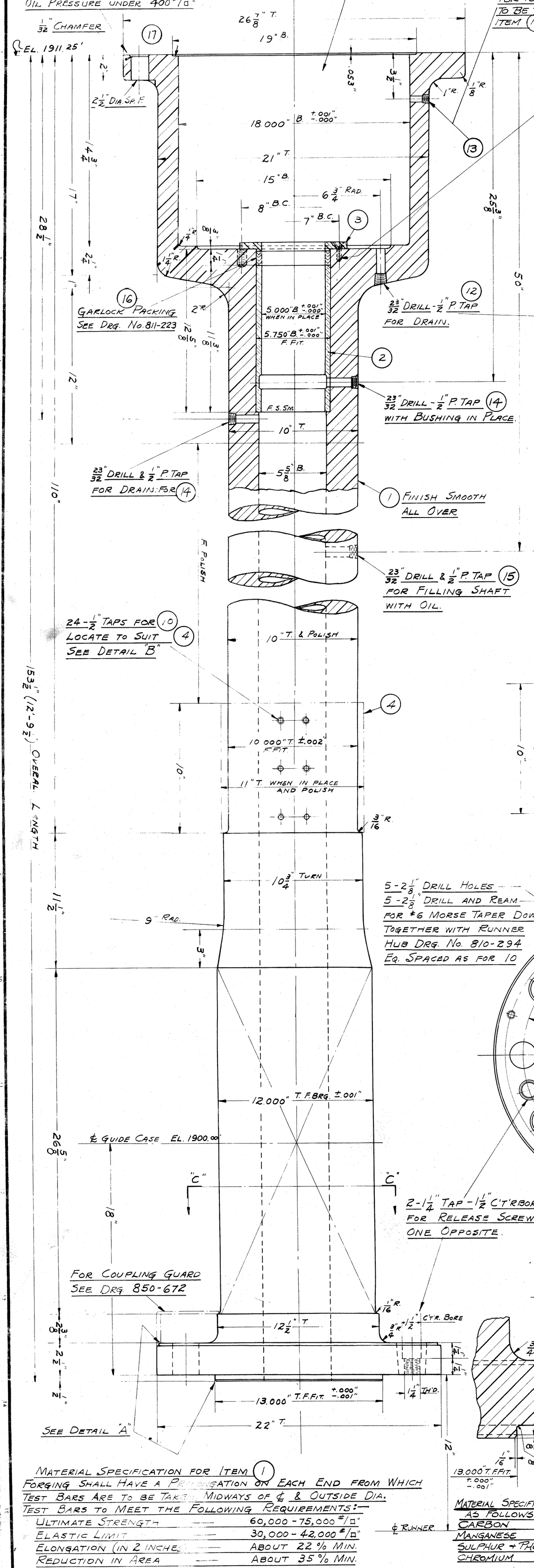
DRAWN R.H.S. DATE 2-5-36
TRACED J.B.W. DATE 4-7-36
CHECKED Edw.B. DATE 2/24/36
O. K. DATE 3/5/36
SIMILAR TO 859-363
SCALE 1½" = 3"

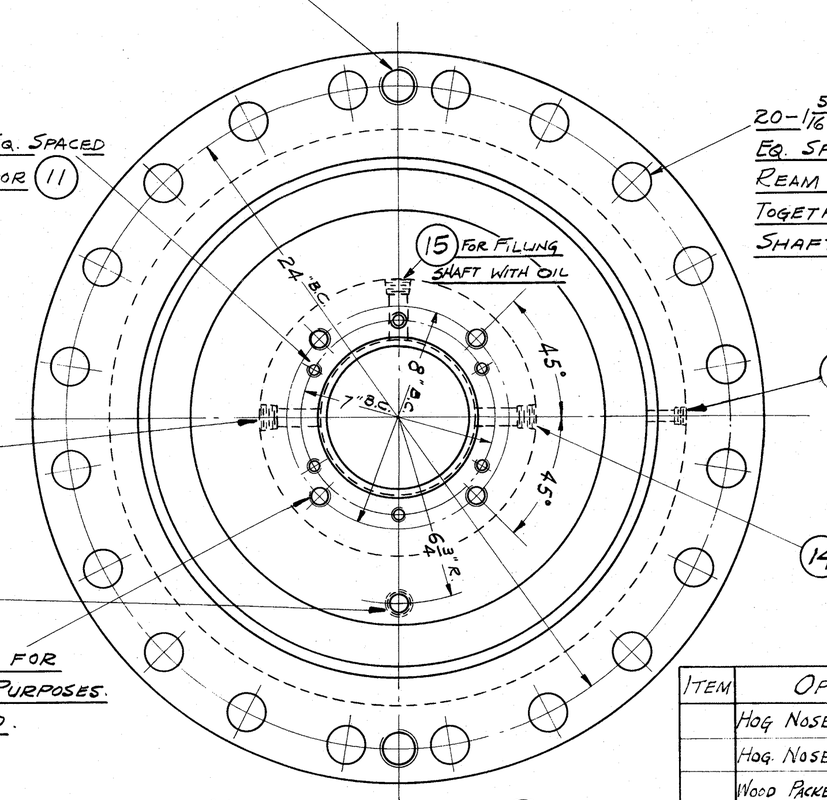
ADJUSTING SHAFT FOR RUNNER OPERATING MECHANISM USED ON HYDRAULIC TURBINE

841
358

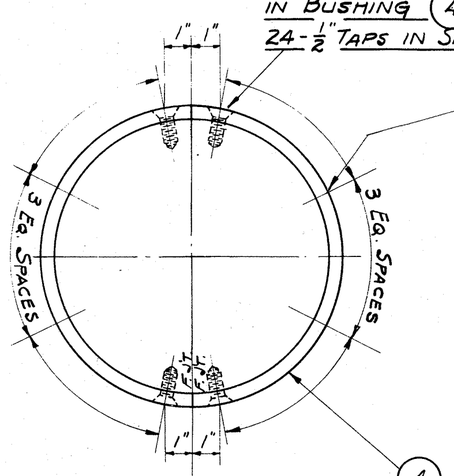
USED FOR		No.	ORD. NO.	
CITY OF SPOKANE, WASH. WATER DIVISION	2/27-36 J.F.K.	3	28-1110	

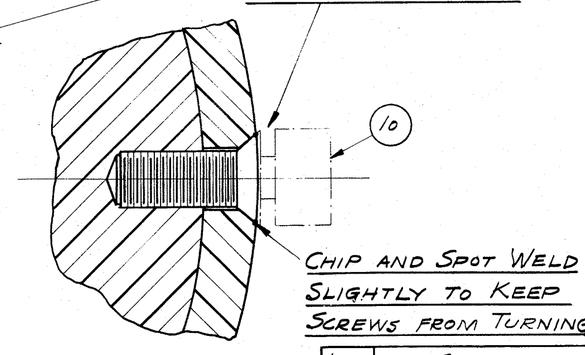
NOTE:-
THIS FACE TO BE ABSOLUTELY TRUE AND SMOOTH TO WITHSTAND OIL PRESSURE UNDER 400#/□"



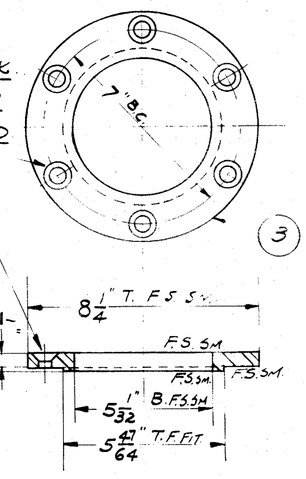


ITEM	OPERATION	TOOL NO.
	HOG NOSE TOOL 5 5/8" DIA.	23887
	HOG. NOSE TOOL 5 5/8" DIA.	23888
	WOOD PACKED REAMER 5.670" DIA.	75463
	1.375" REAMER FOR COUPLING HOLES	162436

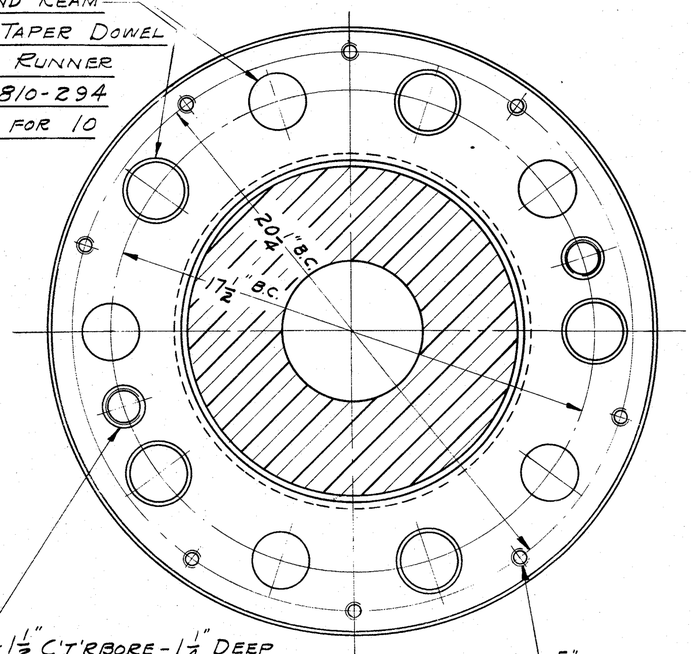




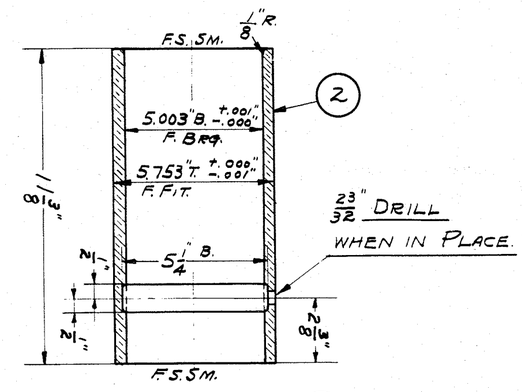
ITEM	OPERATION	TOOL NO.
	1.365" REAMER FOR COUPLING HOLES	162437
	ARBOR FOR REAMERS 162436 AND 162437	161930



DETAIL "B"

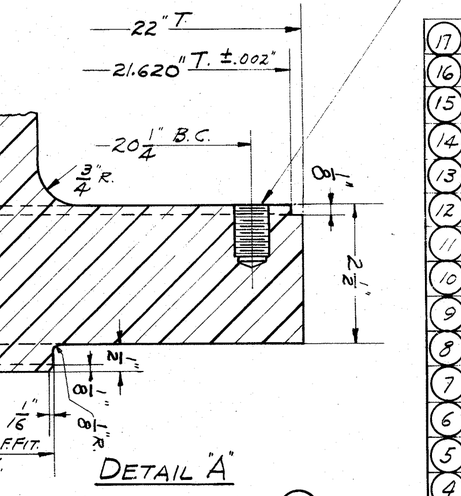


SECTION "C-C"



MATERIAL FOR ITEM (2) TO CONFORM TO APPROXIMATELY THE FOLLOWING SPECIFICATIONS:-

COPPER	79-80 %
TIN	9.5-10 %
LEAD	9.5-10 %
ZINC	1/2 - 1 %
TRACE OF PHOSPHORUS	
TENSILE STRENGTH	25,000 #/□"
ELONGATION (IN 2 INCHES)	8 % MIN.



MATERIAL SPECIFICATION FOR ITEM (1) FORGING SHALL HAVE A PROLONGATION ON EACH END FROM WHICH TEST BARS ARE TO BE TAKEN MIDWAYS OF ℄ & OUTSIDE DIA. TEST BARS TO MEET THE FOLLOWING REQUIREMENTS:—

ULTIMATE STRENGTH	60,000 - 75,000 #/□"
ELASTIC LIMIT	30,000 - 42,000 #/□"
ELONGATION (IN 2 INCHES)	ABOUT 22 % MIN.
REDUCTION IN AREA	ABOUT 35 % MIN.

MATERIAL SPECIFICATION FOR ITEM (4) TO BE AS FOLLOWS:—

CARBON	.25 MAX.
MANGANESE	.40 TO .60
SULPHUR + PHOSPHOROUS	.03 MAX.
CHROMIUM	11 TO 15 %

ITEM	REQ.	SIZE & NAME	MAT.	PATT. NO.	DRG. NO.	STOCK	RGH. WEIGHT	FIN.
(17)	1	18 1/8" I.D. x 18 7/8" O.D. x .062" THK. RING. - #953 OIL RESISTING PACKING. - GARLOCK PACKING CO.						
(16)	1	5" INS. DIA. x 5 3/4" O.D. x 1 3/16" HIGH. PACKING - #430 CHEVRON - ENDS SQUARE - GARLOCK PACKING CO.						
(15)	1	1/2" C'T'RSUNK PIPE PLUG.	BR.	(CRANE	CAT. #51,	PAGE 77)		
(14)	2	1/2" STD. PIPE - 5" LG. - THRD ONE END	W.I.					
(13)	1	1/4" SOLID PIPE PLUG	C.I.		S-5076	1652		
(12)	1	1/2" SOLID PIPE PLUG	C.I.		S-5076	1654		
(11)	6	1/2" x 1 1/4" LG. FLAT H'D. CAP SCREW	STEEL		S-5039	191		
(10)	24	7/8" T. x 1 7/8" LG. SPEC. FLAT H'D. SCREW	STAINLESS IRON-R.357	(PART #1)	868-115	(USE 7/8" BAR)		
(9)	2	1/4" x 2" LG. SPECIAL PLUG (TYPE 'B')	BR. CUT FROM BAR	(PART #5)	864-182			
(8)	4	1 1/4" x 3 3/4" LG. HEX. H'D. SET SCREW.	STEEL		S-5122	2113	(ORDER 4 ON JOB ONLY)	
(7)	2	1 1/4" x 3 1/4" LG. SPECIAL PLUG	BR. CUT FROM BAR	(PART #5)	867-379			
(6)	40	1 1/4" S.F. HEX. NUT (8 TH'DS. / INCH)	S.A.E. 1035		S-6020	6677		
(5)	20	1 7/16" T. x 7 1/4" LG. COUPLING BOLT	S.A.E. 1045	(PART #28)	867-36			
(4)	2	11" T. x 10.000" B. x 10" LG. HALF BUSHING.	STEEL. SEE SPEC.	(MAKE FROM 1-1" x 11" x 38" LG. PLATE)				
(3)	1	8 1/4" T. x 5" TH'K. GLAND	A.S.T.M. A-113	(CUT FROM 3/4" x 8 1/2" SQ. PLATE.)				
(2)	1	5.753" T. x 11 3/8" LG. BUSHING	BR. SEE SPEC.	2 WT. - 5767-6				
(1)	1	12 1/2" T. x 153 1/2" LG. SHAFT	F.S. SEE SPEC.	(TEST BAR)				

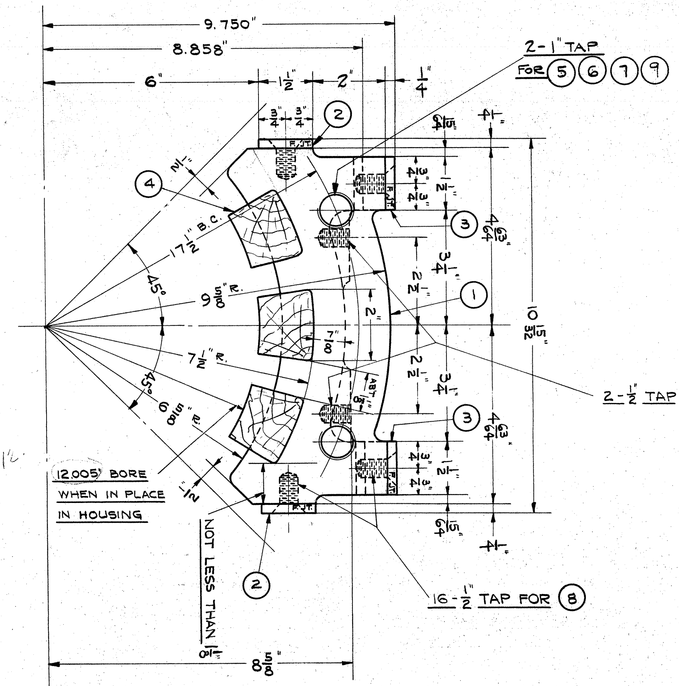
1 FEB. 27, 1936 J.F.K.

