

September 20, 2021

Kennedy Jenks
1201 2nd Avenue, Suite 700
Seattle, WA 98101

Attention: Robyn Wilmouth

**Subject: City of Centralia Wastewater Treatment Plant Outfall Assessment Letter Report
K/J Project No. 2197009*00**

Dear Ms. Wilmouth,

As requested by Kennedy Jenks (KJ), Moffatt & Nichol (M&N) conducted an underwater inspection and condition assessment of the City of Centralia Wastewater Treatment Plant (WWTP) outfall on September 2, 2021. This letter report includes: a summary of M&N's scope of work, description of the outfall, inspection methodology, observed conditions, and recommendations.

1. Scope of Work

M&N's approved scope of work for this task order included the following:

- Conduct a desktop review of reference documents and plans provided to M&N by KJ
- Conduct an underwater condition assessment of accessible portions of the outfall, including visual/tactile examination of the outfall pipe, protective log barrier, and cradles
- Prepare a condition assessment letter report summarizing the condition of the sewer outfall

2. Facility Description

The City of Centralia WWTP is located in Centralia, WA approximately 0.5-miles east of the Chehalis River. Treated effluent from the WWTP discharges to the Chehalis River. Based on available record drawings, the outfall consists of a horizontal 36-inch diameter ductile iron pipe (DIP) with eight vertical 16-inch diameter diffuser risers. Four of the eight risers are shown on the record drawings as being capped with a blind flange, whereas the remaining four risers have rubber duckbill type check valves. The four capped risers are believed to have been provided to allow for future growth and/or increase of effluent flow capacity. The horizontal DIP segment is oriented approximately 90-degrees from the riverbank, in a west-southwesterly direction, and is bedded in the river bottom. The risers are intended to protrude vertically through the river bed approximately six-inches where a bolted flange connection connects the risers to the rubber check valves. The risers are spaced at five-foot on-center with the eastern most riser approximately 38-feet from the river's edge¹. The outfall continues for approximately 30 additional feet before terminating with a steel access hatch. The general arrangement of the outfall in plan and profile is shown in Figure 1 and Figure 2, respectively. The location of the downstream end of the outfall was not able to be located during the inspection due to accretion of the riverbed in the immediate vicinity of the outfall. The location of one riser, riser #7, was observed and the location recorded using a sub-meter GNSS receiver unit. Based on the recorded location of riser #7 and an upland maintenance hole structure, the approximate location of the downstream end of the outfall was recorded. The latitude/longitude of riser #7, the maintenance hole, and the approximate downstream end of the outfall are shown in Figure 1.

¹ Water depth to the top of diffuser riser #7 was measured as 1 foot at 1100 hrs on September 2, 2021. Reference USGS Station 12027500 for River Gage Height observations.

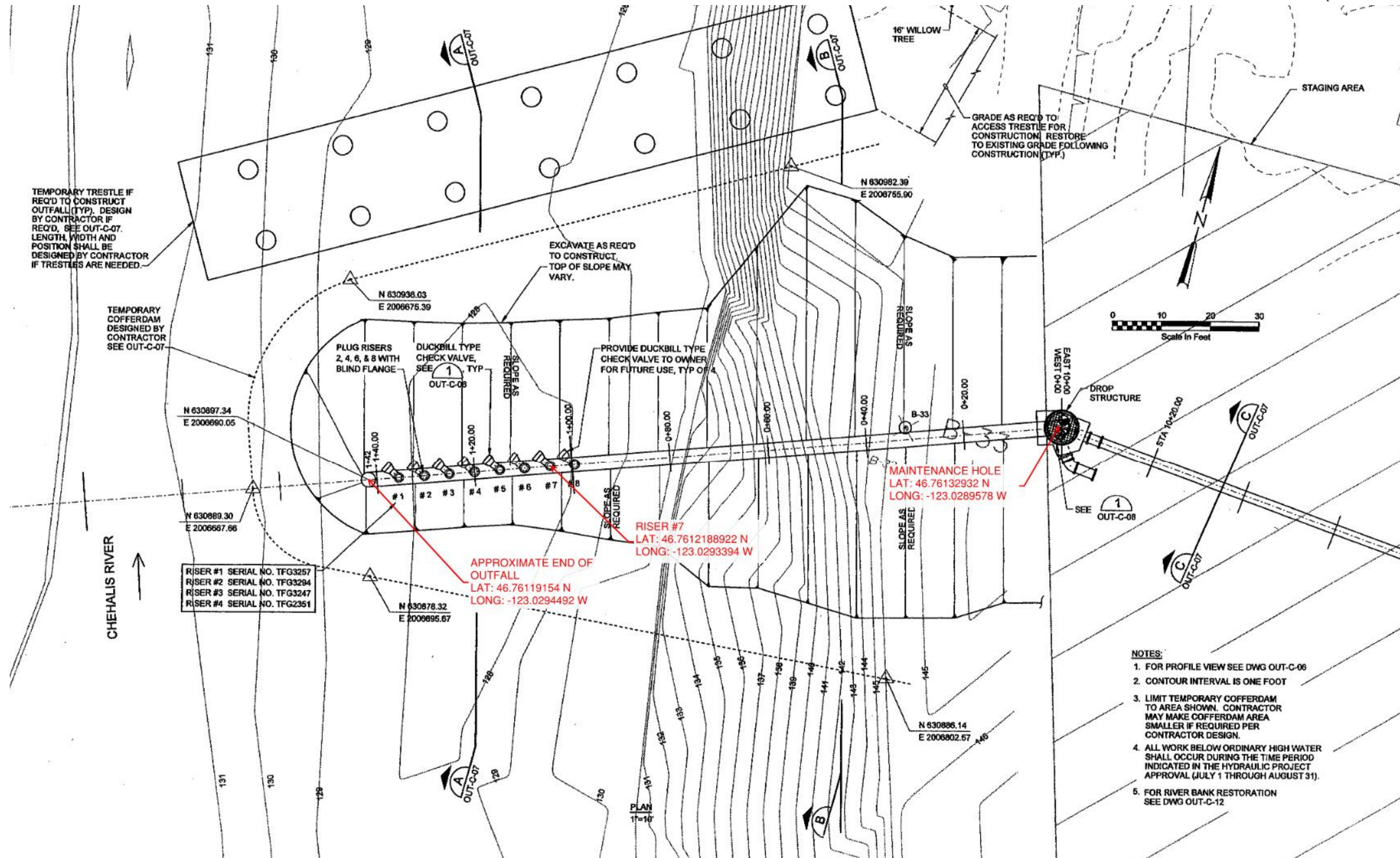


Figure 1: Outfall Plan (Source: Record Drawing OUT-C-05, Dated 12/30/03)