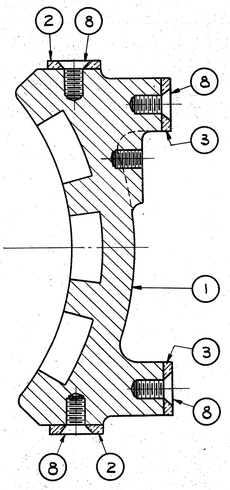
ALLIS-CHALMERS MFG. CO.
MILWAUKEE, WIS., U. S. A.
HYDRAULIC DEPT.
DRAWN R.H.S. DATE 2-5-36
TRACED DATE 2-18-36
CHECKED T.F.K. DATE 2/20-36
O. K. DATE
SIMILAR TO 839-541
SCALE 3", 6", 12"

MAIN SHAFT
USED ON
HYDRAULIC TURBINE

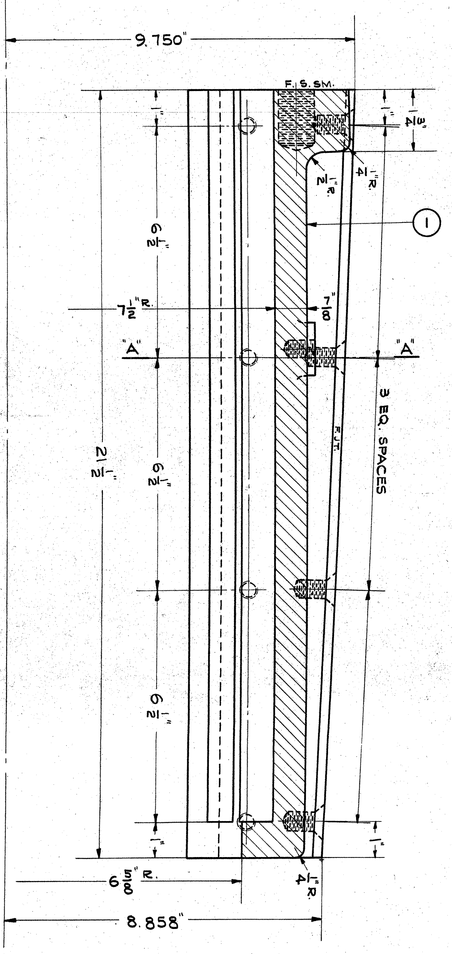
841 — 354

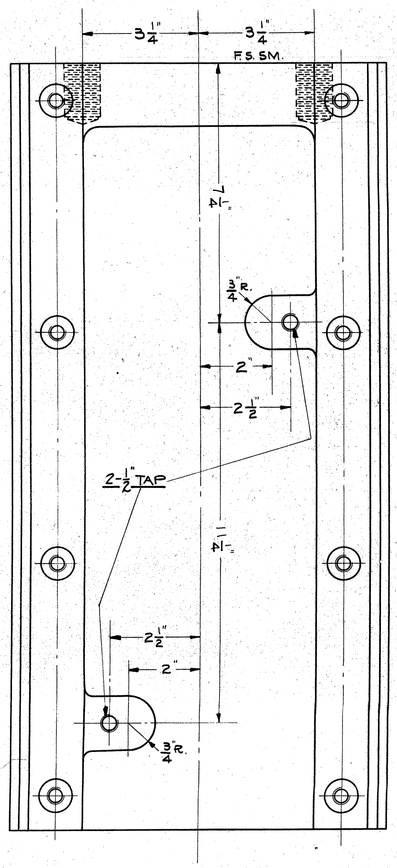
USED FOR		NO.	ORD. NO.	
CITY OF SPOKANE, WASH. WATER DIVISION	2/25/36 J.F.K.	12	28-11111	

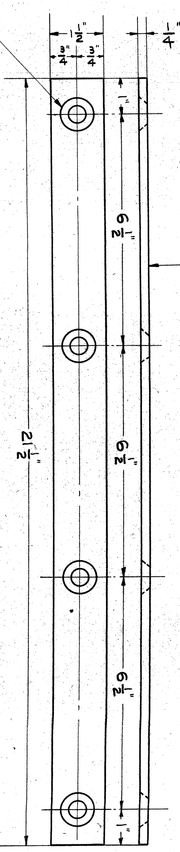


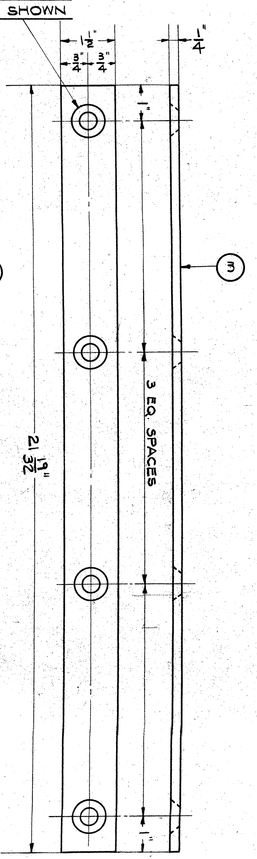


SECTION "A-A"

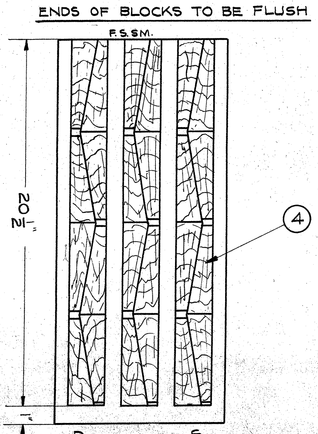




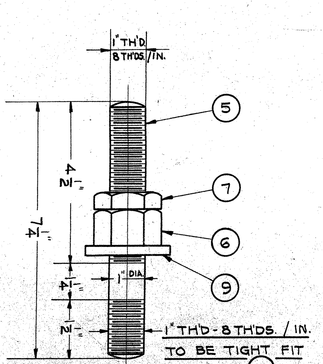




ENDS OF BLOCKS TO BE FLUSH



DEVELOPED SURFACE OF SHELL



ITEM	REQ.	SIZE & NAME.	MAT.	PATT. NO.	DRG. NO.	STOCK	RGH. WEIGHT	FIN. WEIGHT
(12)								
(11)								
(10)								
(9)	8	1" FIN. WASHER	S.A.E. 1020		S-5062	707		
(8)	16	½" X 1" LG. FLAT H'D. CAP SCREW.	BR.		S-5039	(USE 7/8" DIA BAR)		
(7)	2	1" S. F. JAM NUT	STEEL		S-5382	974		
(6)	2	1" S.F. HEX. NUT	STEEL		S-5382	373		
(5)	2	1" x 7½" LG. SPEC. STUD	STAINLESS IRON-R.S.S.T.	CUT FROM BAR				
(4)	3	1½" x 2" x 20½" LG. BLOCKS	LIGNUM VITAE					
(3)	2	¼" x 1½" x 21 19/32" LG. SLIDING STRIP	COLD ROLLED BRASS					2.5#
(2)	2	¼" x 1½" x 21½" LG. SLIDING STRIP	COLD ROLLED BRASS					2.5#
(1)	1	BEARING SHOE	CI-A.S.T.M. A-48-35T CLASS 25	2 WT 19946				100#

1	FEB. 25, 1936								
J.F.K.									

ALLIS-CHALMERS MFG. CO.
MILWAUKEE, WIS., U.S.A.
HYDRAULIC DEPT.

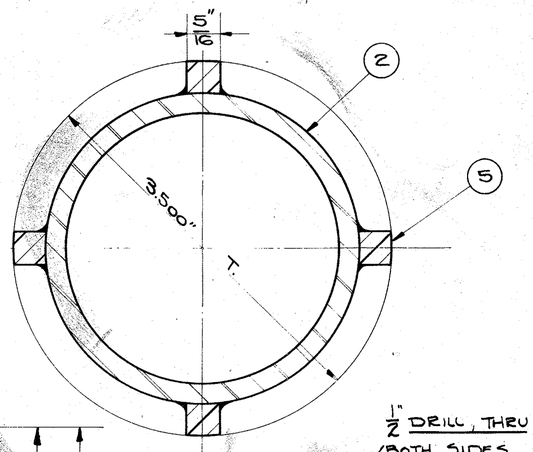
DRAWN H.I. DATE 12-12-35
TRACED 1644 DATE 1-28-36
CHECKED J.F.K. DATE 2/18-36
O. K. [illegible] DATE
SIMILAR TO 802-243
SCALE 3" & 6" — 12"

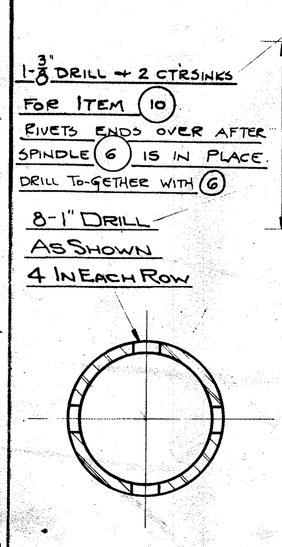
12" BEARING SHOE USED ON HYDRAULIC TURBINE

841 — 342

Used For		No.	Ord. No.	
Passaic Valley Water Comm. Little Falls Pumping Sta.	10/30-31 J.F.K.	1	2-B-10559	

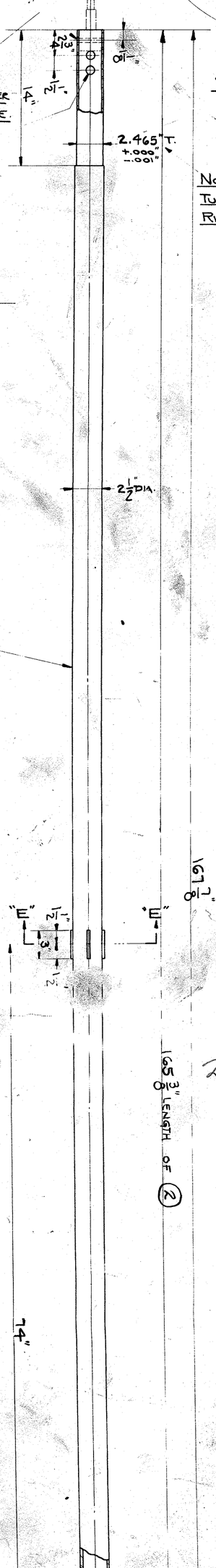
FORM E 80A 9-31



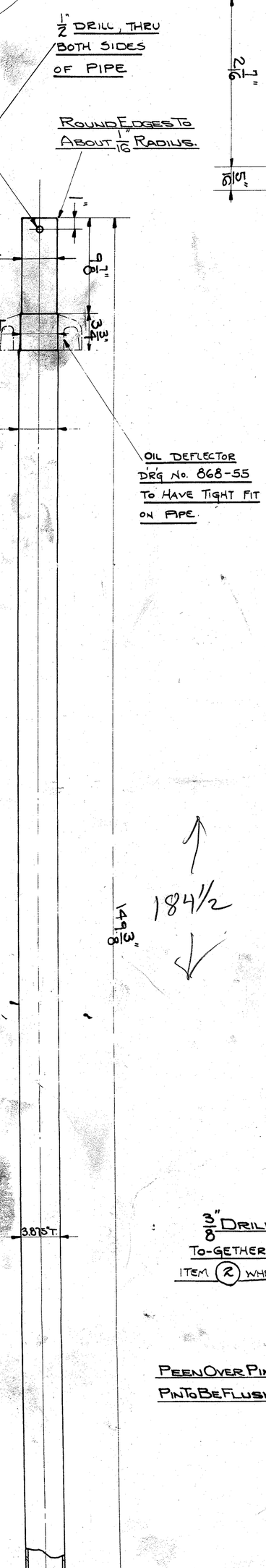


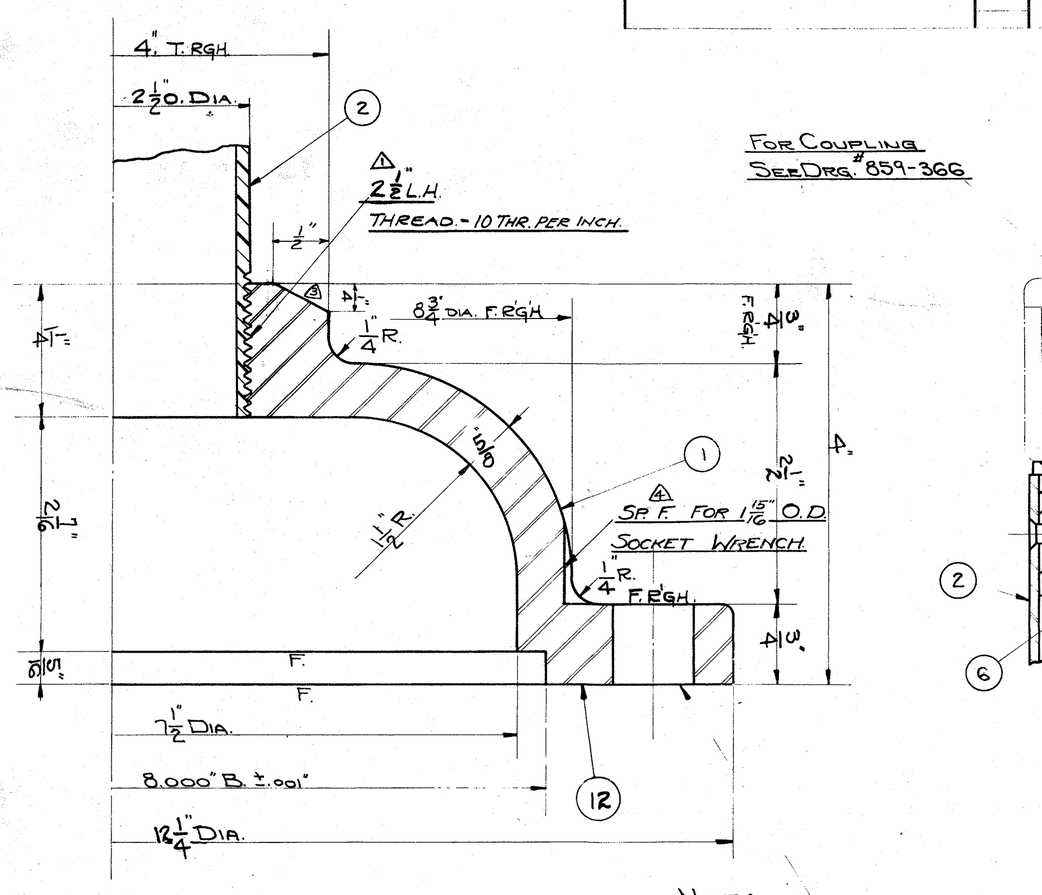
1-3/8" DRILL + 2 CTRSINKS FOR ITEM (10) RIVETS ENDS OVER AFTER SPINDLE (6) IS IN PLACE. DRILL TO-GETHER WITH (6)

8-1" DRILL AS SHOWN 4 IN EACH ROW

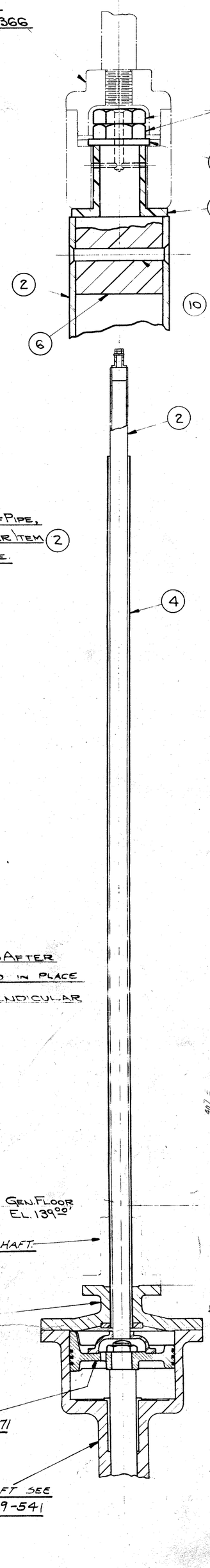


THIS FACE IS TO BE PERPENDICULAR TO ℄ OF PIPE. SEE DETAIL "A".



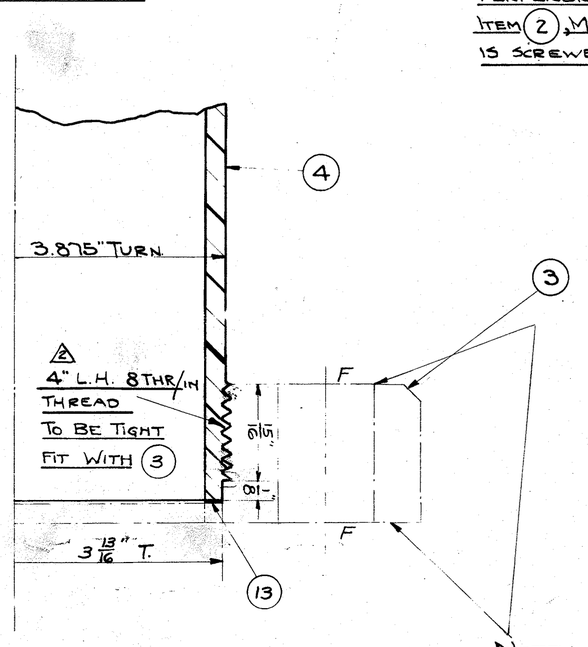


FOR COUPLING SEE DRG. # 859-366



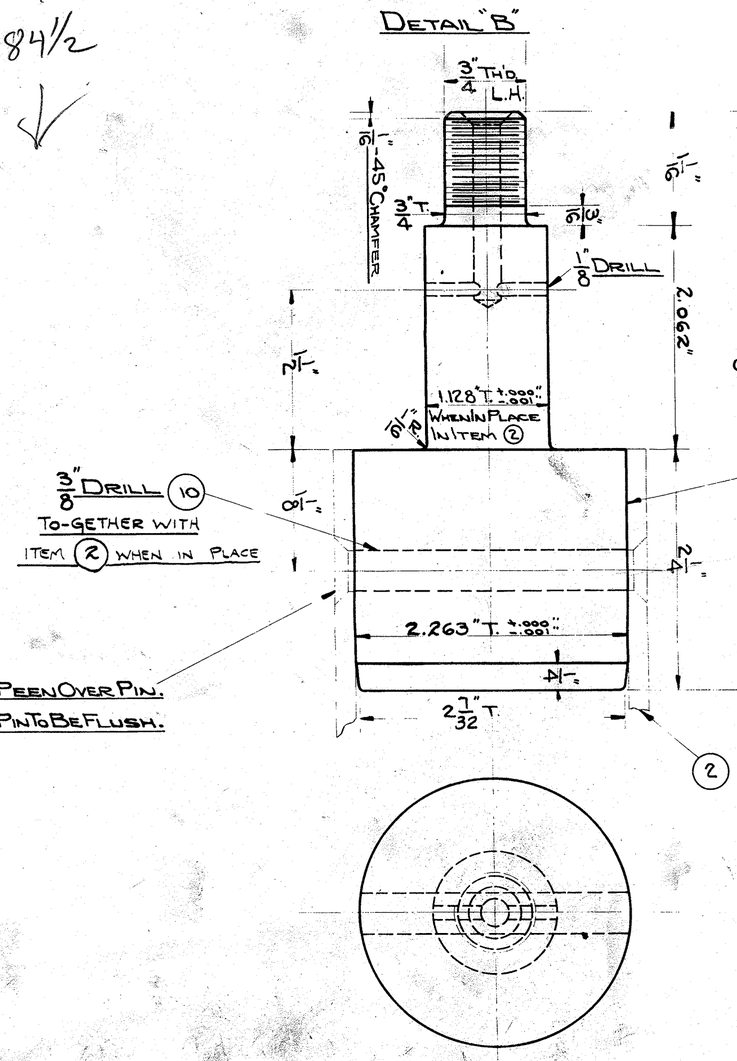
NOTE: THIS FACE IS TO BE PERPENDICULAR TO ℄ OF PIPE, ITEM (2), MACHINE AFTER ITEM (2) IS SCREWED IN PLACE.