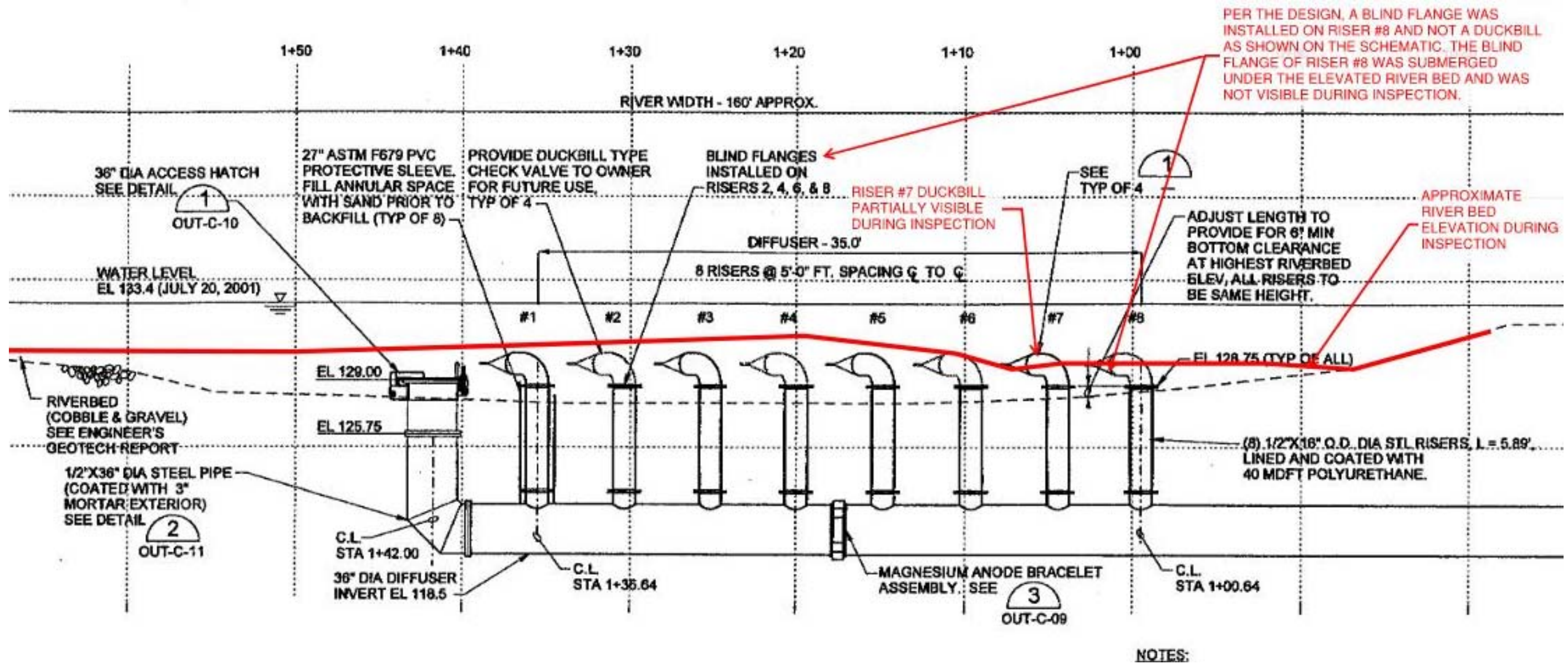


Figure 2: Outfall Profile (Source: Record Drawing OUT-C-06, Dated 12/30/03)

3. Inspection Methodology

The field investigation was conducted on September 2, 2021. The investigation was conducted from shore and wading in the Chehalis River. Exposed portions of the outfall risers were visually and tactilely inspected to identify readily-visible deterioration. Destructive testing, disassembly, and excavation of river bottom material was not performed as part of this inspection.

4. Observations

The following section is a summary of the observations noted in the field. Additional photographs of typical conditions are provided as an attachment to this letter report.

4.1. Outfall Pipe and Risers

The horizontal outfall piping is fully embedded in the river bottom and is not accessible for inspection. Additionally, all but one of the vertical risers, including the check valves, are fully buried in the river bed. The one visible check valve, for Riser #7, protrudes from the river bed approximately two to three-inches. The location of Riser #7 was marked in the field by a white buoy as shown in Photo 1. At the time of the inspection, it was noted that effluent was flowing out of the check valve. Flow from the buried check valves was unable to be determined.

The check valves being mostly buried indicates that river bed material has accumulated significantly in the vicinity of the outfall pipe since construction of the outfall and the previous inspections. It is estimated that river bottom elevation has increased 12-inches or greater at this location. The accumulation of river bed material is also evident by the small island that has formed in the middle of the river as shown in Photo 1. The check valve for riser #7 is shown in Photo 2 and Photo 3. Minor damage to the check valve is present and includes delamination and tearing of the rubber, shown in Photo 4.



Photo 1: Looking Northeast Towards Outfall Location (Riser #7 Location Marked with White Buoy)



Photo 2: Riser Check Valve #7, Looking North



Photo 3: Riser Check Valve #7, Looking East



Photo 4: Minor Delamination and Tearing of Rubber (White Arrow) on Riser Check Valve #7

5. Recommendations & Closing

The impact of the buried risers on the hydraulics of the outfall discharge should be immediately assessed to evaluate the impedance of effluent discharge and whether mixing within the regulatory mixing zone is sufficient to assure water quality standards are being met at the edge of the mixing zone. If the hydraulics are found to be impeded, it may be necessary to remove the gravel deposits from around the diffuser; however, given the dynamic nature of the riverbed, gravel deposits may continue to move into and out of the area of the diffuser.

Additionally, routine inspections should be performed on an annual basis and in accordance with applicable permit requirements.

Sincerely,



A handwritten signature in black ink, appearing to read 'Aaron Patterson'.

Aaron Patterson, PE
Project Manager, Engineer-Diver



Attachments:

Attachment A: City of Centralia WWTP Supplemental Photos

Attachment B: Record Drawings

Attachment A: City of Centralia WWTP Supplemental Photos



Photo 5: Looking West at Top of Bank (Approximate Outfall Alignment Shown in Dashed Line)



Photo 6: Looking West, at River's Edge (Approximate Outfall Alignment Shown with Dashed Line)



Photo 7: Upstream Riverbank Approximately at Outfall Location



Photo 8: Downstream Riverbank Approximately at Outfall Location



Photo 9: Looking Towards Shore at Outfall Location (Approximate Outfall Alignment Shown in Dashed Line. Riser #7 Marked with White Buoy)



Photo 10: Top of Riverbank, Looking West



Photo 11: Riser #7 Check Valve, Looking South



Photo 12: Riser #7 Check Valve, Looking North

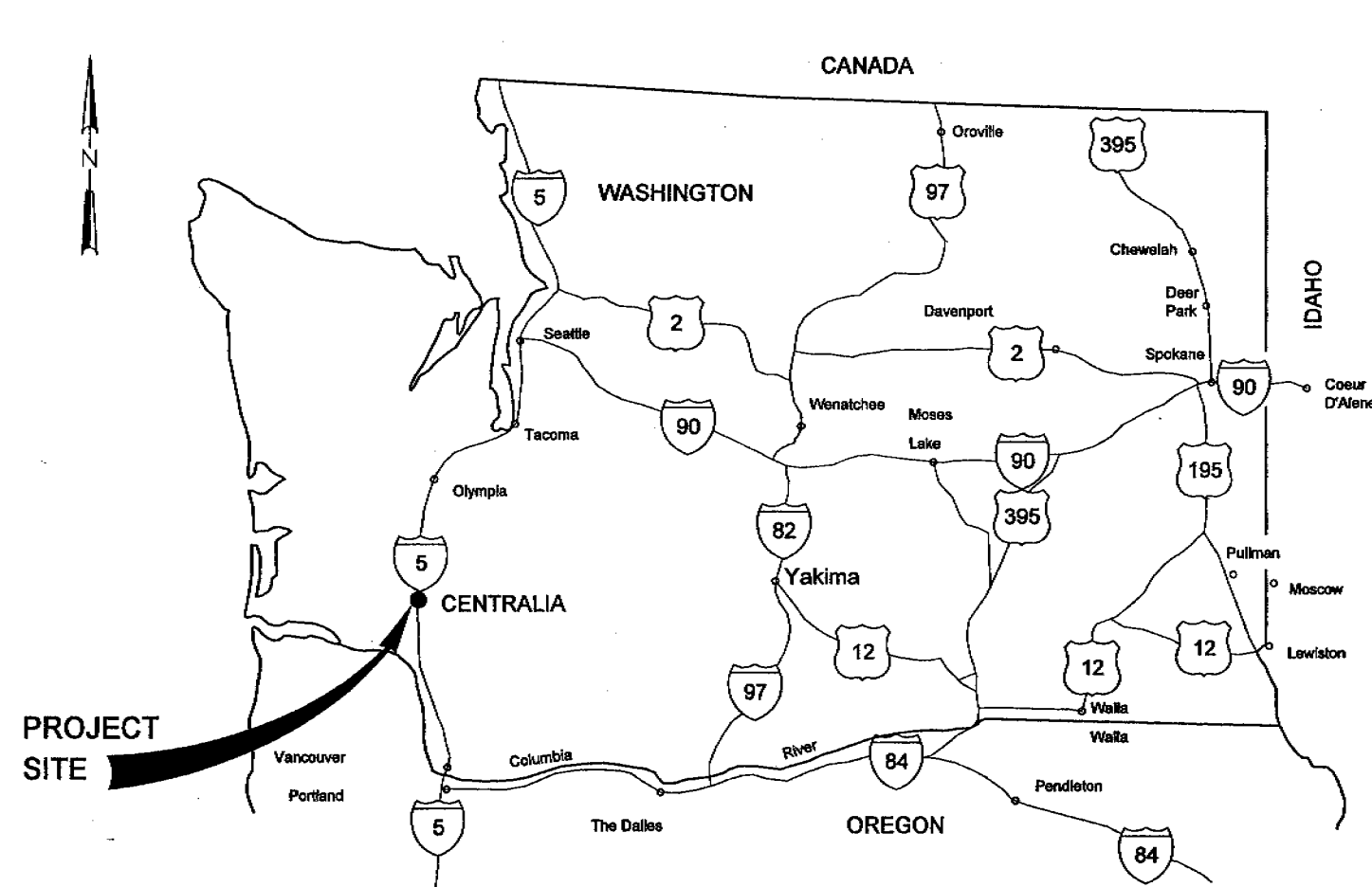
Attachment B: Record Drawings



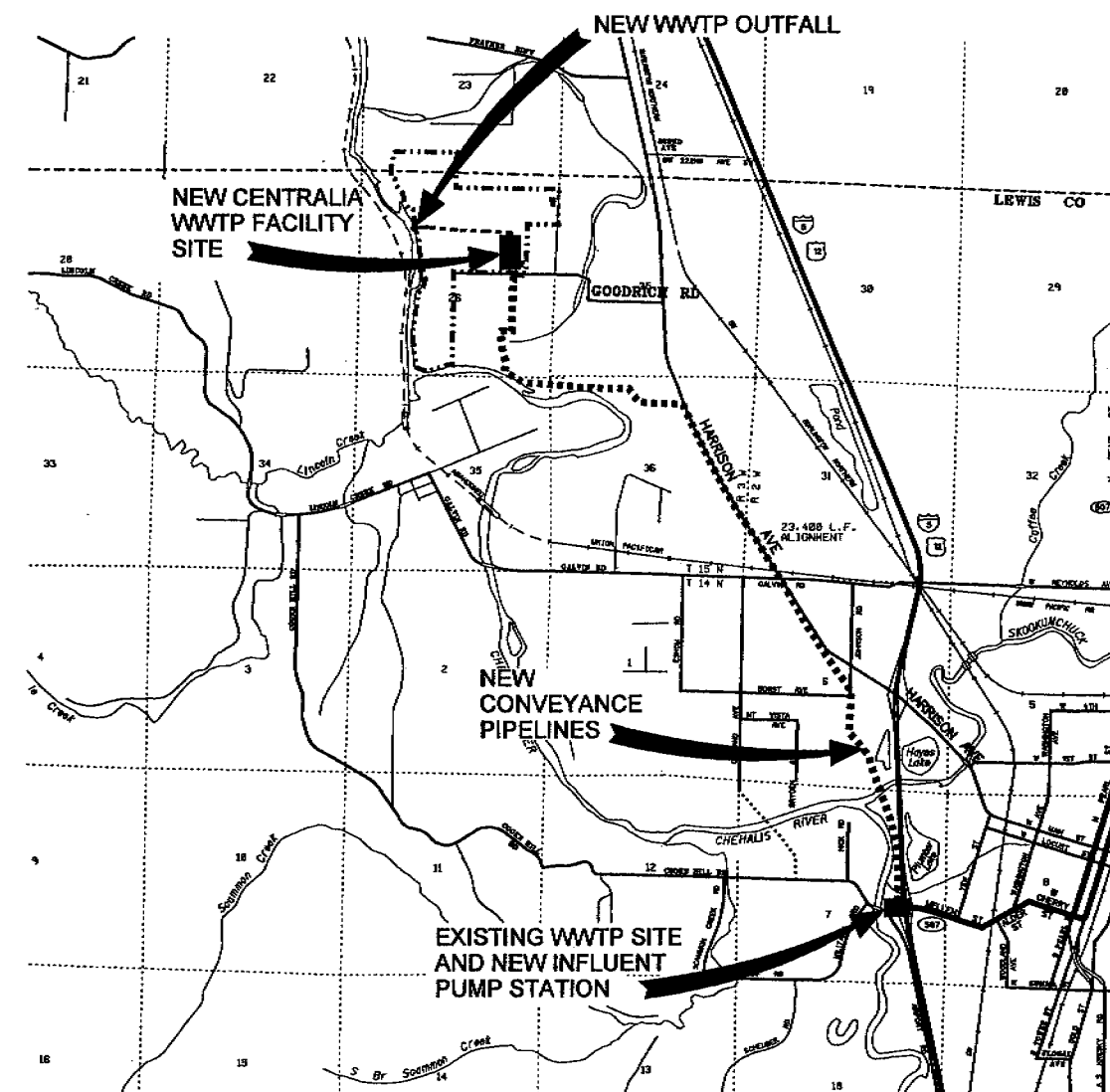
WWTP OUTFALL

CITY OF CENTRALIA UTILITIES

CENTRALIA, WASHINGTON



VICINITY MAP
NTS



LOCATION MAP
NTS

THE CONTRACT DRAWINGS ARE PRINTED DOCUMENTS DATED AUGUST 2002, AS SUBSEQUENTLY AMENDED, WHICH DEFINE THE SCOPE, EXTENT, AND CHARACTER OF THE WORK. THE ORIGINAL DOCUMENT DRAWING WAS SEALED AND SIGNED BY R. BRADY FULLER, STATE OF WASHINGTON, P.E. NO 37880.

RECORD DRAWINGS

Revisions Drawn By K. R. WEIGUM Date 12/30/03

DSGN RB FULLER
DR KR WEIGUM
CHK GR GRAHAM
APVD DT REYNOLDS

THESE RECORD DRAWINGS HAVE BEEN PREPARED, IN PART, ON THE BASIS OF INFORMATION COMPILED BY OTHERS. THEY ARE NOT INTENDED TO REPRESENT IN DETAIL THE EXACT LOCATION, TYPE OF COMPONENT NOR MANNER OF CONSTRUCTION. THE ENGINEER WILL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THE RECORD DRAWINGS.

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

CH2MHILL
in association with
Pfaff Architects
RB Engineering
Foresight Surveying

WWTP OUTFALL
CITY OF CENTRALIA UTILITIES
CENTRALIA, WASHINGTON

GENERAL
OUTFALL
LOCATION AND VICINITY MAPS

SHEET 1
DWG OUT-G-01
DATE AUGUST, 2002
PROJ 166367.OD

DESIGN DATA SUMMARY