DETAIL "A"

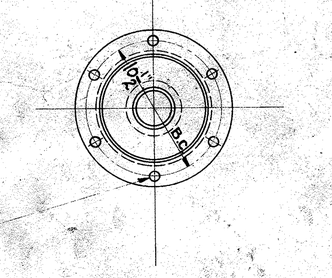


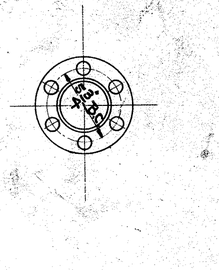
NOTE: FLANGE TO BE FACED AFTER ITEM (4) IS SCREWED IN PLACE FACES TO BE PERPENDICULAR TO ℄ OF PIPE.

DETAIL "B"



THIS FACE IS TO BE PERPENDICULAR TO ℄ OF PIPE. SEE DETAIL "A".





THESE SURFACES ARE TO BE PERPENDICULAR TO ℄ OF PIPE. SEE DETAIL "B".

Item	Req.	Size & Name	Mat.	Patt. No.	Drg. No.	Stock	Weight Rgh.	Weight Fin.
1	1	Piston Head	C.I. "B"	2WT-20123			35#	
2	1	2.260" Ins. D. x 2 1/2" O.D. x 165 3/8" Lg. Tubing.	Steel		S-5299			
3	1	7.496" T. x 1 1/4" Thk. Spec. Flange	B.P. A.S.T.M. A-11		868-84			
4	1	3 1/2" St'd. Pipe - 149 3/8" Lg.	W.I.					
5	4	5/16" x 1/2" x 3" Lg. Bar	S.S."G"		S-5294			
6	1	Spindle	S.S."C"	Cut From 2 1/2" Dia. x 5 1/2" Lg. Bar				
7	1	Bushing - 1.125" Ins. Dia. x 2 1/2" O.D. x 2.062" Lg.	S.S."E"	(Part #43)	865-310			
8	1	7/8" Finish Washer - Turn Outside Dia to 2 1/8" -	S.S."C"		S-5062	706		
9	2	3/4" S.F. Hex. Half Nut - L.H. Thd.	S.S."C"		S-5382			
10	1	3/8" Dia. x 3" Lg. Pin	S.S."G"		S-5030			
11								
12	1	8 1/8" Ins. Dia. x 7 1/2" O.D. x 1/64" Thk. Gasket.	Endura Packing		S-5838			
13	1	3 13/16" O.D. x 3 1/2" I.D. x 1/16" Thk. Washer	Annealed Copper					
14								
15								
16								
17								
18								

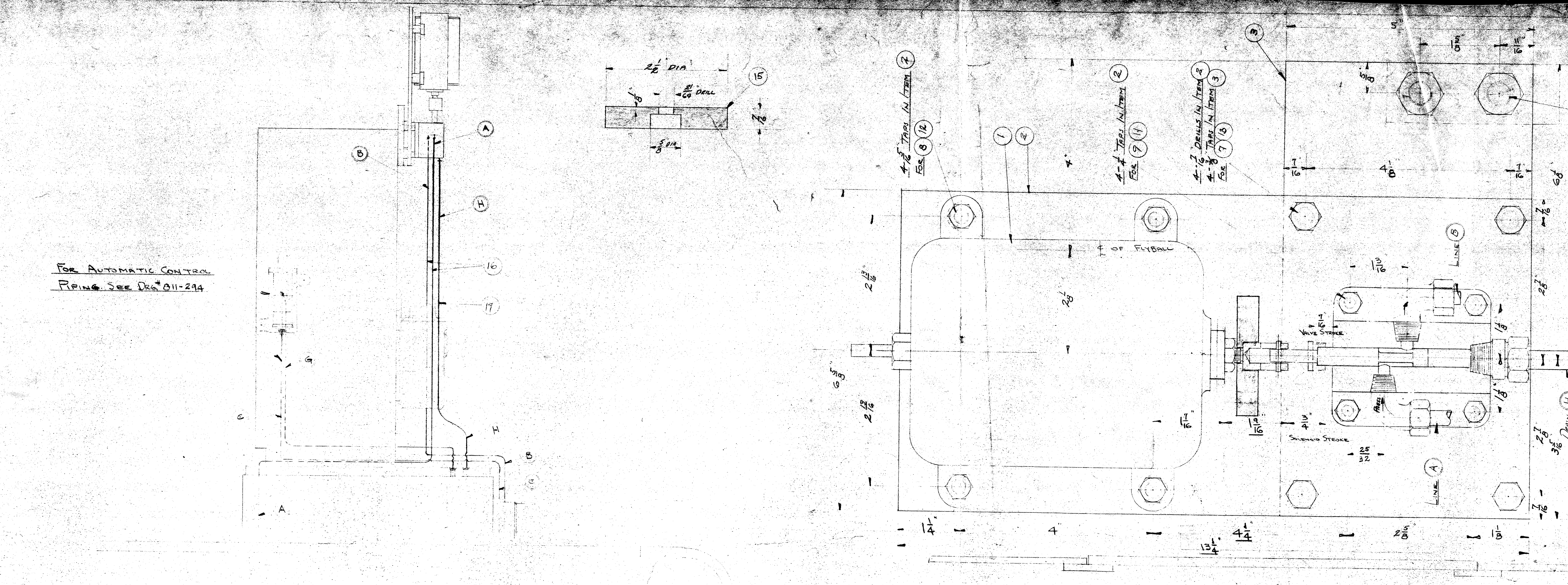
1 | 10/29-31 — J.F.K. — Material for Item (7) was S.S.C.	2 | 11/10-31 — J.F.K. — Changed: (F-1) was 2" L.H. Pipe Thr. (F-7) was 3 1/2" L.H. Pipe Thr.	3 | 11-30-31 — C.F.E. — Item (3) was 1-3.875" B x 7.246" T. x 7/8" Thk. Flange. Added Item (13). (3) -2F Added Chamfer. (4) -3H Added Note	4 | 12-28-31 — C.F.A.

ALLIS-CHALMERS MFG. CO.
MILWAUKEE, WIS. U.S.A.
HYD. DEPT.

Drawn H.J.J. Date 6/23/31
Traced H.J.J. Date 6/29/31
Checked J.F.K. Date 10/29-31
O.K. M. 11-3-31 Date
Similar to
Scale 1" - 1 1/2" - 6" ℄ 12"

Details Of Operating Mechanism Used On Hydraulic Turbine

839-547


For Automatic Control
Piping See Drg #811-294
$2\frac{1}{2}$ Dia
$\frac{21}{64}$ Drill
$\frac{5}{8}$ Dia
15
4-$\frac{5}{16}$ Taps in Item 2 For 8 12
4-$\frac{1}{4}$ Taps in Item 2 For 9 11
4-$\frac{7}{16}$ Drills in Item 2
4-$\frac{3}{8}$ Taps in Item 3 For 7 13
2-$\frac{5}{8}$ Drill in 3 For 6 - 2-$\frac{1}{2}$ Taps $\frac{3}{4}$ Deep in Mounting Panel Drg #841-403 in Field.
℄ of Flyball
Line B
Line A
Valve Stroke
Solenoid Stroke
Press.
Drain H

Used For	Rd.	No.	Ord No.	
City of Spokane, Wash Water Division	C.S. 6-8-37	3	18-9500	Supersedes #841-401

Item	No. Req.	Size & Name	Mat.	Patt No.	Drg. No.	Stock	Weight Rgh	Weight Fin
1	1	#D2 Lifting Solenoid - Continuous Duty Cutler-Hammer Cat# 560H7 - Voltage 125 V. D.C.						
2	1	$\frac{1}{4} \times 6\frac{5}{8} \times 13\frac{1}{4}$ Panel	A.S.T.M. A113 Str. St. for Cars					
3	1	$\frac{1}{2} \times 5 \times 9\frac{7}{16}$ Bracket	S.A.E. 1020					
4								
5								
6	2	$\frac{1}{2} \times 1\frac{1}{4}$ Lg. Hex Hd. Tap Bolt	Steel		S-5040	136		
7	4	$\frac{3}{8} \times \frac{7}{8}$ Lg. Hex Hd. Cap Screw	Steel		S-5503	3775		
8	4	$\frac{5}{16} \times 1$ Lg. Hex Hd. Cap Screw	Steel		S-5503	3772		
9	4	$\frac{1}{4} \times \frac{3}{4}$ Lg. Hex Hd. Cap Screw	Steel		S-5503	3625		
10								
11	4	$\frac{1}{8}$ Pipe $\times \frac{1}{4}$ Lg. Spacer	Black Wrot Steel					
12	4"	$\frac{1}{4}$ Pipe	Black Wrot Steel	(Cut To Suit On Assembly				
13	4	$\frac{3}{8}$ Ex. Hy. Pipe $\times \frac{1}{4}$ Lg. Spacer	Black Wrot Steel					
14								
15	1	$2\frac{1}{2}$ Dia $\times \frac{7}{16}$ Thk. Weight	Lead					
16	8'-0"	.312 O.D. × .248 I.D. Tubing	Copper	(Cut & Bend To Suit				
17	4'-0"	.375 O.D. × .245 I.D. Tubing	Copper	(Cut & Bend To Suit				
18								
19	3	$\frac{5}{16}$ O.D. Tube - #62 F. Union - Imperial Brass Co.						
20	1	$\frac{3}{8}$ O.D. Tube - #62 F. Union - Imperial Brass Co.						
21								
22								
23								
24								
25								
26								

1 | 6-8-37 JJR

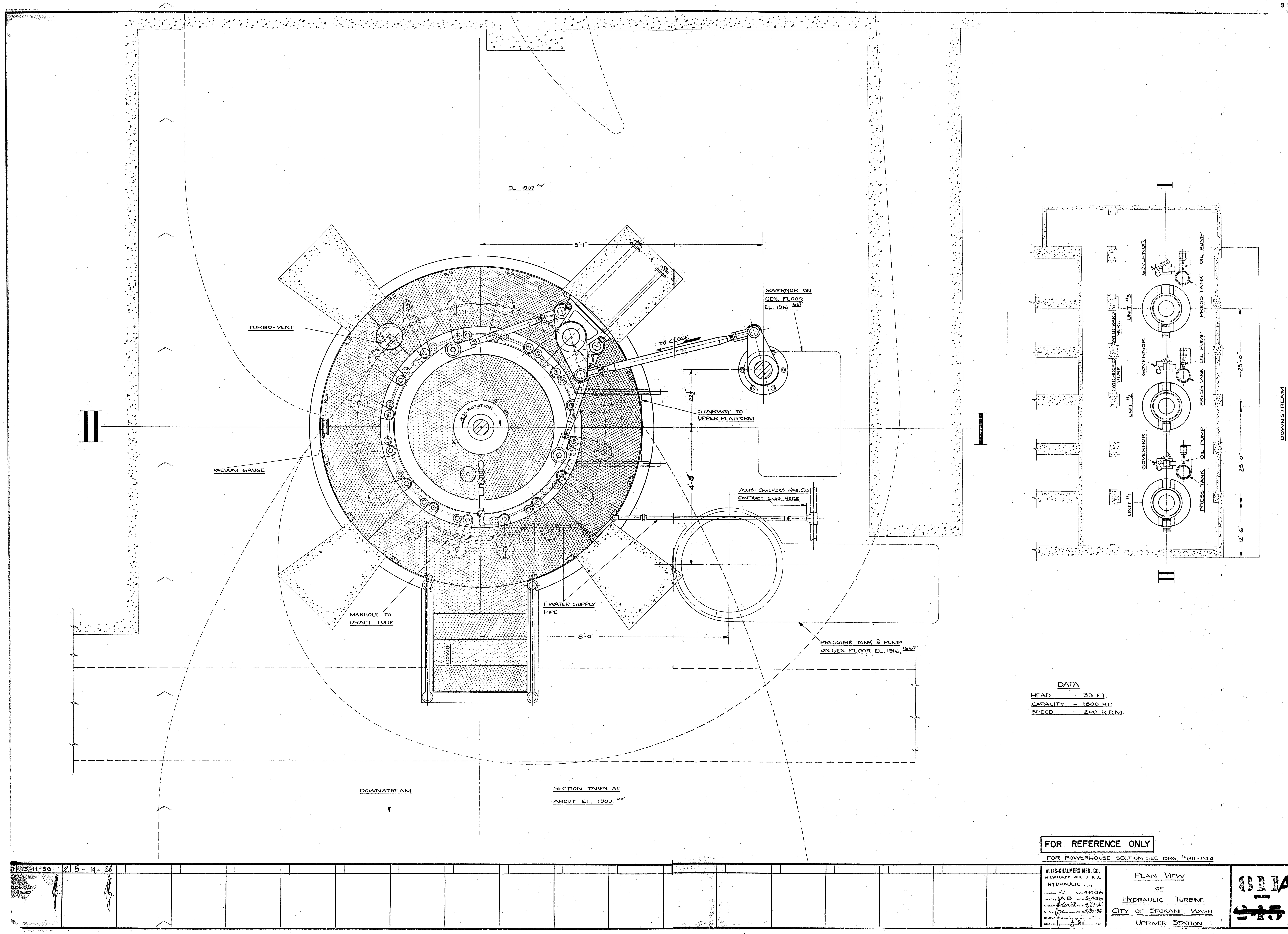
Allis-Chalmers Mfg. Co.
Hydraulic Turbine Dept.
Milwaukee, Wisconsin

Dr. R.W.L. 6/8/37
Chd. R.W.S. 6/8/37
OK JJR.
Scale 3" + 12" = 12"

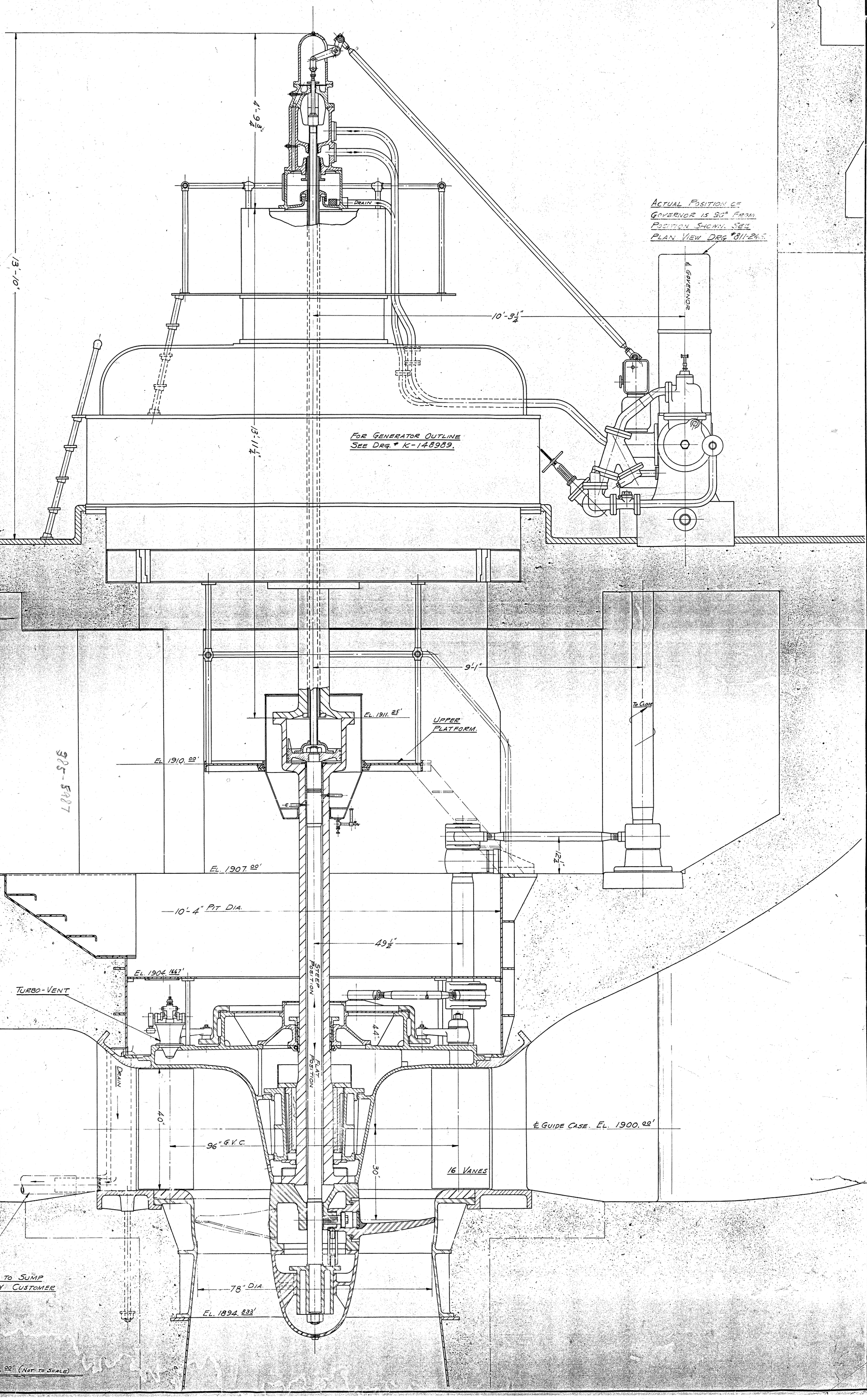
Mounting of Solenoid Valve

Used on Hydraulic Turbine Gov.

814 - 250


EL. 1907 00'
9'-1"
GOVERNOR ON
GEN. FLOOR
EL. 1916. 1661'
TURBO-VENT
TO CLOSE
R.H. ROTATION
22 1/2"
STAIRWAY TO
UPPER PLATFORM
II
I
VACUUM GAUGE
4'-8"
ALLIS-CHALMERS MFG. COS
CONTRACT ENDS HERE
MANHOLE TO
DRAFT TUBE
1" WATER SUPPLY
PIPE
DOWN
8'-0"
PRESSURE TANK & PUMP
ON GEN. FLOOR EL. 1916. 1667'
DOWNSTREAM
SECTION TAKEN AT
ABOUT EL. 1909. 00'
GOVERNOR
UNIT #3
SWITCHBOARD HERE
UNIT #2
UNIT #1
PRESS TANK
OIL PUMP
25'-0"
25'-0"
12'-6"
DOWNSTREAM
DATA
HEAD - 33 FT.
CAPACITY - 1800 H.P.
SPEED - 200 R.P.M.
FOR REFERENCE ONLY
FOR POWERHOUSE SECTION SEE DRG. #811-244
1 3-11-36
2 5-19-36
J.F.K.
DRAWING TRACED
ALLIS-CHALMERS MFG. CO.
MILWAUKEE, WIS., U. S. A.
HYDRAULIC DEPT.
DRAWN H.L. DATE 4-14-36
TRACED A.B. DATE 5-4-36
CHECKED H.L.-J.K. DATE 4-24-36
O.K. DATE 4-30-36
SIMILAR TO
SCALE 1/8" = 1'-0"
PLAN VIEW
OF
HYDRAULIC TURBINE
CITY OF SPOKANE, WASH.
UPRIVER STATION
811A

1 MARCH 15, 1936 JFK



DATA

HEAD — 33 F.T.

CAPACITY — 1800 HP.

SPEED — 200 R.P.M.

FOR TURBINE SECTION SEE DRG. #811-233.

FOR PLAN VIEW OF POWERHOUSE SEE DRG. #811-245

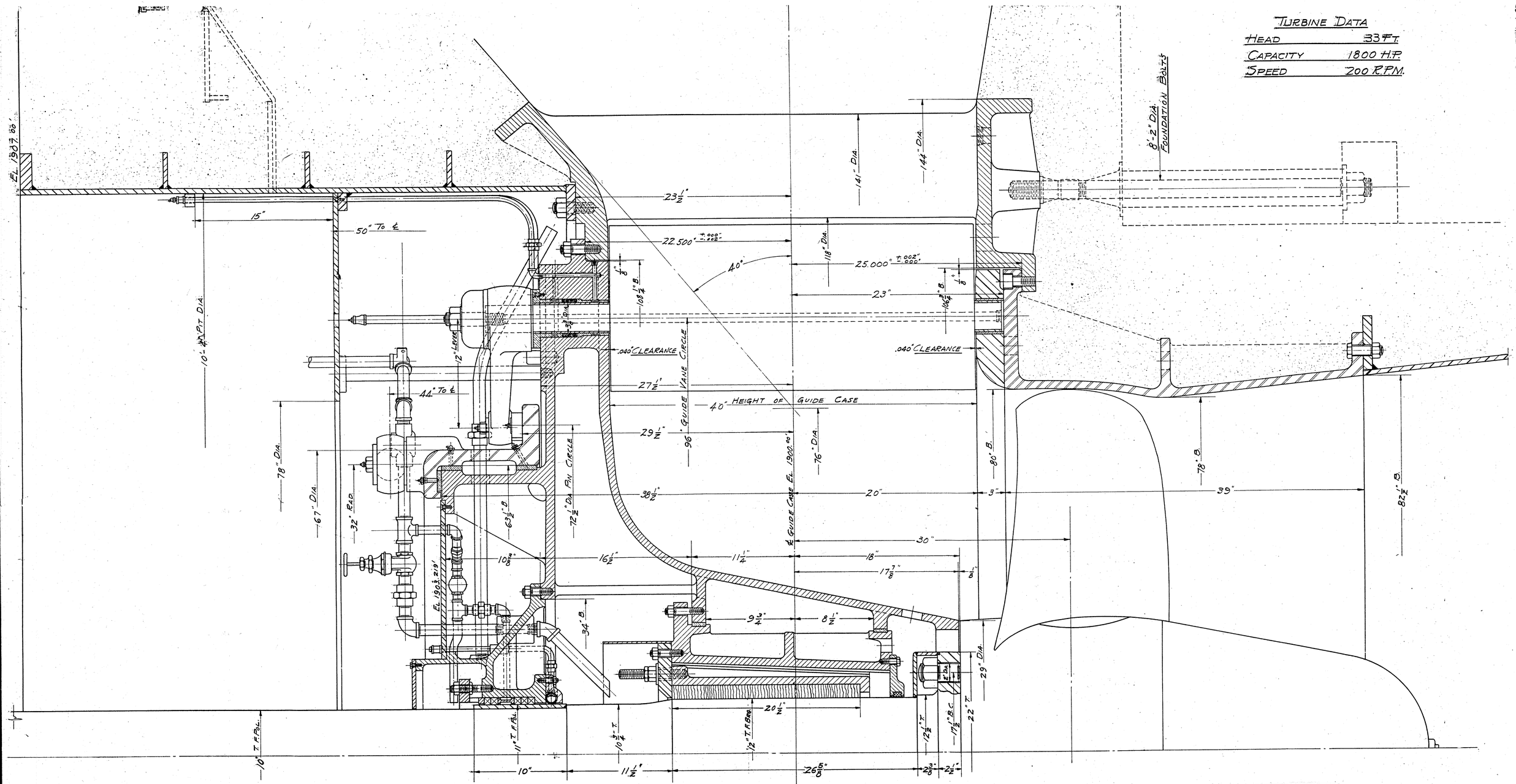
375-3787

ALLIS-CHALMERS MFG. CO.
MILWAUKEE, WIS., U. S. A.
HYDRAULIC DEPT.

DRAWN HLL DATE 4-13-36
TRACED [illegible] DATE 6-2-36
CHECKED JFK DATE 4-13-36
O. K. DATE
SUBMITTED TO
SCALE

ASSEMBLY OF TURBINE & GENERATOR
FOR
CITY OF SPOKANE, WASH.
WATER DIVISION
UPRIVER STATION

811
245



FOR REFERENCE ONLY

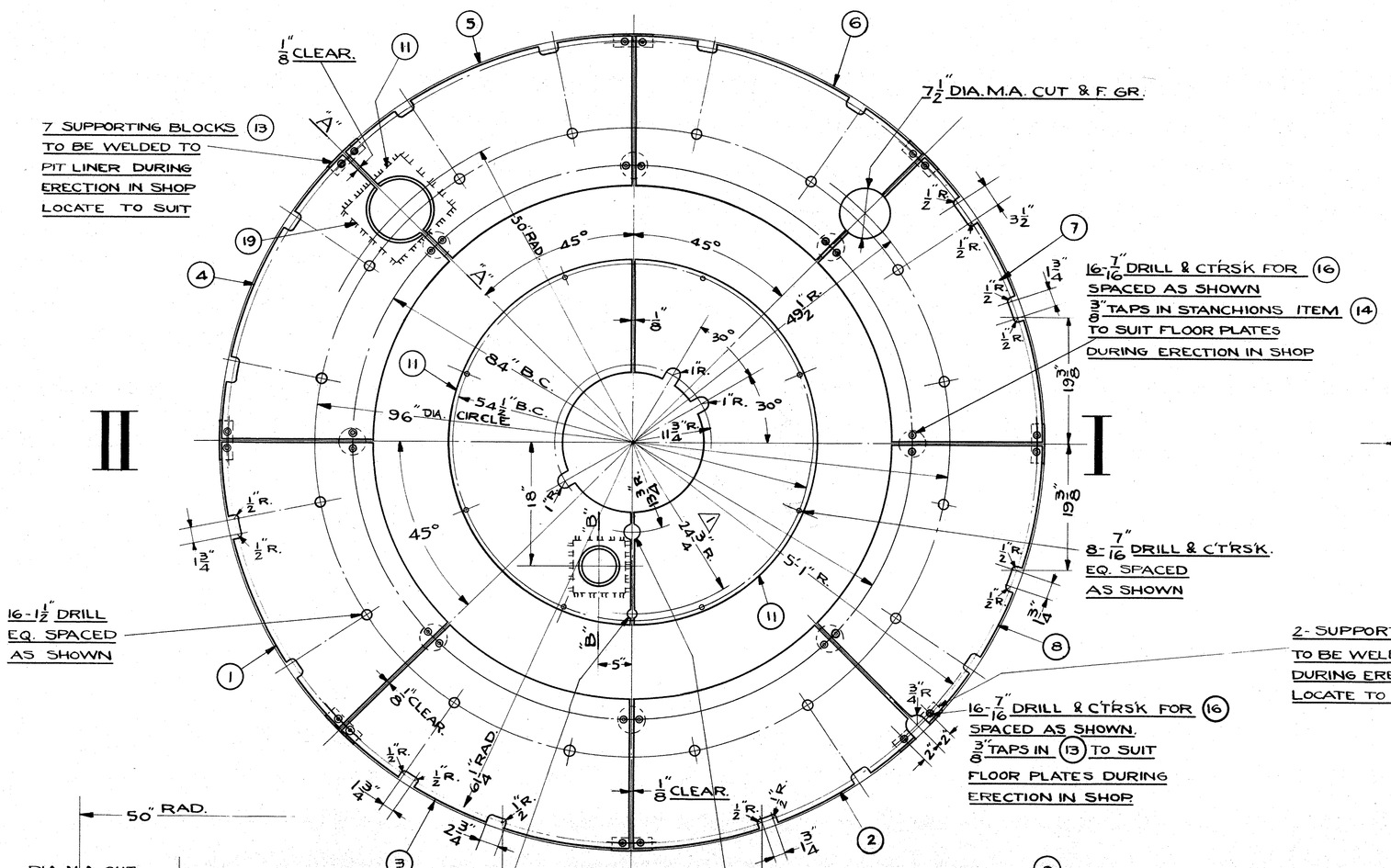
1 MARCH, 1, 1936
J.R.L.

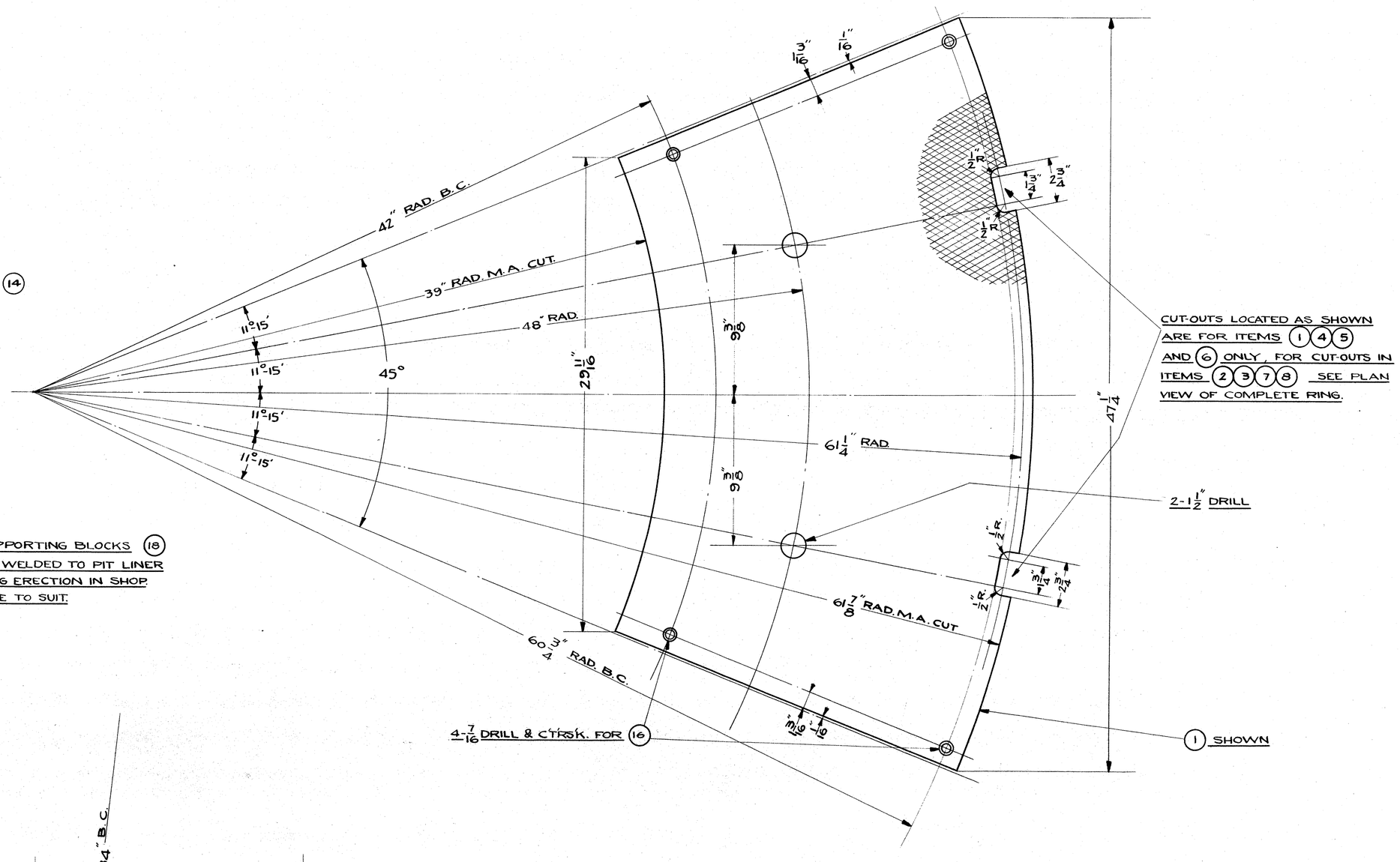
ALLIS-CHALMERS MFG. CO.
MILWAUKEE, WIS., U. S. A.
HYDRAULIC DEPT.
DRAWN H.I. DATE 2-19-36
TRACED 764 DATE 2-20-36
CHECKED H.I. DATE 4/16/36
O.K. A.E.S. DATE
SHIPPED TO

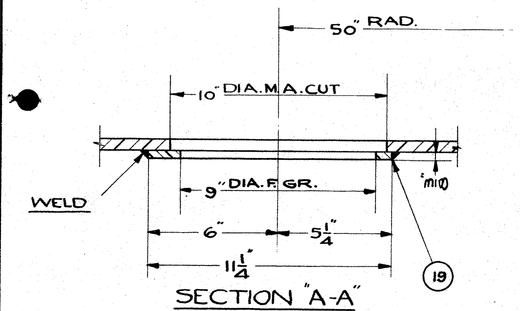
TURBINE CROSS-SECTION
FOR
CITY OF SPOKANE, WASH.
WATER DIVISION

811B
~~289~~

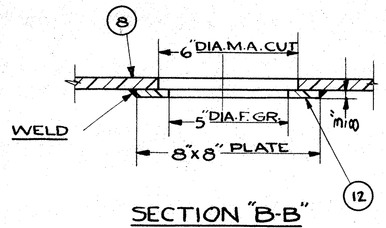
USED FOR		NO.	ORD. NO.	
CITY OF SPOKANE, WASH. WATER DIVISION	3-33 J.F.K.	3	28-11114	



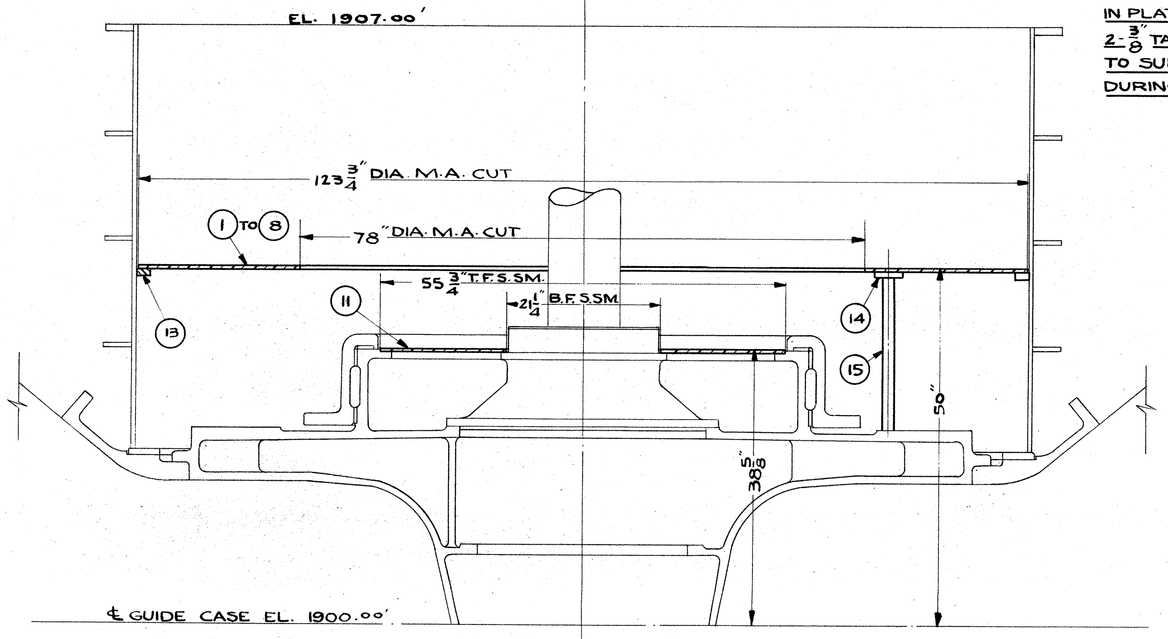


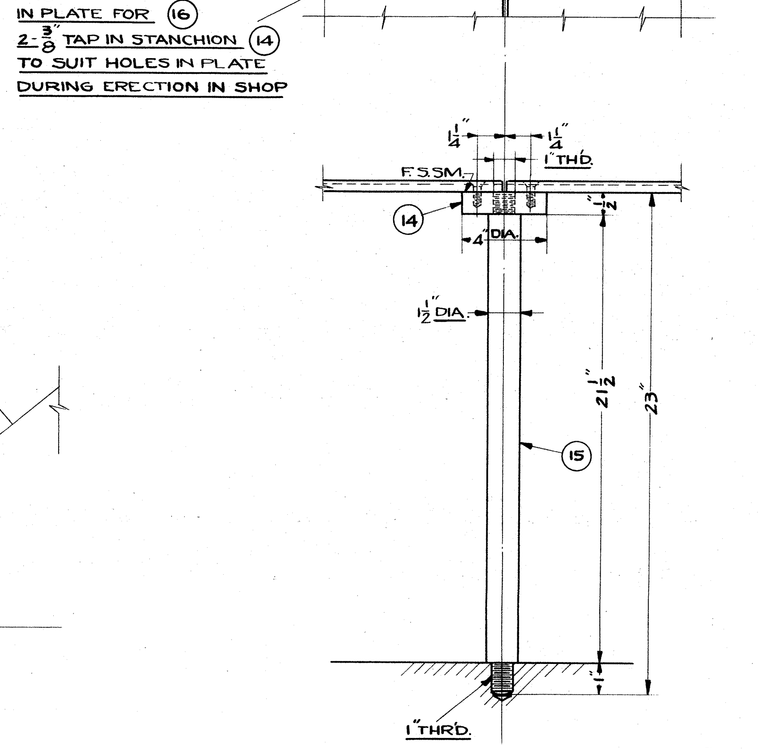


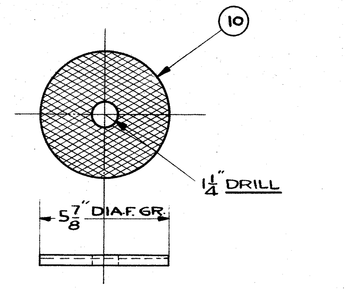
SECTION "A-A"