OUTFALL

Flows	MGD
Average Annual	2.7
Maximum Day	9.3 (10 MGD Used for Peak Hydraulic)

No. of Diffuser Ports	4 Open, 4 Closed 8 Open (Ultimate)
Diffuser Riser Size	16-Inches
Outfall Diameter	36-Inches

NOTES

1. Additional 24-inch effluent pipe from WWTP to drop structure will allow 30 MGD peak hydraulic capacity.
2. 36" outfall & 8 installed diffusers are suitable for flows from 0-30 MGD.

DRAWING INDEX

SHEET NO. OF 17	DWG NO.	TITLE
GENERAL		
1	OUT-G-01	OUTFALL LOCATION AND VICINITY MAPS
2	OUT-G-02	OUTFALL INDEX TO DRAWINGS, DESIGN DATA SUMMARY & AS-BUILT DIFFUSER PHOTOS
3	OUT-G-03	OUTFALL ABBREVIATIONS
4	OUT-G-04	OUTFALL CIVIL LEGEND & GENERAL NOTES
CIVIL		
5	OUT-C-01	OUTFALL GENERAL ARRANGEMENT - KEY MAP AND SURVEY CONTROL
6	OUT-C-02	OUTFALL DIFFUSER AND EFFLUENT PIPELINE PLAN AND PROFILE
7	OUT-C-03	OUTFALL EFFLUENT PIPELINE PLAN AND PROFILE
8	OUT-C-04	OUTFALL EFFLUENT PIPELINE PLAN AND PROFILE
9	OUT-C-05	OUTFALL COFFERDAM & EXCAVATION PLAN
10	OUT-C-06	OUTFALL DIFFUSER SECTIONS AND DETAILS
11	OUT-C-07	OUTFALL COFFERDAM & EXCAVATION SECTIONS AND DETAILS
12	OUT-C-08	OUTFALL DIFFUSER SECTIONS AND DETAILS
13	OUT-C-09	OUTFALL DIFFUSER SECTIONS AND DETAILS
14	OUT-C-10	OUTFALL DIFFUSER SECTIONS AND DETAILS
15	OUT-C-11	OUTFALL DIFFUSER SECTIONS AND DETAILS
16	OUT-C-12	OUTFALL EROSION CONTROL PLAN AND SECTIONS
17	OUT-C-13	OUTFALL EROSION CONTROL DETAILS