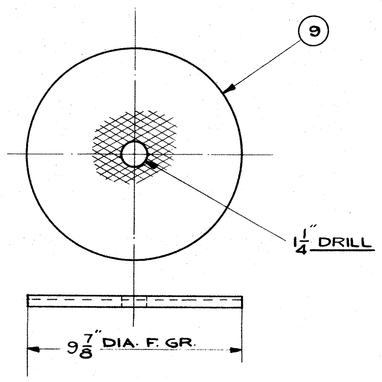


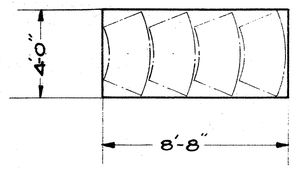
SECTION "B-B"











SKETCH SHOWING METHOD OF LAYING OUT PLATES ITEMS (1) TO (8)

ITEM	REQ	SIZE & NAME	MAT.	PATT. NO.	DRG. NO.	STOCK	RGH F'IN. WEIGHT
(20)							
(19)	2	3/8" X 6" X 11 1/4" LG. PLATE	A.S.T.M. A-113				
(18)	2	3/4" X 2" X 3" LG. BAR	S.A.E. 1020				
(17)	2	7/8" DIA. HANDLE - 24" LG. WHEN STR.	S.A.E. 1025			864-100	(ORDER TWO) (ON JOB ONLY)
(16)	32	3/8" X 1" LG. FLAT HD. CAP SCREW	STEEL		S-5039	531	
(15)	8	1 1/2" DIA. X 23" LG. BAR	S.A.E. 1025	BAR STOCK			
(14)	8	1 1/2" THK. X 4" DIA. SPEC. FLANGE	S.A.E. 1025	CUT FROM 4" DIA. BAR.			
(13)	7	3/4" X 2" X 6" LG. BAR	S.A.E. 1020				
(12)	1	3/8" X 8" SQ. PLATE	A.S.T.M. A-113				
(11)	2	3/8" X 55 3/4" T. X 21 1/4" B. FLOOR PLATE IN HALVES	STEEL				
(10)	1	3/8" X 5 7/8" DIA. COVER	STEEL				
(9)	1	3/8" X 9 7/8" DIA. COVER	STEEL	* MAKE FROM 1'-3/8" X 57" SQ PLATE ILLINOIS STEEL CO. - SECT. S-300			
(8)	1	3/8" X 29 11/16" X 47 1/4" LG. FLOOR PLATE	STEEL				
(7)	1	3/8" X 29 11/16" X 47 1/4" LG. FLOOR PLATE	STEEL				
(6)	1	3/8" X 29 11/16" X 47 1/4" LG. FLOOR PLATE	STEEL				
(5)	1	3/8" X 29 11/16" X 47 1/4" LG. FLOOR PLATE	STEEL				
(4)	1	3/8" X 29 11/16" X 47 1/4" LG. FLOOR PLATE	STEEL	* MAKE FROM 2-3/8" X 41'-0" X 8" LG. PLATE ILLINOIS STEEL CO. - SECT. S-300			
(3)	1	3/8" X 29 11/16" X 47 1/4" LG. FLOOR PLATE	STEEL				
(2)	1	3/8" X 29 11/16" X 47 1/4" LG. FLOOR PLATE	STEEL				
(1)	1	3/8" X 29 11/16" X 47 1/4" LG. FLOOR PLATE	STEEL				

1 MARCH 3, 1936 J.F.K. PLATE FOR ITEMS (1) TO (8) WAS 1-3/8" X 7'-6 3/8"-0 1/8" △ - 24 3/4" R WAS 23 1/2" R.	2 MARCH 11, 1936 H.I. ADDED ITEM (18)	3 4-14-36 H.I. DRG. TRACED.	4 APRIL 27, 1936 J.F.K.	

ALLIS-CHALMERS MFG. CO.
MILWAUKEE, WIS. U. S. A.
HYDRAULIC DEPT.
DRAWN H.I. DATE 2/4-36
TRACED A.B. DATE 4-21-36
CHECKED J.F.K. DATE 2/20-36
O. K. ____ DATE 3-2-36
SIMILAR TO ____
SCALE 1" = 3"

FLOOR PLATES USED ON HYDRAULIC TURBINE

811 — 226

AIR VENT

2" PRESS. PIPE

2" PRESS. PIPE

DRAIN

TO DISTRIBUTOR VALVE

7½"

8" RAD.

3" LINK

24°

6⅞" STROKE

1¼" DIA.

11"

TO DISTRIBUTOR VALVE

16¾"

AIR VENT

DRAIN

7½"

2.4688" TURN

2" PRESSURE PIPE

8"

21"

DRAIN

UP STEEP

2" PRESSURE PIPE

60°

DOWN FLAT

5"

2.500" DIA.

3.750" TURN

12½"

3.8125" BORE & TURN

12-13/16" DRILL
EQ. SPACED
STRADDLING ℄S

3.875" TURN

S.P.F.

F.J.T.

18.996" TURN

21¼" B.C.

23" DIA.

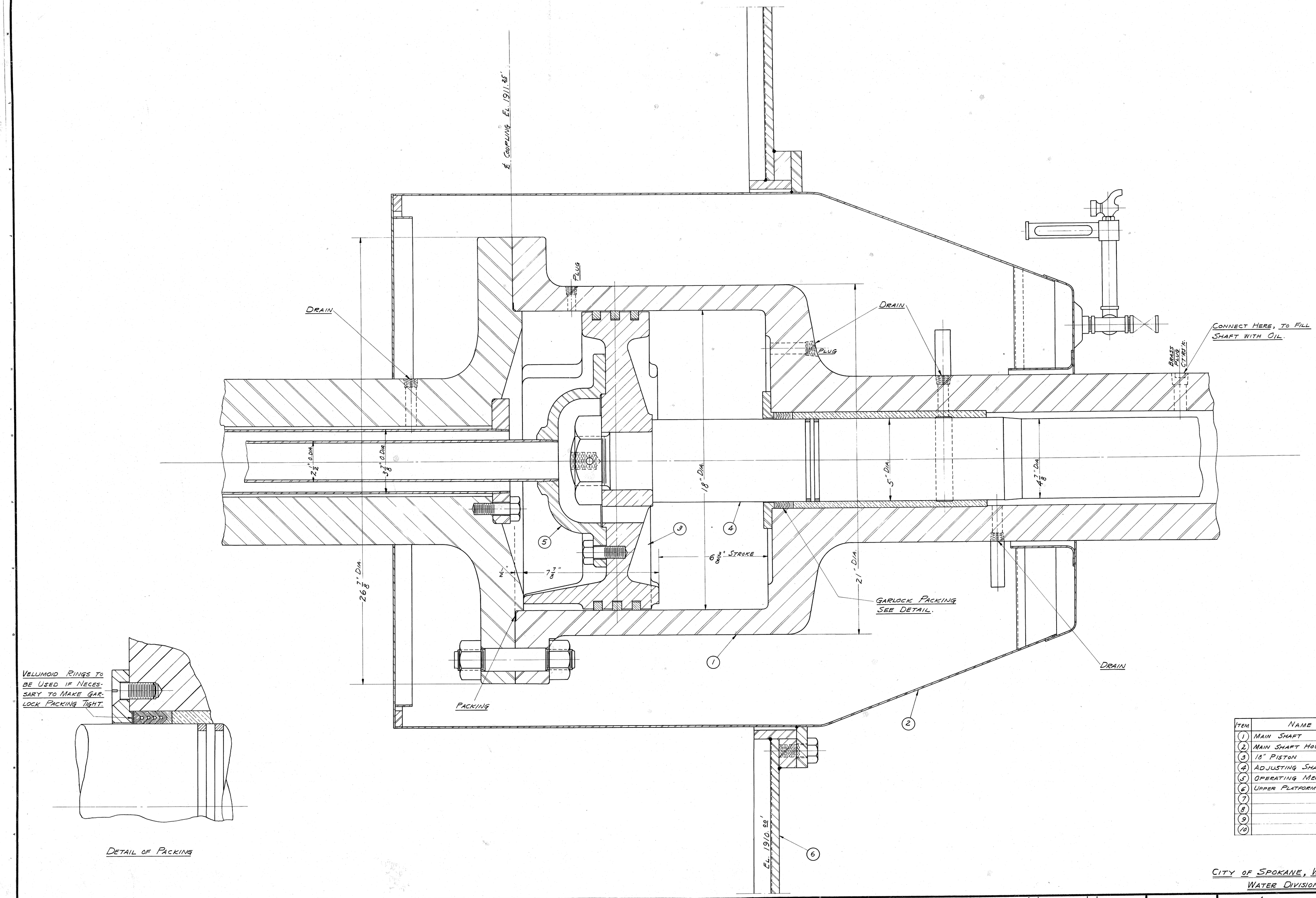
DRAIN

4'-9¾"

ALLIS-CHALMERS MFG. CO.
MILWAUKEE, WIS., U. S. A.

ASSEMBLY
OF
OIL DISTRIBUTOR HEAD
CITY OF CHICAGO, ILL.
WATER DIVISION

811
—
224



VELUMOID RINGS TO BE USED IF NECESSARY TO MAKE GARLOCK PACKING TIGHT.

DETAIL OF PACKING

ITEM	NAME	DRG. NO.
1	MAIN SHAFT	841-354
2	MAIN SHAFT HOUSING	811-235
3	18" PISTON	850-687
4	ADJUSTING SHAFT	841-358
5	OPERATING MECH. DETAILS	841-370
6	UPPER PLATFORM	811-236
7		
8		
9		
10		

CITY OF SPOKANE, WASHINGTON
WATER DIVISION

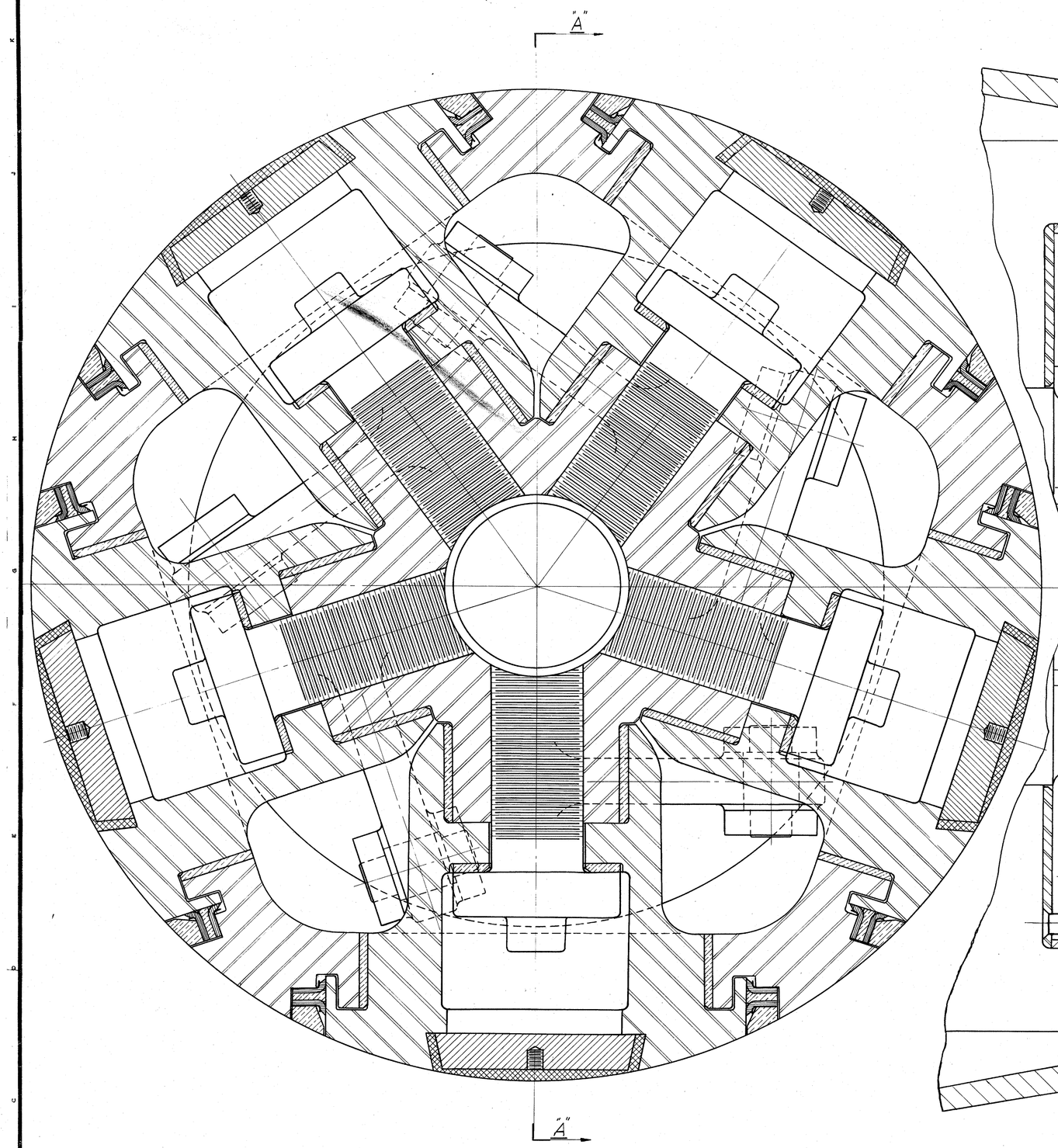
1	MARCH, 26, 1936	
Edw. B.		

ALLIS-CHALMERS MFG. CO.
MILWAUKEE, WIS., U.S.A.
HYDRAULIC DEPT.

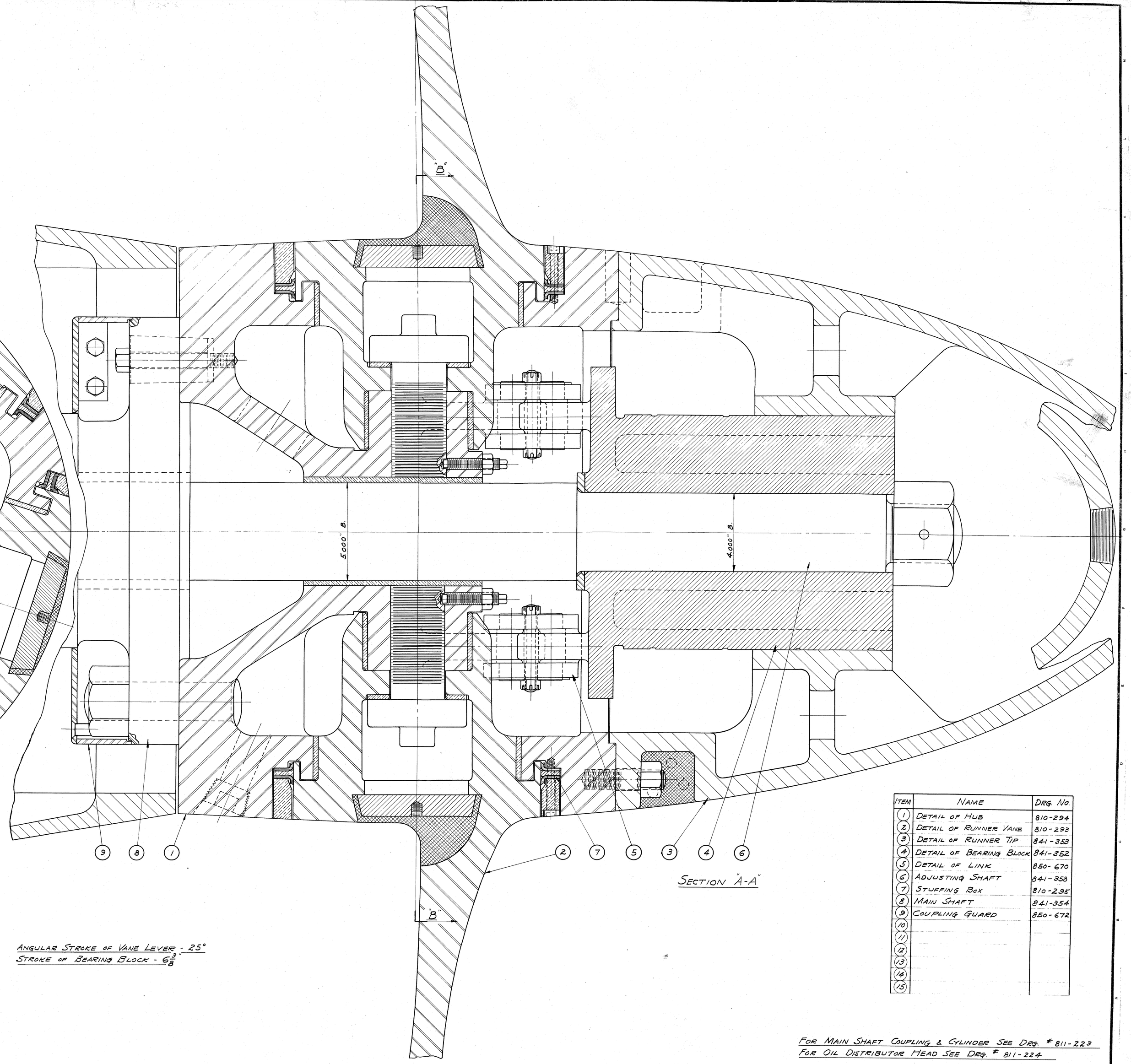
DRAWN Edw. B. DATE 2-11-36
TRACED [illegible] DATE 3-17-36
CHECKED Edw. B. DATE 3-26-36
O.K. [illegible] DATE
SIMILAR TO 840-313
SCALE 6" = 1'-0"

ASSEMBLY OF MAIN SHAFT COUPLING & CYLINDER FOR ADJUSTABLE BLADE RUNNER USED ON HYDRAULIC TURBINE

811
223



SECTION "B-B"



SECTION "A-A"

ANGULAR STROKE OF VANE LEVER - 25°
STROKE OF BEARING BLOCK - $6\frac{3}{8}$"

ITEM	NAME	DRG. NO.
1	DETAIL OF HUB	810-294
2	DETAIL OF RUNNER VANE	810-293
3	DETAIL OF RUNNER TIP	841-353
4	DETAIL OF BEARING BLOCK	841-352
5	DETAIL OF LINK	850-670
6	ADJUSTING SHAFT	841-358
7	STUFFING BOX	810-295
8	MAIN SHAFT	841-354
9	COUPLING GUARD	850-672
10		
11		
12		
13		
14		
15		

FOR MAIN SHAFT COUPLING & CYLINDER SEE DRG. # 811-223
FOR OIL DISTRIBUTOR HEAD SEE DRG. # 811-224

1	MARCH, 26, 1936	Chu. B.

ALLIS-CHALMERS MFG. CO.
MILWAUKEE, WIS., U. S. A.
HYDRAULIC DEPT.

DRAWN 881-138 DATE ~
TRACED [illegible] DATE 3-10-36
CHECKED Chu. B. DATE 3-26-36
O. K. [illegible] DATE 3-26-36
SIMILAR TO 804-299
SCALE 6" — 12"

ASSEMBLY OF 30" DIA. HUB FOR CITY OF SPOKANE, WASH. WATER DIVISION - UP RIVER STATION

811 — 222

USED FOR		No.	ORD. No.
CITY OF SPOKANE, WASH. WATER DIVISION	7/16 & 1/2 T.F.K.	3	28-11106

8-3/8" TAP FOR (24) EQ. SPACED AS SHOWN

4-1" TAP FOR (22) EQ. SPACED AS SHOWN

FOR REGULATING SHAFT.

16-3/4" TAP FOR (11)(12) EQ. SPACED AS SHOWN STRADDLING 30° LINE

4-SLIDING PIECES ITEM (6) EQ. SPACED AS SHOWN

8-SLIDING PIECES ITEM (7) EQ. SPACED AS SHOWN STRADDLING ℄

8-1" TH'K. RIBS EQ. SPACED AS SHOWN

FOR TURBO VENT.

4-1-1/4" TAP EQ. SPACED ON 57-1/4" B.C. AS SHOWN FOR EYEBOLTS

8-1/2" TAP FOR (15)(16) EQ. SPACED 1/2" PINCH.

8-2-1/4" DIA. CORE HOLES EQ. SPACED AS SHOWN.

32-7/16" DRILL & 1/4" P. TAP EQ. SPACED AS SHOWN FOR (18) SEE LARGE SECTION

8-1" TAP - 1" DEEP EQ. SPACED, DO NOT DRILL THRU.

ARROW "E"

2" DIA. CORE

64-1-1/4" DRILL EQ. SPACED AS SHOWN

64-3/8" TAP FOR (14) SPACED AS SHOWN SEE LARGER PART PLAN.

4-25/32" DRILL IN SHOP REAM TOGETHER WITH SPEED RING Dwg. 810-282 FOR (19) DURING ERECTION IN FIELD.

16-1" TH'K. RIBS EQ. SPACED AS SHOWN.

4-1-1/4" TAP-2" DEEP EQ. SPACED ON 60-1/2 B.C. FOR (23)

16-3/4" TAP FOR (10)(12) EQ. SPACED AS SHOWN

12-3/4" TAP FOR (13) TO SUIT SLIDING PIECES ITEM (6)

16-.3875" REAM ACCURATELY SPACED

16-1.250" REAM FOR (8) 1-3/8" DEEP DO NOT DRILL THRU COUNTERSINK 1/8"

16-3/4" DRILL SPACED AS SHOWN

SECTION "5-5"

SECTION "D-D"

4-3/8" TAP FOR (14) EQ. SPACED AS SHOWN.

32-7/16" DRILL & 1/4" P. TAP WITH (3) IN PLACE

3/4" DRILL

2" DRILL & 1/2" P. TAP.

96" G.V. CIRCLE

105-1/2" TAP CIRCLE

8-3/8" TAP FOR (24) EQ. SPACED STRADDLING ℄

63.468" T. ±.002" F. Brg. WHEN IN PLACE

62-1/2" T.F.S.SM.

54-1/2" B.C.

56" B.F.S.SM.

48-3/4" TAP FOR (13) TO SUIT SLIDING PIECES ITEM (7)

16-3/4" TAP - EQ. SPACED STRADDLING 30° LINE SEE PLAN VIEW.

53" DIA.

37-1/2" DIA.

35-3/4" B.C.

34.000" B. +.002" -.000" F. FIT

F. JT.

8 RIBS

63" DIA.

59-1/2" DIA.

8 RIBS

108" T.F.S.SM.

105-1/2" TAP CIRCLE

16-7/16" DRILL & 1/4" P. TAP EQ. SPACED

4.125 REAM +.001 -.000

3.375 +.005 -.000 FINAL REAM

16-7/16" DRILL & 1/4" P. TAP EQ. SPACED FOR (8) PLUG TO BE FILED FLUSH

80" DIA.

3/16" 45° CHAMFER

42" DIA.

58" DIA.

35" DIA.

33-1/2" DIA.

31-1/4" B.C.

28.875" B. ±.001" F. Brg.

75" DIA.

60-1/2" B.C.

96" G.V. CIRCLE

FINISH TO THIS LINE LET MACHINE CUT RUN OUT

108" T.F.S.SM.

113-1/2" T.F.S.SM.

111" B.C.

105-1/2" DIA

3.375 +.005 -.000 FINAL REAM

3.875 REAM

16-3/4" TAP EQ. SPACED STRADDLING ℄

4-1-1/4" TAP (23) 2" DEEP - EQ. SPACED ON RIB ℄ SEE PLAN VIEW

32" R.

8-CORED HOLES EQ. SPACED, ON ℄

1/4" TAP FOR (17) TOGETHER WITH BUSHING ITEM (3) WHEN IN PLACE

64-1-1/4" DRILL EQ. SPACED STRADDLING ℄.

℄ GUIDE CASE

TAPER 1" ON DIA IN ONE FT. LENGTH

8-2-1/4" DIA. CORE EQ. SPACED ON ℄

27.104" B. ±.001" F. Brg.

27" B.F.S.SM.

29" DIA.

F.S.SM. ALL OVER (22)

1" TH'D

VIEW 'R-R'

SECTION "A-O-B"

2" DIA. CORE HOLE

VIEW IN DIRECTION OF ARROW "E"

96" B.C.

62-1/2" T.F.S.SM.

80" DIA.

34.000" B. ±.002" F. FIT.

84" B.C.

54-1/2" B.C.

4-1-1/4" TAP - EQ. SPACED ON RIB ℄. SEE PLAN VIEW.

8" B.C.

7" B.F.S.SM.

1/8" x 45° CHAMFER

28.875" B. ±.001" F. Brg.

96" G.V. CIRCLE

℄ GUIDE CASE

8-2-1/4" DIA. CORE EQ. SPACED ON ℄

27.104" B. ±.001" F. Brg.

27" B.F.S.SM.

29" DIA.

SECTION "O-C"

SECTION "H-H"

SECTION "K-K"

8-1" TH'K. RIBS EQ. SPACED AS SHOWN

4-2" WIDE CORE EQ. SPACED AS SHOWN

SECTION "M-M"

ITEM	OPERATION	TOOL NO.
	5-8" BORING CUTTER USE WITH 29911	162264
	4.125" BORING CUTTER USE WITH 29311	162265
	3.87" BORING CUTTER USE WITH 29511	162266

MATERIAL FOR ITEMS (3)(4)(6)(7)(9) TO CONFORM TO APPROXIMATELY THE FOLLOWING SPECIFICATIONS:-

COPPER	79-80%
TIN	9.5-10%
LEAD	9.5-10%
ZINC	1/2-1%

TRACE OF PHOSPHORUS

TENSILE STRENGTH - 25000#/□"

ELONGATION (IN 2 INCHES) 8% MIN.

ITEM	REQ.	SIZE & NAME	MAT.	PATT. NO.	DWG. NO.	STOCK	WEIGHT
25							
24	8	3/8" x 1" Lg. Flat Hd. Cap Screw	Steel		S-5039	531	
23	4	1-1/4" x 1/2" Lg. Spec. Plug	Br.	Part #4	864-182		
22	4	1" x 3" Lg Release Screws	Stainless Iron-RS.57	(Cut From 1" Dia. Bar Stock)			
21	2	1/2" x 3" Lg. Sq. Hd. Cup Pt. Set Screw	Steel	Release Subj. to Pat. Rights Item (4)	S-5055	3106	
20							
19	4	#3 x 4-7/16" Lg. Style "B" Morse Taper Dowel	S.A.E. 1120		S-5073	617	
18	16	1/4" Solid Pipe Plug	C.I.		S-5076	1652	
17	16	1/4" x 3/8" Lg. Threaded Rod	S.A.E. 1120		S-5594	3909	
16	6	1/2" S.F. Hex. Nut	Steel		S-5382	369	
15	6	1/2" x 1-3/8" Lg. Stud	Stainless Iron-RS.57		S-5044		
14	64	3/8" x 1/2" Lg. F.L. Hd. Cap Screw	Br.		S-5039	Cut From Bar	
13	60	1/4" T. x 2-1/2" Lg. Spec. Fil. Hd. Screw	Br.	Part #91	863-326		
12	32	3/8" S.F. Hex. Nut	Steel		S-5382	371	
11	16	3/8" x 3-1/4" Lg. Stud	Stainless Iron-RS.57		S-5044	Make From Bar	
10	16	3/8" x 4" Lg. Stud	Stainless Iron-RS.57		S-5044	Make From Bar	
9	1	7-1/8" T. x 6-1/2" Lg. Bushing (Part #1)	Br. See Spec	2WT 20038-1	868-278		
8	16	1/2" Dia x 3-1/4" Lg. Pin	S.A.E. 1120	(Part #7)	867-216	(Cut From 1/2" Dia Bar)	
7	16	Sliding Piece (Item (2) only)	C.M. See Spec	2WT-15384-2	868-271		
6	4	Sliding Piece (Item (1) only)	Br. See Spec	2WT-14761-6	868-271		
5							
4	16	6-1/2" T. x 3-3/16" Lg. Bushing	Br. See Spec	2WT-10404-2	868-270		
3	16	4-25/32" T. x 3-1/2" Lg. Bushing (Part #3)	Br. See Spec	2WT-8507-18	868-21		
2							
1	1	Cover Plate (Test Bar)	Cl. A Sym. A-48-35 T. Class 25	2WT 21432	(Sweeps-Core Boxes)		13,200 Actual Req'd. F'in.

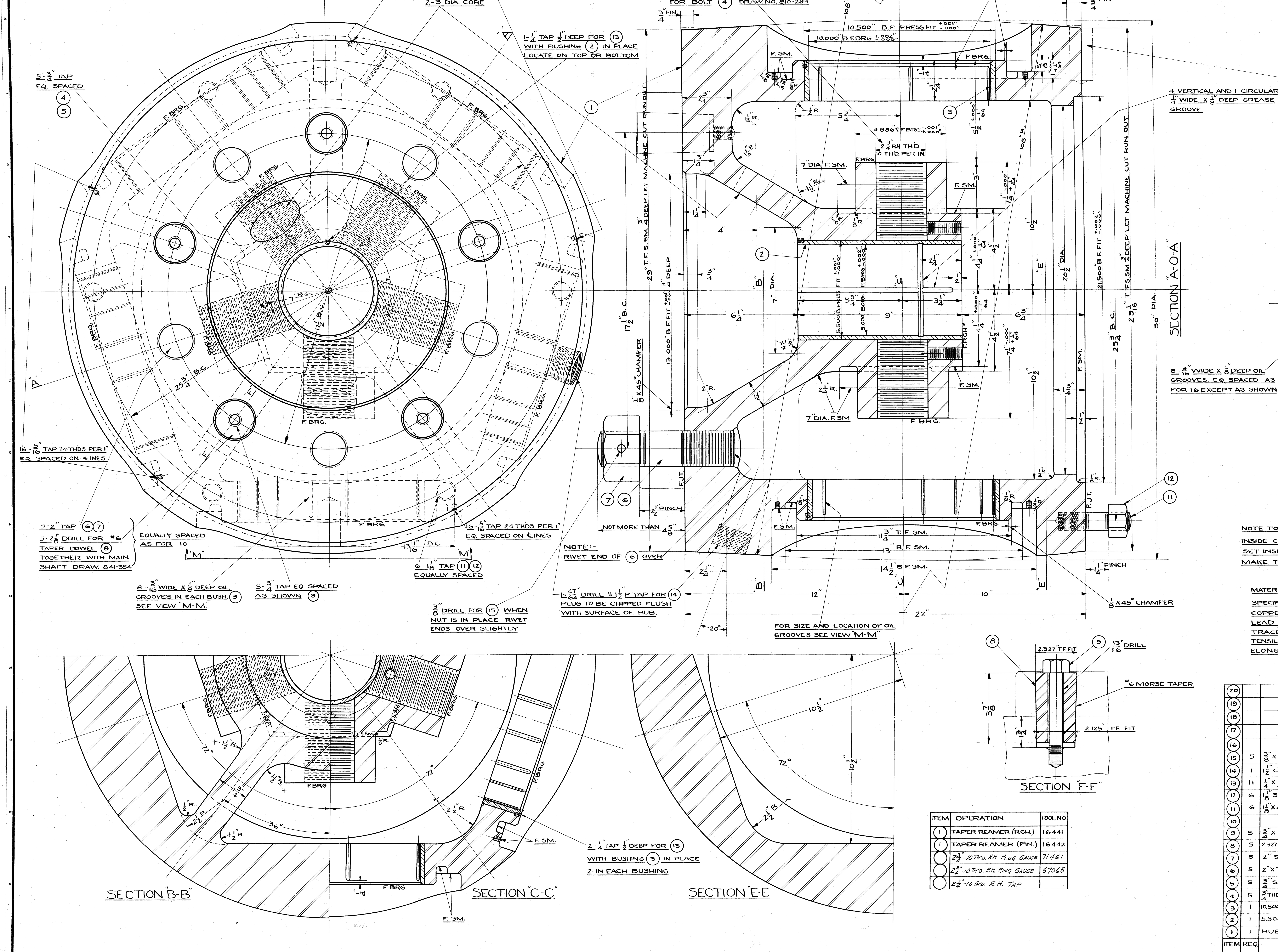
1	FEB. 25, 1936	T.F.K.

ALLIS-CHALMERS MFG. CO.
MILWAUKEE, WIS., U. S. A.
HYDRAULIC DEPT.
DRAWN A.I. DATE 1/11/36
TRACED A.I. DATE 2/7/36
CHECKED T.F.K. DATE 2/18-36
O. K'D 2-15-36 DATE
SIMILAR TO
SCALE 1/2" = 1'-0"

COVER PLATE
USED ON
HYDRAULIC TURBINE

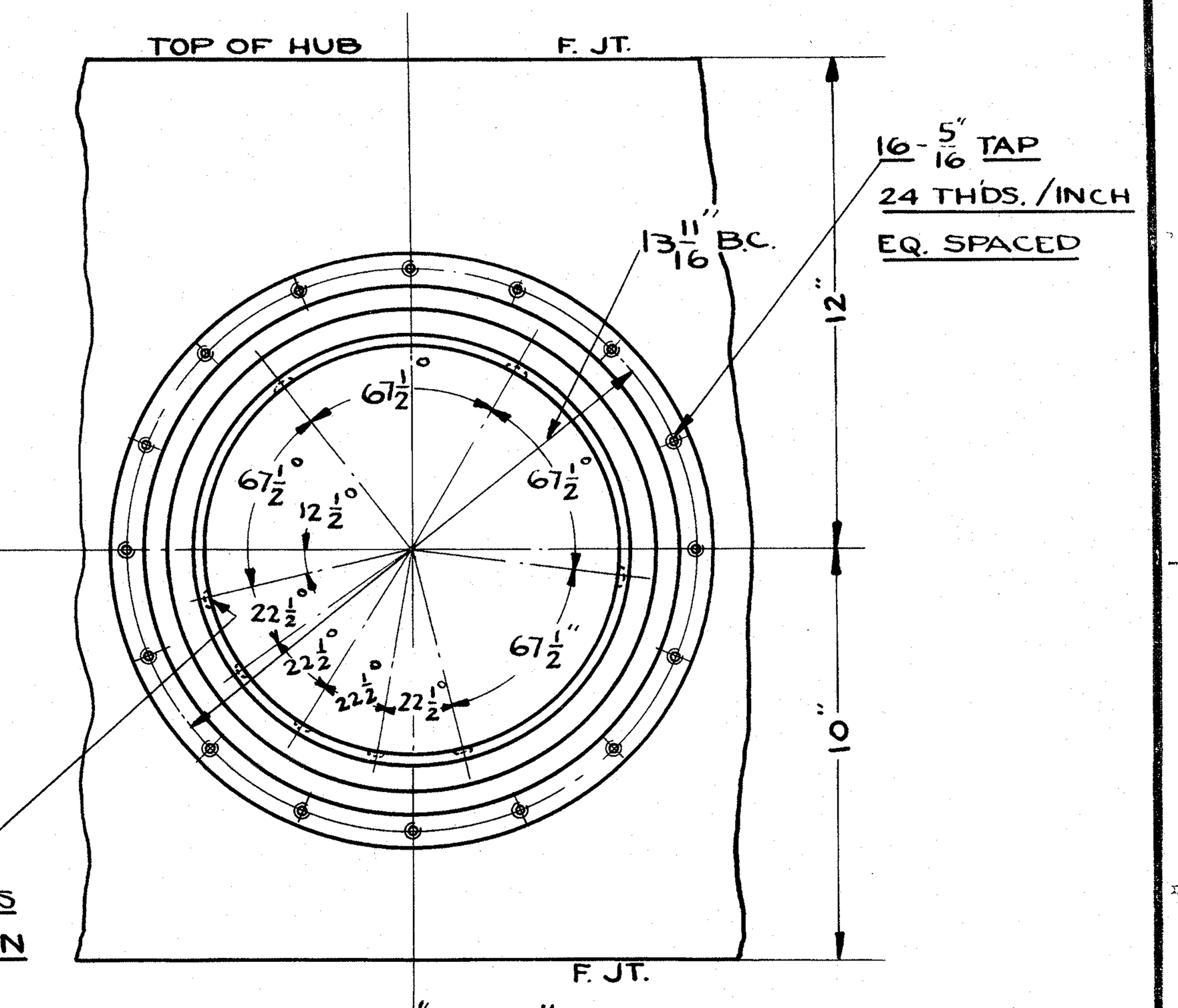
810 / 299

USED FOR	NO.	ORD. NO	TEST PRESSURE
CITY OF SPOKANE, WASH. WATER DIVISION 3-2-36 EDW.B	3	2B-11102	30 #/□"