AS-BUILT PHOTOS OF OUTFALL DIFFUSER INSTALLED INSIDE TEMPORARY COFFER DAM & DROP MANHOLE

PHOTO TAKEN PRIOR TO BACKFILL

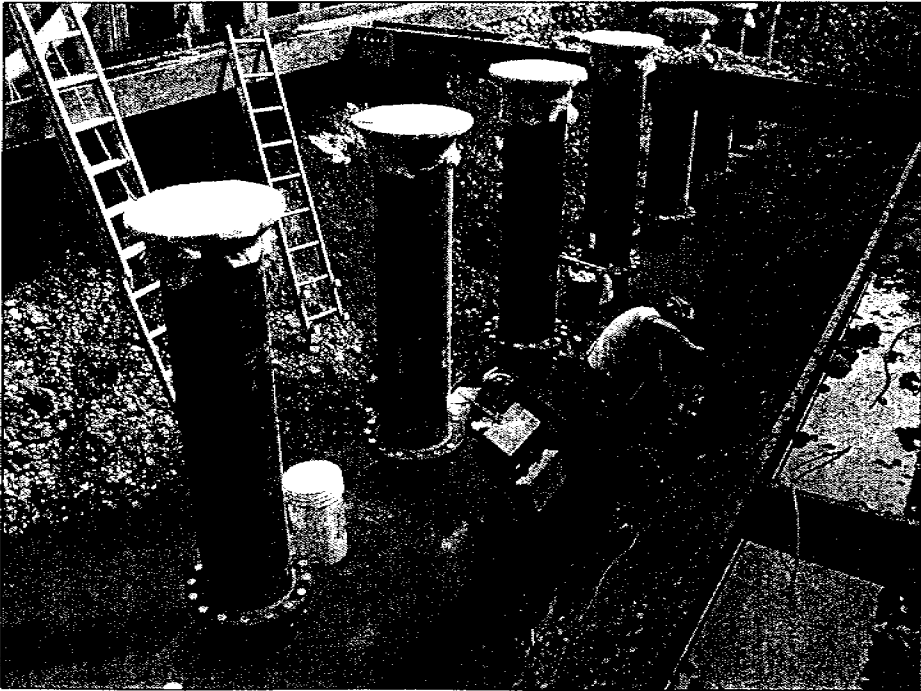
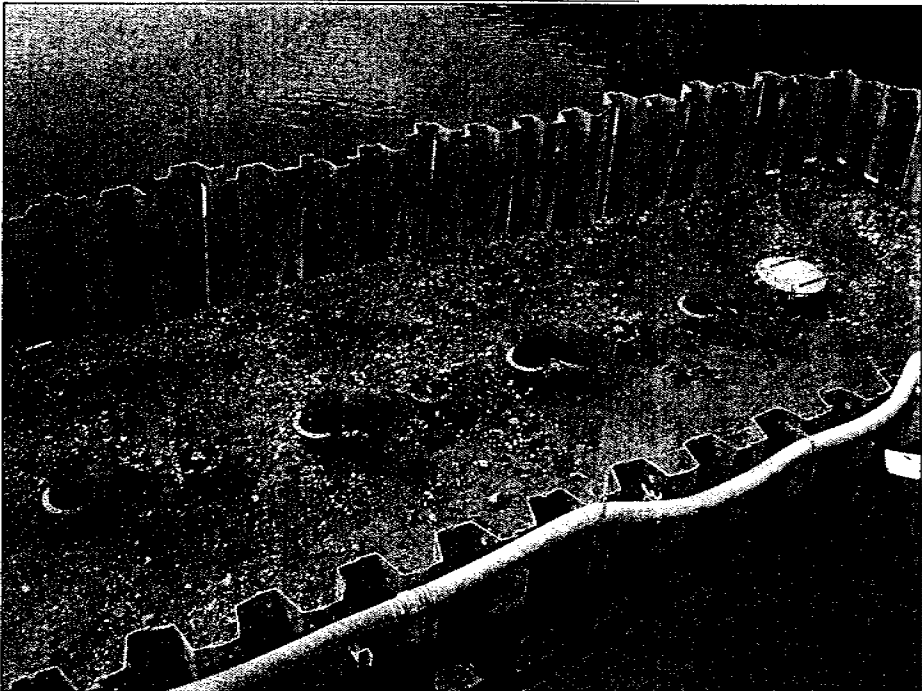
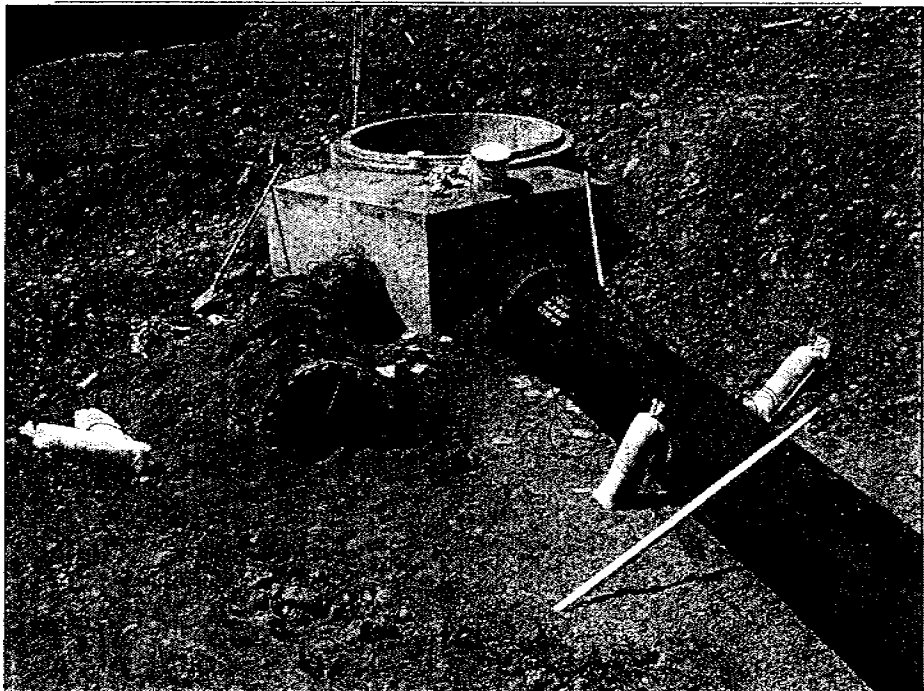


PHOTO TAKEN FOLLOWING BACKFILL



BASE OF DROP STRUCTURE MANHOLE WITH 24" PIPE PENETRATIONS



RECORD DRAWINGS

Revisions Drawn By K. R. WEIGUM Date 12/30/03

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WWTP OUTFALL
CITY OF CENTRALIA UTILITIES
CENTRALIA, WASHINGTON

DRAWING NUMBER LEGEND

FACILITY ABBREVIATIONS	DRAWING NUMBER	DISCIPLINE LEGEND
OUT - WWTP OUTFALL	EXAMPLE: OUT-G-01 FACILITY ABBREV DISCIPLINE(S)	G - GENERAL C - CIVIL

GENERAL
OUTFALL
INDEX TO DRAWINGS, DESIGN DATA SUMMARY,
& AS-BUILT DIFFUSER PHOTOS

SHEET 2
DWG OUT-G-02
DATE AUGUST, 2002
PROJ 166367-00

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DSGN	RB FULLER
DR	KR WEIGUM
CHK	GR GRAHAM
APVD	DT REYNOLDS

NO DATE

REVISION

BY

APVD

AT ANCHOR BOLT, AGGREGATE BASE
ACI ASPHALTIC CONCRETE
ACI AMERICAN CONCRETE INSTITUTE
ACP ASPHALT CONCRETE PAVEMENT
ACT ACOUSTICAL TILE
ADDL ADDITIONAL
ADH AB ADHESIVE ANCHOR BOLT
ADJ ADJACENT, ADJUSTABLE
AFF ABOVE FINISH FLOOR
AFG ABOVE FINISH GRADE
AHR ANCHOR
AISC AMERICAN INSTITUTE OF STEEL CONSTRUCTION
AL ALUMINUM
ALTN ALTERNATE
ANSI
AP ANGLE POINT
APPROX APPROXIMATELY
APVD APPROVED
ARCH ARCHITECTURAL
ARV AIR RELEASE VALVE
ARVTR ACID RESISTANT VENT THRU ROOF
ASSY ASSEMBLY
AUTO AUTOMATIC
AUX AUXILIARY
AWG AMERICAN WIRE GAGE
AWWA AMERICAN WATER WORKS ASSOCIATION
BC BEGIN CURVE, BOTTOM CONTINUOUS
BD BUTTERFLY DAMPER, BOARD
BETW BETWEEN
BF BLIND FLANGE, BOTTOM FACE
BFD BUTTERFLY VALVE DAMPER
BFV BUTTERFLY VALVE
BLDG BUILDING
BM BENCH MARK, BEAM
BO BLOW OFF
BOB BOTTOM OF BEAM
BOD BOTTOM OF DUCT
BOP BOTTOM OF PIPE
BOS BOTTOM OF STEEL
BOT BOTTOM
BRG BEARING
BV BALL VALVE
BVC BEGINNING OF VERTICAL CURVE
C CHANNEL (BEAM)
CAB CABINET
CAC CONTACT ADSORPTION CLARIFIER
CAP CAPACITY
CB CATCH BASIN
CC CENTER OF CURVE
CCP CONCRETE CYLINDER PIPE
CD CONDENSE DRAIN
CFM CUBIC FEET PER MINUTE
CFS CUBIC FEET PER SECOND
CHEM CHEMICAL
CHKD PL CHECKED PLATE
CI CAST IRON
CIGC CAST IRON GROOVED COUPLING
CIMJ CAST IRON MECHANICAL JOINT
CIP CAST IRON PIPE, CAST IN PLACE
CIRJ CAST IRON RESTRAINED JOINT
CISP CAST IRON SOIL PIPE
CJ CONSTRUCTION JOINT
CLDI CEMENT-LINED DUCTILE IRON
CLG CEILING
CLR CLEAR
CL CENTERLINE, CLASS
CMP CORRUGATED METAL PIPE
CMU CONCRETE MASONRY UNIT
CO CLEANOUT
COL COLUMN
CONC CONCRETE
CONN CONNECTION
CONT CONTINUOUS, CONTINUED, CONTINUATION
COORD COORDINATE
COP COPPER
CP CONTROL POINT
CPLG COUPLING
CPVC CHLORINATED POLYVINYL CHLORIDE
CRS COLD ROLLED STEEL
CSP CONCRETE SEWER PIPE
CTD CENTERED
CTR CENTER
C TO C CENTER TO CENTER
CU CUBIC
CULV CULVERT
CV CHECK VALVE
°C DEGREES CELSIUS

PENNY (NAIL SIZE)
DBA DEFORMED BAR ANCHOR
DRAIN, DEEP
DD DIGESTER DRAIN
DBL DOUBLE
DEC DECANT
DEMO DEMOLITION
DET DETAIL
DI DROP INLET, DUCTILE IRON
DIA DIAMETER
DIAG DIAGONAL
DIL DILUTE
DIMJ DUCTILE IRON MECHANICAL JOINT
DIP DUCTILE IRON PIPE
DIPGL DUCTILE IRON PIPE, FLANGED, GLASS LINED
DIR DIRECTION
DIST DISTANCE
DN DOWN
DWG DRAWING
E EAST
EA EACH
EC END CURVE
ECC ECCENTRIC
EF EACH FACE, EXHAUST FAN
EFL EFFLUENT
EIFS EXTERIOR INSULATION AND FINISH SYSTEMS
EL ELEVATION
ELB ELBOW
ELC ELECTRICAL LOAD CENTER
ELEC ELECTRIC, ELECTRICAL
ENGR ENGINEER
ENT ENTERING
EO EMERGENCY OVERFLOW
EQL SP EQUALLY SPACED
EQPT EQUIPMENT
EVC END OF VERTICAL CURVE
EW EACH WAY
EW,EF EACH WAY, EACH FACE
EXC EXCAVATE
EXH EXHAUST
EXP EXPOSED, EXPANSION
EXP JT EXPANSION JOINT
EXST EXISTING
EXT EXTENSION
FB FLAT BAR
FC FLEXIBLE COUPLING
FCA FLANGED COUPLING ADAPTER
FCO FLOOR CLEANOUT
FD FLOOR DRAIN
FDA FLOOR DRAIN W/INTEGRAL TRAP
FDM FOUNDATION
FES FLARED END SECTION
FEXT FIRE EXTINGUISHER
FF FINISH FLOOR
FG FINISH GRADE
FHY FIRE HYDRANT
FIG FIGURE
FLEX FLEXIBLE
FLG FLANGE
FLH FLAT HEAD
FLI FLOW LINE
FLR FLOOR
FLTR FILTER
FM FORCE MAIN
FNSH FINISH
FOB FLAT ON BOTTOM
FOC FACE OF CONCRETE
FOT FLAT ON TOP
FRP FIBERGLASS REINFORCED PLASTIC
FT FOOT OR FEET
FTG FOOTING
FWD FORWARD
°F DEGREES FAHRENHEIT
GA GAGE
GAL GALLON
GALV GALVANIZED
GB GRAB BAR
GC GROOVED COUPLING
GCO GRADE CLEANOUT
GCF GROOVED COUPLING FITTING
GE GROOVED END
GL GLASS
GLDI GLASS LINED DUCTILE IRON
GLB GLULAM BEAM
GPD GALLONS PER DAY
GPH GALLONS PER HOUR
GPM GALLONS PER MINUTE
GRG GRATING
GSP GALVANIZED STEEL PIPE
GV GATE VALVE
GVL GRAVEL
GWB GYPSUM WALLBOARD
GYP GYPSUM