16-5/16" TAP 24 THDS. PER INCH EQ. SPACED ON ℄INES
2-3" DIA. CORE
1-1/4" TAP 1/2" DEEP FOR (13) WITH BUSHING (2) IN PLACE LOCATE ON TOP OR BOTTOM
5-3/4" TAP EQ. SPACED (4) (5)
16-5/16" TAP 24 THDS. PER 1" EQ. SPACED ON ℄INES
5-2" TAP (6)(7)
5-2 1/8" DRILL FOR #6 TAPER DOWEL (8) TOGETHER WITH MAIN SHAFT DRAW. 841-354
EQUALLY SPACED AS FOR 10
8-3/16" WIDE X 1/8" DEEP OIL GROOVES IN EACH BUSH. (3) SEE VIEW "M-M"
5-3/4" TAP EQ. SPACED AS SHOWN (9)
6-1 1/8" TAP (11)(12) EQUALLY SPACED
3/8" DRILL FOR (15) WHEN NUT IS IN PLACE RIVET ENDS OVER SLIGHTLY
NOTE:- RIVET END OF (6) OVER
1-47/64" DRILL & 1 1/2" P. TAP FOR (14) PLUG TO BE CHIPPED FLUSH WITH SURFACE OF HUB.
NOTE:- THREAD TO BE CLOSE FIT FOR BOLT (4) DRAW. NO. 810-293
1/8" X 45° CHAMFER
4-VERTICAL AND 1-CIRCULAR 1/4" WIDE X 1/8" DEEP GREASE GROOVE
8-3/16" WIDE X 1/8" DEEP OIL GROOVES, EQ. SPACED AS FOR 16 EXCEPT AS SHOWN
FOR SIZE AND LOCATION OF OIL GROOVES SEE VIEW "M-M"
29" T. F. S. SM. 3/4" DEEP LET MACHINE CUT RUN OUT
13.000" B. F. FIT 3/4" DEEP
10.500" B.F. PRESS FIT
10.000" B. F. BRG.
5.500" B. PRESS FIT
5.000" BORE F. BRG.
4.996" T. F. BRG.
2 3/4" RH THD. 10 THD. PER IN.
21.500" B. F. FIT
29 1/16" T. F.S.SM 3/4" DEEP LET MACHINE CUT RUN OUT
25 3/4" B. C.
17 1/2" B. C.
30" DIA.
20 1/2" DIA.
108" R.
SECTION "A-O-A"
SECTION "F-F"
2.327" T.F. FIT
2.125" T.F. FIT
13/16" DRILL
#6 MORSE TAPER
2-1/4" TAP 1/2" DEEP FOR (13) WITH BUSHING (3) IN PLACE 2-IN EACH BUSHING
SECTION "B-B"
SECTION "C-C"
SECTION "E-E"

2-1.250" REAM-2 5/8" DEEP TOGETHER WITH RUNNER TIP DRAWING NO. 841-353. UPSET EDGES OF HOLE TO HOLD PIN IN PLACE. LOCATION OF DOWELS TO BE DETERMINED AFTER HUB, VANES, TIP AND OPERATING MECHANISM HAVE BEEN ASSEMBLED. APPROXIMATE LOCATION SHOWN IN PLAN.



VIEW "M-M"

SHOWS LOCATION OF BUSHING WITH GREASE GROOVES, ITEM (3) IN PLACE IN HUB.

NOTE TO SHOP:-
INSIDE CORE OF HUB TO BE MADE IN HALVES.
SET INSIDE CORE OF HUB ACCURATELY TO DIMENSIONS.
MAKE TEMPLATE FOR SETTING SAME.

MATERIAL FOR (2) & (3) TO CONFORM TO APPROX. THE FOLLOWING SPECIFICATIONS:-
COPPER = 79-80% TIN = 9.5-10%
LEAD = 9.5-10% ZINC = 1/2 - 1%
TRACE OF PHOSPHORUS
TENSILE STRENGTH - 25,000 #/□" MIN.
ELONGATION IN 2 INCHES - 8% MIN.

ITEM	OPERATION	TOOL NO.
(1)	TAPER REAMER (RGH.)	16441
(1)	TAPER REAMER (FIN.)	16442
( )	2 3/4"-10 TH'D. R.H. PLUG GAUGE	71461
( )	2 3/4"-10 TH'D. R.H. RING GAUGE	67065
( )	2 3/4"-10 TH'D. R.H. TAP	

ITEM	REQ.	SIZE & NAME	MAT.	PATT. NO	DRAW. NO	STOCK	FIN. WEIGHT	RGH. WEIGHT
(20)								
(19)								
(18)								
(17)								
(16)								
(15)	5	3/8" x 3 1/2" LG. STRAIGHT PIN	S.A.E. 1120		S-5030			
(14)	1	1 1/2" C'TRSUNK PIPE PLUG	BR.	CRANE	CAT. NO. 51 PAGE 77			
(13)	11	1/4" x 1/2" LG. THREADED ROD	S.A.E. 1120		S-5594	3909		
(12)	6	1 1/8" S.F. HEX. NUTS	STEEL		S-5382	374		
(11)	6	1 1/8" x 4 1/2" LG. STUD (1 1/4" PINCH)	STAIN-LESS IRON RS-57		S-5044			
(10)								
(9)	5	3/4" x 5" LG. HEX. HD. TAP BOLT	S.A.E. 1020		S-5040	245		
(8)	5	2.327" T. x 3 7/8" LG. SPEC. #6 TAPER DOWEL	S.A.E. 1120					
(7)	5	2" S.F. HEX. NUT	STEEL		S-5382	381		
(6)	5	2" x 7 3/4" LG. STUD (2 1/2" PINCH)	STAIN-LESS IRON RS-57		S-5044			
(5)	5	3/4" S.F. HEX. JAM NUT	STEEL		S-5382	1431		
(4)	5	3/4" THD. x 3 1/4" LG. SPEC. SET SCREW	S.A.E. 1045	PART #8	873-83			
(3)	1	10.504" T. x 10.004" B. x 16" LG. BUSHING	BR. SEE SPEC.	2 WT. 7671-1	PART #20 868-282	TO MAKE 5 BUSHINGS EACH 2 1/4" LG.		
(2)	1	5.504" T. x 5.004" B. x 9" BUSHING	BR. SEE SPEC.	STD 56	PART #7 868-96	4875		
(1)	1	HUB (ANNEALED)	A.S.T.M. C.S. A27BH	2 WT 21440	TEST BAR			2150#

1	3-3-36	Edw.B

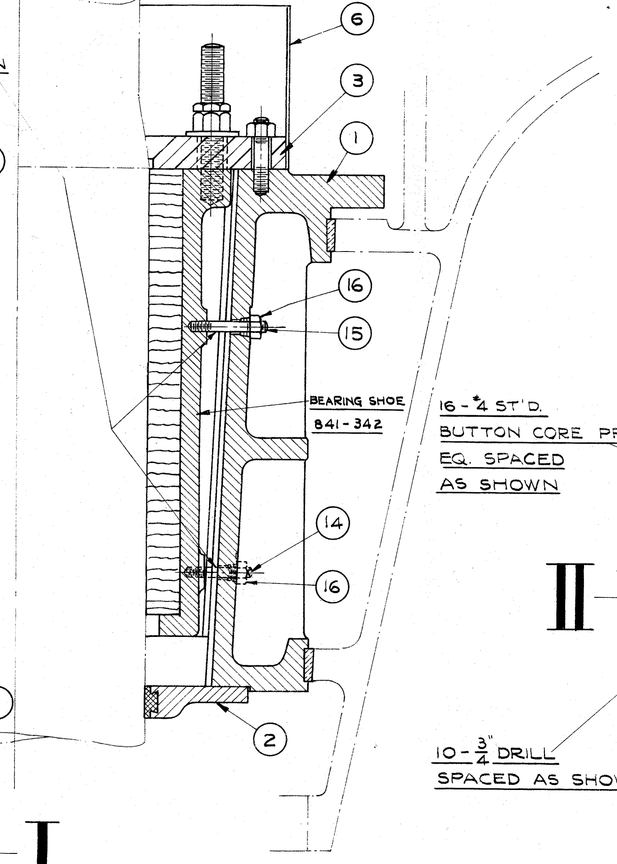
ALLIS-CHALMERS MFG. CO.
MILWAUKEE, WIS., U. S. A.
HYDRAULIC DEPT.
DRAWN Edw.B DATE 12-18-35
TRACED A.B DATE 4-16-36
CHECKED Edw.B DATE 2-17-36
O.K. DATE 3-6-36
SIMILAR TO 804-269
SCALE 6" = 12"

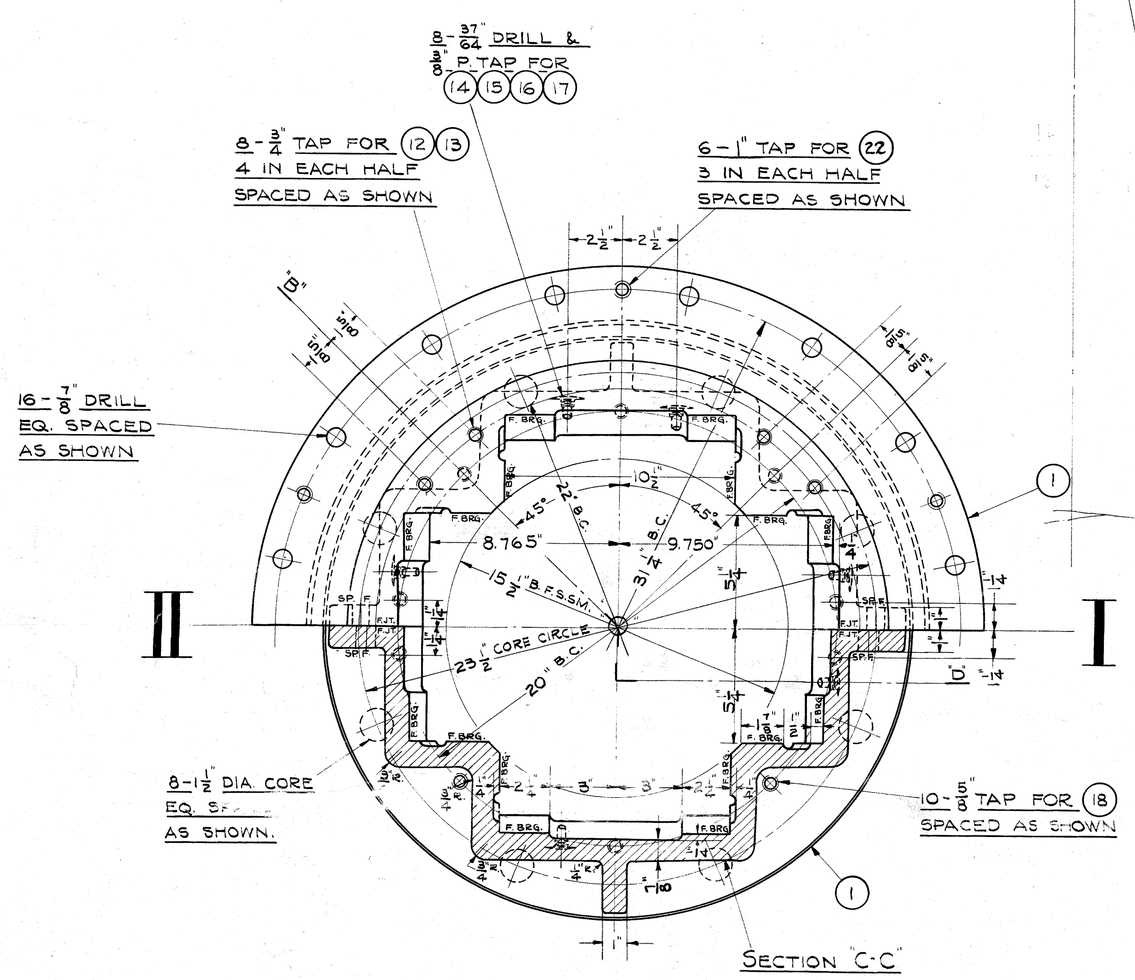
30" DIA. HUB
FOR
ADJUST. VANE RUNNER
USED ON
HYDRAULIC TURBINE

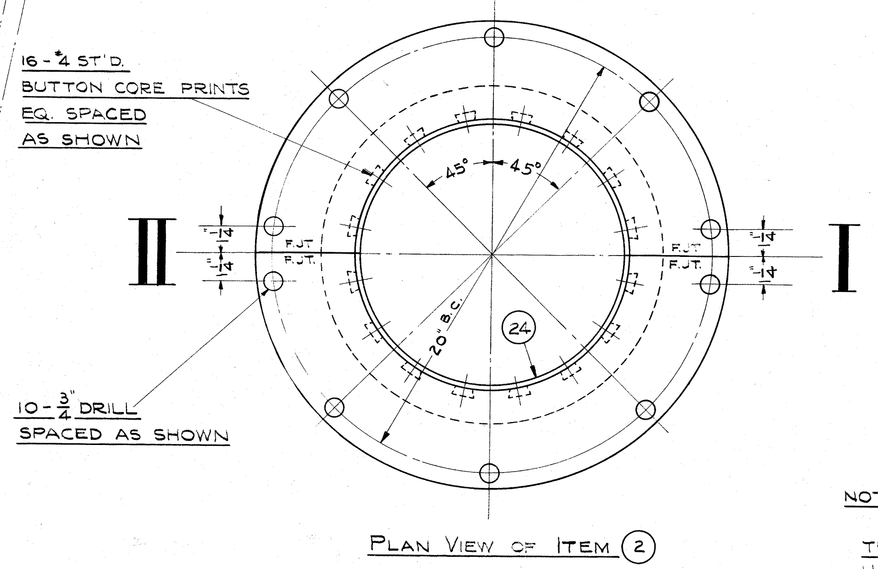
810
294

USED FOR		NO.	ORD NO.
CITY OF SPOKANE, WASH. WATER DIVISION	6/5/36 CHK.	3	28-11111

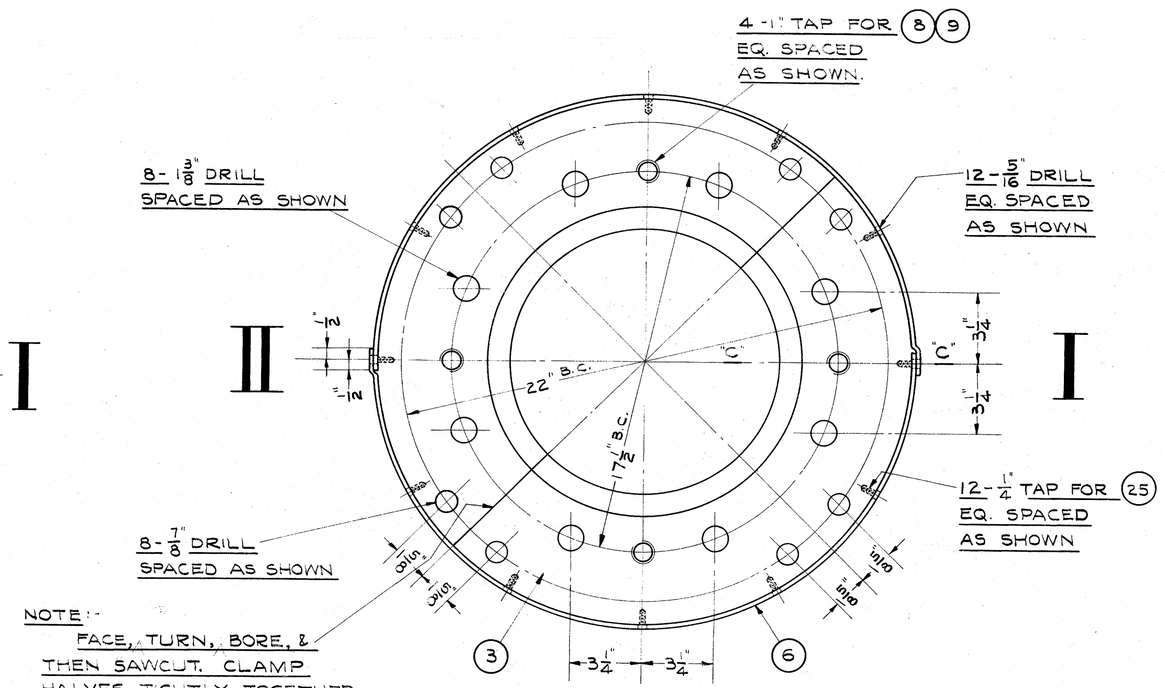
NOTE:- STUDS ARE USED ONLY FOR HOLDING SHOES IN PLACE IN HOUSING, WHILE BORING BLOCKS. WHEN BORING IS DONE, REMOVE STUDS AND PLUG HOLES WITH ITEM (17)





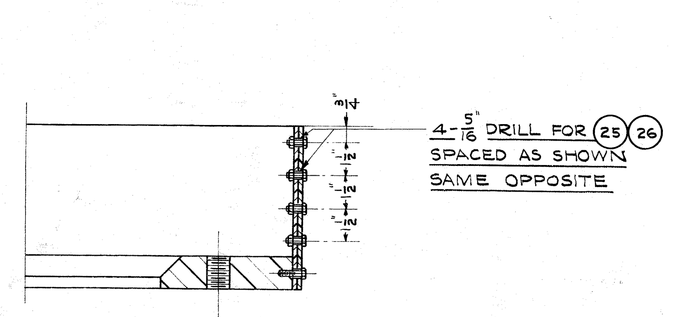


PLAN VIEW OF ITEM (2)