ABBREVIATIONS

H HIGH, HEIGHT
HAS HEADED ANCHOR STUD
HBU HOLLOW BRICK UNIT
HD HUB DRAIN
HDPE HIGH DENSITY POLYETHYLENE
HDR HEADER
HDW HARDWARE
HGT HEIGHT
HM HOLLOW METAL
HORIZ HORIZONTAL
HP HORSEPOWER
HPT HIGH POINT
HR HANDRAIL, HOSE RACK
HSS HOLLOW STRUCTURAL SECTION
HV HOSE VALVE
I&C INSTRUMENTATION & CONTROL
ID INSIDE DIAMETER
IE INVERT ELEVATION
I.F. INSIDE FACE
IN INCH
INFL INFLUENT
INSTM INSTRUMENTATION
INSUL INSULATE, INSULATION
INTX INTERSECTION
INVT INVERT
JT JOINT
KIP THOUSAND POUNDS
KW KILOWATT
L LEFT, ANGLE, LENGTH
LAB LABORATORY
LATL LATERAL
LAV LAVATORY
LB POUNDS
LB/CU FT POUNDS PER CUBIC FOOT
LF LINEAR FEET
LG LONG
LH LEFT HAND
LLV LONG LEG VERTICAL
LONG LONGITUDINAL
LPT LOW POINT
LR LONG RADIUS
LVG LEAVING
MAX MAXIMUM
MB MACHINE BOLT
MCC MOTOR CONTROL CENTER
MECH MECHANICAL
MFR MANUFACTURER
MGD MILLION GALLONS PER DAY
MG/L MILLIGRAMS PER LITER
MH MANHOLE
MIL MILLIMETER
MIN MINIMUM, MINUTE
MISC MISCELLANEOUS
MJ MECHANICAL JOINT
MO MASONRY OPENING
MSNRY MASONRY
MTL MATERIAL
MTS MILL TYPE STEEL
MWS MAXIMUM WATER SURFACE
N NORTH
N/A NOT APPLICABLE
NC NORMALLY CLOSED
NIC NOT IN CONTRACT
NO. NUMBER, NUMBERING, NORMALLY OPEN
NPT NATIONAL PIPE THREAD
NTS NOT TO SCALE
OC ON CENTER
OD OUTSIDE DIAMETER, OVERFLOW DRAIN
O.F. OUTSIDE FACE, OVERFLOW
OG ORIGINAL GROUND
OPNG OPENING
OPP OPPOSITE
OSD OPEN SITE DRAIN
O TO O OUT TO OUT
OZ OUNCE
PC POINT OF CURVE
PE PLAIN END
PENT PENETRATION
PI POINT OF INTERSECTION
PJF PREMOLDED JOINT FILLER
PLE PLANT EFFLUENT (FLOW STREAM IDENTIFICATION)
PLYWD PLYWOOD
POT POINT ON TANGENT
PPM PARTS PER MILLION
PRC POINT OF REVERSE CURVE
PRCST PRECAST
PREFAB PREFABRICATED
PRESS PRESSURE
PRI PRIMARY
PROP PROPERTY
PSF POUNDS PER SQUARE FOOT
PSI POUNDS PER SQUARE INCH
PSIG POUNDS PER SQUARE INCH, GAUGE
PT POINT OF TANGENCY, PRESSURE TREATED
PV PLUG VALVE
PVC POLYVINYL CHLORIDE PLASTIC
PVCGLS POLYVINYL CHLORIDE PLASTIC- GRAVITY SEWER TYPE
PVCW POLYVINYL CHLORIDE PLASTIC- WATER DISTRIBUTION SERVICE TYPE PAVEMENT
PVMT
RAC ROOM AIR CONDITIONER
R, RAD RADIUS
RC REINFORCED CONCRETE
RCP REINFORCED CONCRETE PIPE
RCPP REINFORCED CONCRETE PRESSURE PIPE
RD ROAD, ROOF DRAIN
RDCR REDUCER
REF REFER OR REFERENCE
REINF REINFORCED, REINFORCING, REINFORCE
REQD REQUIRED
RH RIGHTHAND, RODHOLE
RJ RESTRAINED JOINT
RLS RUBBER LINED STEEL
RM ROOM
RO ROUGH OPENING
RST REINFORCING STEEL
RTN RETURN
RV ROOF VENT
RW RIGHT-OF-WAY
S I-BEAM, SOUTH
SA SAMPLE
SC SOLID CORE
SCFH STANDARD CUBIC FEET PER HOUR
SCFM STANDARD CUBIC FEET PER MINUTE
SCH, SCHED SCHEDULE
SD STORM DRAIN, SOAP DISPENSER
SEC SECONDARY
SECT SECTION
SEW. SEWAGE
SH SHEET
SIM SIMILAR
SLD SLUDGE
SLP SLOPE
SOLN SOLUTION
SP SPACE OR SPACES
SPD SUMP PUMP DISCHARGE
SPEC SPECIFICATIONS
SPG SPACING
SPLY SUPPLY
SQ SQUARE
SQ FT SQUARE FOOT
SQ IN SQUARE INCH
SSH SAFETY SHOWER
SST STAINLESS STEEL
STA STATION
STD STANDARD
STIF STIFFENER
STL STEEL
STR STRAIGHT
STRUT STRUCTURAL
SUBFL SUBFLOOR
SUSP SUSPEND, SUSPENDED
SYMM SYMMETRICAL
SAW SIDEWALK
T, TAN TANGENT
TBG TUBING
T&B TOP AND BOTTOM
TC TOP OF CURB, TOP CONTINUOUS
TDH TOTAL DYNAMIC HEAD
TECH TECHNICAL
TEL TELEPHONE
TEMP TEMPERATURE
TF TOP FACE
T&G TONGUE AND GROOVE
THD THREAD
THK THICK
TJB TERMINAL JUNCTION BOX
T.O. TOP OF
TOC TOP OF CONCRETE
TOF TOP OF FOOTING
TP TURNING POINT
TRANS TRANSITION
TRANSV TRANSVERSE
TST TOP OF STEEL
TT THRUST TIE
TW TOP OF WALL
TYP TYPICAL
UBC UNIFORM BUILDING CODE
UD UNDERDRAIN
UH UNIT HEATER (ELECTRIC)
UNO UNLESS NOTED OTHERWISE
UP UNIT PROCESS
UR URINAL
V VENT, VOLT, VALVE
VAC VACUUM
VAR VENT ACID RESISTANT
VC VERTICAL CURVE
VERT VERTICAL
VPI VERTICAL POINT OF INTERSECTION
VPS VENEER PLASTER SYSTEM
VTR VENT THRU ROOF
W WITH
W WIDE FLANGE (BEAM), WEST
WC WATER CLOSET
WD WOOD
WH WATER HEATER, WALL HEATER
WM WATER METER
WR WATER RESISTANT
WS WATER SURFACE, WATER STOP
W SH ST WEATHERING SHEET STEEL
WSP WELDED STEEL PIPE
WTR WATER
WW WASHWATER
WWF WELDED WIRE FABRIC
W2 NON-POTABLE WATER (FLOW STREAM IDENTIFICATION) CROSS
X
YD YARD
YR YEAR

NOTES:

- CONTACT THE ENGINEER FOR ABBREVIATIONS NOT LISTED.
- THIS IS A STANDARD LEGEND SHEET, THEREFORE, SOME SYMBOLS OR ABBREVIATIONS MAY APPEAR ON THIS SHEET AND MAY NOT BE UTILIZED ON THIS PROJECT.
- FOR FLOW STREAM IDENTIFICATIONS SEE PIPING SCHEDULE IN SPECIFICATION SECTION 15060 AND DRAWING OUT-G-04.

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WWTP OUTFALL

CITY OF CENTRALIA UTILITIES
CENTRALIA, WASHINGTON

GENERAL
OUTFALL
ABBREVIATIONS

SHEET 3

DWG OUT-G-03

DATE AUGUST, 2002

PROJ 166387.0D

CIVIL LEGEND

EXISTING	THIS CONTRACT	
X 157.7	⊙ 158.5	SPOT ELEVATION
155	155	CONTOUR LINE
	3:1	EMBANKMENT AND SLOPE
		DRAINAGEWAY OR DITCH
		CATCH BASIN
	OR	SIGN
	●	MANHOLE
		TELEPHONE MANHOLE
		TELEPHONE RISER BOX
	○	CLEANOUT
	○-H	HOSE VALVE WITH HOSE RACK
		GAS RISER
		GATE
	●	POST OR GUARD POST
		GUY ANCHOR
		ELECTRIC BOX
	○	FIRE HYDRANT
		UTILITY POLE
		LIGHT POLE
		WATER METER
	△	SURVEY CONTROL POINT OR POINT OF INTERSECTION
		BRUSH/TREE LINE
	○	TREE
	○ B-	CENTER LINE, BUILDING, ROAD, ETC.
	TP-	BORING # AND LOCATION
		TEST PIT AND LOCATION
	N 1000.00 E 1000.00	STRUCTURE, BUILDING OR FACILITY LOCATION POINT - COORDINATES
		FACILITY NUMBER
OR	OR	STRUCTURE, BUILDING OR FACILITY
		ASPHALT CONCRETE PAVEMENT
		GRAVEL SURFACING
		ABANDON EXISTING YARD PIPING
		6' CHAIN LINK FENCE
		CULVERT
		GATE VALVE
		REDUCER
12" PW	12" PW	YARD PIPING
		FILTER FABRIC FENCE

NOTES:

- EXISTING PIPING, EQUIPMENT, AND TOPOGRAPHY IS SHOWN SCREENED AND/OR LIGHT-LINED. NEW PIPING, EQUIPMENT, STRUCTURE, AND FINISHED GRADE IS SHOWN HEAVY-LINED.