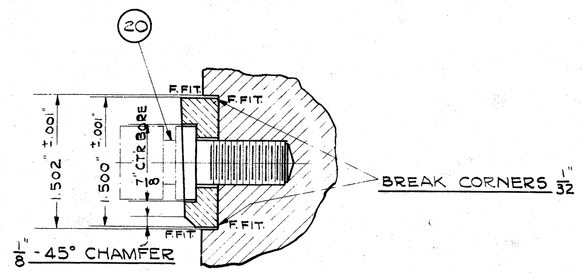


NOTE:- FACE, TURN, BORE, & THEN SAWCUT. CLAMP HALVES TIGHTLY TOGETHER & LAYOUT FOR DRILLING

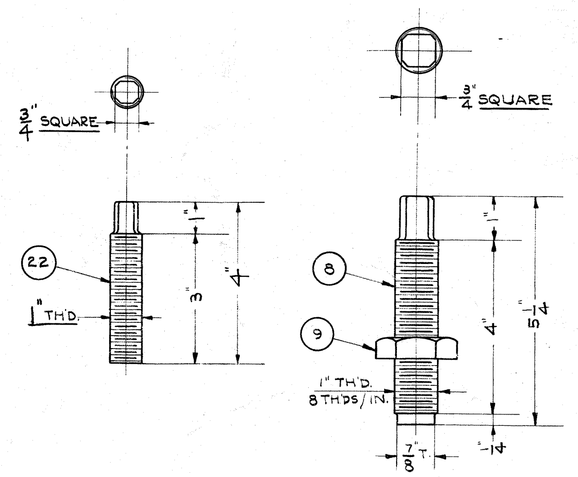
PLAN VIEW OF ITEMS (3) & (6)

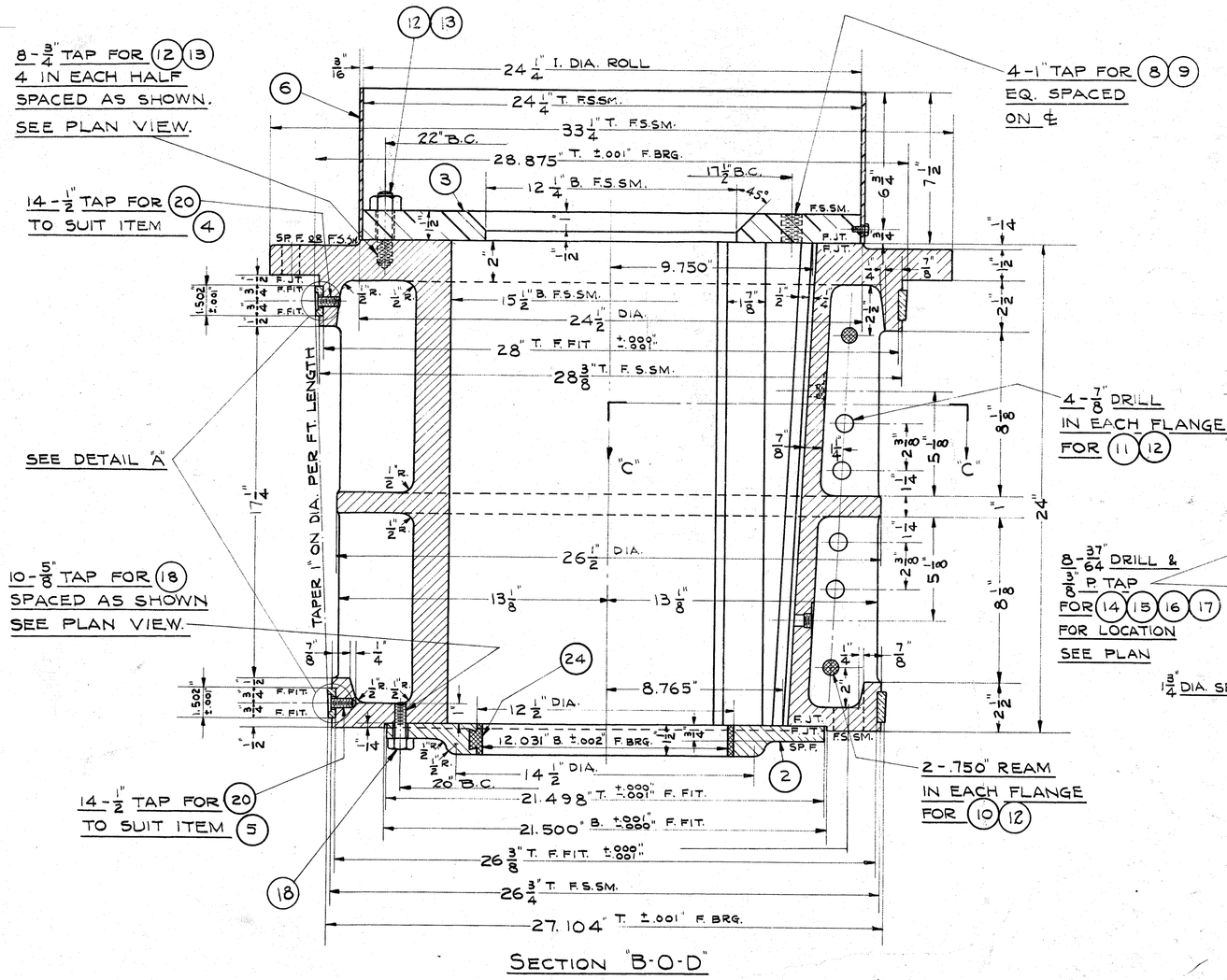


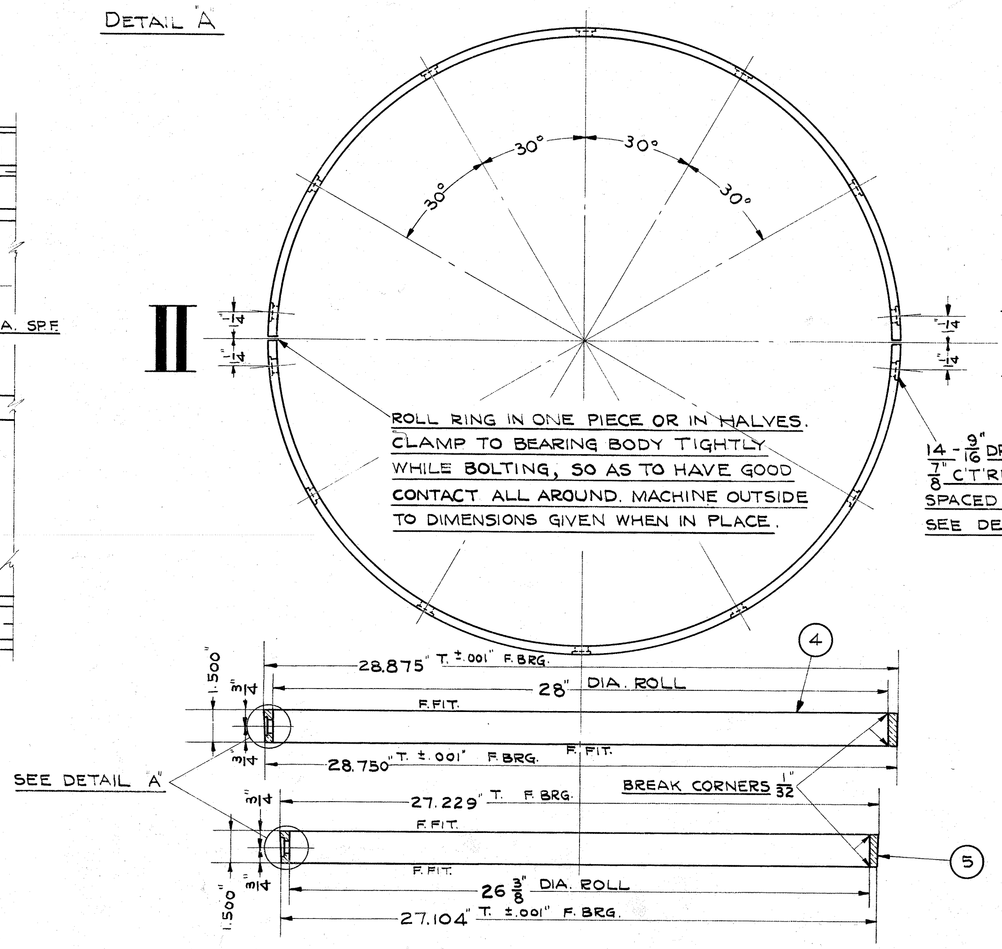
SECTION "C-C"



DETAIL 'A'







ITEM	REQ.	SIZE & NAME	MAT.	PATT. NO.	DRG. NO.	STOCK	RGH. FIN. WEIGHT
30							
29							
28							
27							
26	8	$\frac{1}{2}$"-13 S.F. HEX. NUT	STEEL		S-5382	365	
25	20	$\frac{1}{4}$"-20 x $\frac{3}{4}$" LG. HEXAGON HD CAP SCREW	BR.		S-5503		
24	15#	BABBITT	"M" BABBITT				
23							
22	6	1" x 4" Lg. Sq. HD Bolt	STAINLESS IRON-R.S.ST.	CUT FROM 1" DIA. BAR			
21							
20	28	$\frac{1}{2}$"-13 x $\frac{53}{64}$" T. x 1$\frac{1}{8}$" LG. SPEC. FIL. HD. SCREW	BR.	PART #36	863-326		
19							
18	10	$\frac{5}{8}$"-11 x 1$\frac{3}{4}$" HEX. HD. TAP BOLT	BR.	CUT FROM 1$\frac{1}{8}$" HEX. BAR	S-5040		
17	8	SOLID PIPE PLUG	BR.		S-5076	4572	
16	8	$\frac{1}{2}$"-13 S.F. HEX. NUT	STEEL		S-5382	369	ORD. FOR ONE BRG. ONLY. FOR MACHINING
15	4	$\frac{1}{2}$"-13 x 3$\frac{3}{4}$" LG. STUD	S.A.E. 1020		S-5044	799	
14	4	$\frac{1}{2}$"-13 x 3" LG. STUD	S.A.E. 1020		S-5044	945	ONLY. DO NOT SHIP.
13	8	$\frac{3}{4}$"-10 x 3$\frac{1}{2}$" LG. STUD	STAINLESS IRON-R.S.ST.	CUT FROM $\frac{3}{4}$" DIA. BAR	S-5044		
12	32	$\frac{3}{4}$"-10 S.F. HEX. NUT	STEEL		S-5382	371	
11	8	$\frac{3}{4}$"-10 x 4" Lg. Stud	STAINLESS IRON-R.S.ST.		S-5044		
10	4	.750" x 4" Lg. Turned Stud	STAINLESS IRON-R.S.ST.				
9	4	1" S.F. HEX. JAM NUT	STEEL		S-5382	97	
8	4	1"-8 TH'D. x 5$\frac{1}{2}$" LG. SPEC. SET SCREW	STAINLESS IRON-R.S.ST.	(CUT FROM BAR STK.)			
7							
6	2	$\frac{3}{16}$" x 7$\frac{1}{2}$" x 3'-9" LG. PLATE	A.S.T.M. A-113				
5	1	BEARING RING (IN HALVES)	COLD ROLLED BRASS	ROLL FROM 1-$\frac{3}{4}$" x 12$\frac{1}{2}$" x 7'-6" LG. BAR			
4	1	BEARING RING (IN HALVES)	COLD ROLLED BRASS	ROLL FROM 1-$\frac{3}{4}$" x 12$\frac{1}{2}$" x 8'-0" LG. BAR			
3	2	HALF ADJUSTING RING	A.S.T.M. A-113	MAKE FROM 1-12$\frac{1}{2}$" x 25" SQ. PLATE			
2	2	HALF RETAINING RING	A.S.T.M. A-148-39T CLASS 22 A.S.T.M. A-148-39T CLASS 22	2 WT. 19947			
1	2	HALF BEARING HOUSING	A.S.T.M. A-148-39T CLASS 22	2 WT. 19945-1			

1	FEB. 25, 1936	J.F.K.

ALLIS-CHALMERS MFG. CO. MILWAUKEE, WIS. U.S.A. HYDRAULIC DEPT.

DRAWN H.I. DATE 12-12-35
TRACED Wood DATE 1-24-36
CHECKED J.F.K. DATE 2/18-36
O. K. 2-26-36 DATE
SIMILAR TO 802-243
SCALE 3" 6" 12"

12" BEARING HOUSING USED ON HYDRAULIC TURBINE

810 — 285

USED FOR	NO.	ORD. NO.	TEST PRESSURE
CITY OF SPOKANE, WASHINGTON WATER DIVISION — 2-3-36 Edw. B.	15	28-1102	30 #/a"

NOTE:- PATTERN SHOP TO MAKE ENDS OF VANE FIT HUB WHEN VANE IS IN STEEP POSITION. CONSULT WITH HYDRAULIC ENGINEERING DEPT.

DISCHARGE EDGE

19 7/8" SPHERICAL TURN WITH VANE IN FLAT POSITION

INLET EDGE

8 - 3/16" WIDE x 1/8" DEEP OIL GROOVES EQUALLY SPACED AS FOR 16 EXCEPT AS SHOWN.

SECTION "F-F" SHOWS LOCATION OF BUSHING WITH OIL GROOVES WITH REFERENCE TO VANE LEVER.

NOTE:- LEAVE STOCK FOR LATHE CENTER. TO BE TURNED OFF AFTER FINAL MACHINING.

2 - 3/8" DRILL FOR OIL HOLES. FOR LOCATION ALSO SEE PLAN VIEW.

1/16 x 45° CHAMFER

1 - #10-32 TAP 3/8" DEEP TOGETHER WITH BUSHING (2) IN PLACE FOR (7)

2 - 3/8" DRILL ALSO SEE SIDE VIEW

1 - 3/4" DRILL

15" RAD.

SECTION "A-O-A"

LEVER SECTION "O-B"

14" ON 39" RAD.

ON 39" RAD.

VANE IN FLAT POSITION

25° TRAVEL

VANE IN STEEP POSITION

6.963" IN STEEP POSITION

8 1/2" RAD.

E. LEVER

55°

35°

20°

10 3/8" ON 15 5/8" RAD.

18.35" ON 15 5/8" RAD.

1 - #10-32 TAP 3/8" DEEP TOGETHER WITH BUSHING (3) IN PLACE FOR (7)

4 - 3/16" WIDE x 3/32" DEEP OIL GEOOVES. SEE SECTION "E-E"

FINISHED DISCHARGE EDGE

FRONT SIDE OF VANE

FINISHED INLET EDGE

NOTE TO PATTERN SHOP:- TEMPLATE TO BE MADE OF FRONT SIDE OF VANE AND IS TO BE FITTED TO THE SURFACE OF THE PATTERN.

NOTE:- IMPORTANT! THIS SIDE OF VANE AND LEVER TO BE CAST DOWN IN MOLD TO INSURE GOOD METAL IN LEVER AND BACK FACE OF VANE.

NOTE:- CASTINGS TO BE TRUE TO PATTERN FREE FROM SHRINK CRACKS SPONGY SPOTS AND BLOW HOLES. MACHINED SURFACES ARE NOT TO BE SCALED. ALL UNMACHINED SURFACES ARE TO BE SCALED. CASTINGS ARE NOT TO EXCEED WEIGHTS GIVEN ON DRAWING. SURFACE OF VANE TO BE BUFFED SMOOTH. RUNNER TO BE BALANCED TO WITHIN 1/2 # ON 30" RADIUS.

FOR CORE BOX SEE DRAW. NO. C-3050 (811-237)

MATERIALS FOR ITEMS (2) (3) AND (5) TO CONFORM TO APPROX. THE FOLLOWING SPECIFICATIONS:-

COPPER = 79-80 — TIN = 9.5-10.
LEAD = 9.5-10. — ZINC = 1/2 - 1 1/4
TRACE OF PHOSPHORUS.
TENSILE STRENGTH - 25 000 #/a" MIN.
ELONGATION IN 2 INCHES - 8 % MIN.

SECTION "A-O-A"

108" RAD.

NOTE:- THIS FACE TO BE ABSOLUTELY SQUARE. POLISH FACE AND 1/8" ROUNDING.

1 - 1/2" DRILL 1/2" DEEP TOGETHER WITH VANE IN PLACE IN HUB.

1/2" TAP DO NOT DRILL THRU.

FINISH SEMI-SMOOTH ALL OVER

2" ACCESS FLATS

2 3/4" TURN

2 3/4" TH'D 10-TH'DS PER INCH

NOTE:- THREAD TO BE CLOSE FIT IN HUB DRAW. NO. 810-294.

6 - TO BE CAULKED IN WITH LEAD AFTER RUNNER IS ASSEMBLED.

15/16" DIA. M.A. CUT

5 7/16" DIA. M.A. CUT

5 - 8 - 3/16" WIDE x 3/32" DEEP OIL GEOOVES 4 ON EACH SIDE, STAGGERED AS SHOWN.

SECTION "E-E"

5/32" x 45° CHAMFER

ITEM	REQ.	SIZE & NAME	MAT.	PATT. NO.	DRAW. NO.	STOCK	FIN. WEIGHT
12							
11							
10							
9							
8	9#	LEAD	LEAD				
7	2	#10-32 x 3/8" LG. HDLESS SET SCREW	STEEL		S-5594	4374	
6	1	5 7/16" DIA. M.A. CUT x 3/4" TH'K. SPEC. PLUG	A-47 M SPEC. A-7 1/3 S.S.				
5	1	1" TH'K. x 5" T. THRUST PLATE	BR. SPEC. SPEC.	2WT 21442			
4	1	5" T. x 8 3/8" LG. SPEC. BOLT	CHROME NICKEL STEEL A.E.S.T.M.				TEST BAR AND MICOGRAPHS AT MILL AT WEST ALLIS
3	1	1.753" B. x 2.128" T. x 1.750" LG. BUSHING	BR. SPEC. SPEC.	ST'D. 24	PART #G 868-96	4843	
2	1	5.004" B. x 5.504" T. x 2 15/16" LG. BUSHING	BR. SPEC. SPEC.	ST'D. 56	PART #1 868-282	4875	
1	1	R.H. VANE (ANNEALED)	A-27 M A-27 BM C.S.	2WT 21441	TEST BAR		515#

NO.	DATE	REVISION
1	FEB. - 3 - 1936	Edw. B. — (3-A) 6 15/16" DIM. WAS TO INSIDE FACE OF LEVER.
2	JUNE, 1, 1936	Edw. B.

ALLIS-CHALMERS MFG. CO.
MILWAUKEE, WIS. U. S. A.
HYDRAULIC DEPT.
DRAWN Edw. B. DATE 12-31-35
TRACED Abdel DATE 2-13-36
CHECKED Edw. B. DATE 2-19-36
O. K. [illegible] DATE
SIMILAR TO 806-283
SCALE 6" — 16"

DETAIL OF VANE FOR 76"-80" ADJUSTABLE VANE RUNNER USED ON HYDRAULIC TURBINE

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