RECORD DRAWINGS

Revisions Drawn By K. R. WEIGUM Date 12/30/03

DESIGN	RB FULLER				
OR	KR WEIGUM				
CHK	GR GRAHAM				
APVD	DT REYNOLDS	NO.	DATE	REVISION	BY

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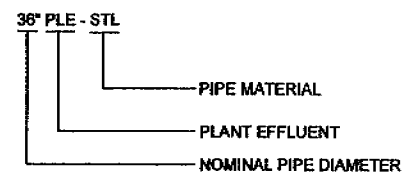
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WWTP OUTFALL
CITY OF CENTRALIA UTILITIES
CENTRALIA, WASHINGTON

GENERAL
OUTFALL
CIVIL LEGEND & GENERAL NOTES

SHEET 4
DWG OUT-G-04
DATE AUGUST, 2002
PROJ 166367.OD

EXAMPLE:



FLOW STREAM IDENTIFICATION

DESIGN DETAIL DESIGNATION

NOTE:
ALL DESIGN DETAILS ARE TYPICAL AND MUST BE USED EVEN IF DESIGN DETAIL DESIGNATION IS NOT SHOWN.

DESIGN DETAIL DESIGNATION

SECTION (LETTER) OR DETAIL (NUMERAL) DESIGNATION

ON DRAWING WHERE SECTION OR DETAIL IS TAKEN:
DRAWING NUMBER WHERE SHOWN

DRAWING NUMBER (REPLACED WITH A LINE IF TAKEN AND SHOWN ON SAME SHEET)

ON DRAWING WHERE SECTION OR DETAIL IS SHOWN
DRAWING NUMBER(S) WHERE TAKEN

DETAIL AND SECTION DESIGNATION

GENERAL NOTES

- CONTRACTOR ACTIVITIES SHALL BE CONFINED TO THE WORK LIMITS SHOWN INCLUDING ACCESS ROUTES, PIPELINE CORRIDOR, AND STAGING AREAS. WORK OUTSIDE THESE LIMITS SHALL BE FOR WORK DIRECTLY RELATED TO THIS CONTRACT.
- CONTRACTOR SHALL COMPLY WITH EPA, CITY OF CENTRALIA, AND LEWIS COUNTY EROSION AND SURFACE WATER POLLUTION CONTROL REQUIREMENTS. THESE REQUIREMENTS WILL BE STRICTLY ENFORCED.
- CONTRACTOR SHALL SHARE SITE ACCESS WITH THE CITY OF CENTRALIA AND ALLOW CITY VEHICLES ACCESS TO PROPERTY AT ALL TIMES DURING CONSTRUCTION. CONTRACTOR SHALL CLOSELY COORDINATE ALL CONSTRUCTION ACTIVITIES WITH CITY STAFF.
- CONTRACTOR SHALL PROVIDE DUST PROTECTION AND ABATEMENT DURING CONSTRUCTION PERIOD FOR ALL AREAS DISTURBED BY WORK UNDER THIS CONTRACT.
- WORK UNDER THIS CONTRACT INTERFACES WITH THREE OTHER CONTRACTS THAT WILL BE UNDERTAKEN BY THE CITY OF CENTRALIA. THESE PROJECTS ARE A NEW INFLUENT PUMP STATION TO PUMP RAW SEWAGE, CONVEYANCE PIPELINES THAT TRANSMIT RAW SEWAGE & A NEW WASTEWATER TREATMENT FACILITY. STARTUP REQUIREMENTS FOR THE NEW TREATMENT FACILITY WILL AFFECT STARTUP, TESTING, COMMISSIONING AND WARRANTIES FOR THE WORK UNDER THIS CONTRACT. SEE SPECIFICATION 01040, COORDINATION.
- OUTFALL AND EFFLUENT PIPELINE CONSTRUCTION SHALL BE CONDUCTED IN STRICT ACCORDANCE WITH PERMIT RESTRICTIONS.
- PROTECTION OF THE ENVIRONMENT:
NO CONSTRUCTION RELATED ACTIVITY SHALL CONTRIBUTE TO THE DEGRADATION OF THE ENVIRONMENT, ALLOW MATERIAL TO ENTER SURFACE OR GROUND WATERS, OR ALLOW PARTICULATE EMISSIONS TO THE ATMOSPHERE, WHICH EXCEED STATE OR FEDERAL STANDARDS. ANY ACTIONS THAT POTENTIALLY ALLOW A DISCHARGE TO STATE WATERS MUST HAVE PRIOR APPROVAL OF THE STATE OF WASHINGTON, DEPARTMENT OF ECOLOGY.
- NO NET FILL IS ALLOWED IN OR AROUND THE CONSTRUCTION LIMITS OF THIS CONTRACT OR ANY CITY OF CENTRALIA PROPERTY. CONTRACTOR SHALL REMOVE ALL EXCESS EXCAVATED MATERIALS, STOCKPILES, STRIPPINGS AND OTHER CONSTRUCTION DEBRIS AT END OF CONSTRUCTION PERIOD.
- NO MORE THAN 500 FEET OF PIPE TRENCH SHALL BE OPEN AT ANY ONE TIME.
- CONTRACTOR SHALL IMPLEMENT EROSION AND SEDIMENT CONTROL MEASURES AS SHOWN ON THE DRAWINGS AND AS REQUIRED IN THE SPECIFICATIONS. CONTRACTOR SHALL FOLLOW THE STORM WATER POLLUTION PREVENTION PLAN INCLUDED IN THE SPECIFICATIONS. CONTRACTOR SHALL PREPARE AND SUBMIT FOR APPROVAL A CONSTRUCTION PERIOD DRAINAGE AND EROSION AND SEDIMENT CONTROL PLAN.
- THE 100-YEAR RETURN PERIOD FLOOD ELEVATION FOR THE CHEHALIS RIVER AT THE OUTFALL LOCATION IS EL 162.7 (1985 NAVD). SEE 01500 CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS ARTICLE TEMPORARY CONTROLS AND ARTICLE STORAGE YARDS AND BUILDINGS FOR FLOOD CONTROL REQUIREMENTS.
- PLAN AND PROFILE DRAWINGS SHOW ALLOWABLE PIPE MATERIALS. WHERE CONTRACTOR OPTION IS NOT FED, PIPE MATERIAL SHALL BE CONSISTENT ALONG ENTIRE ALIGNMENT.

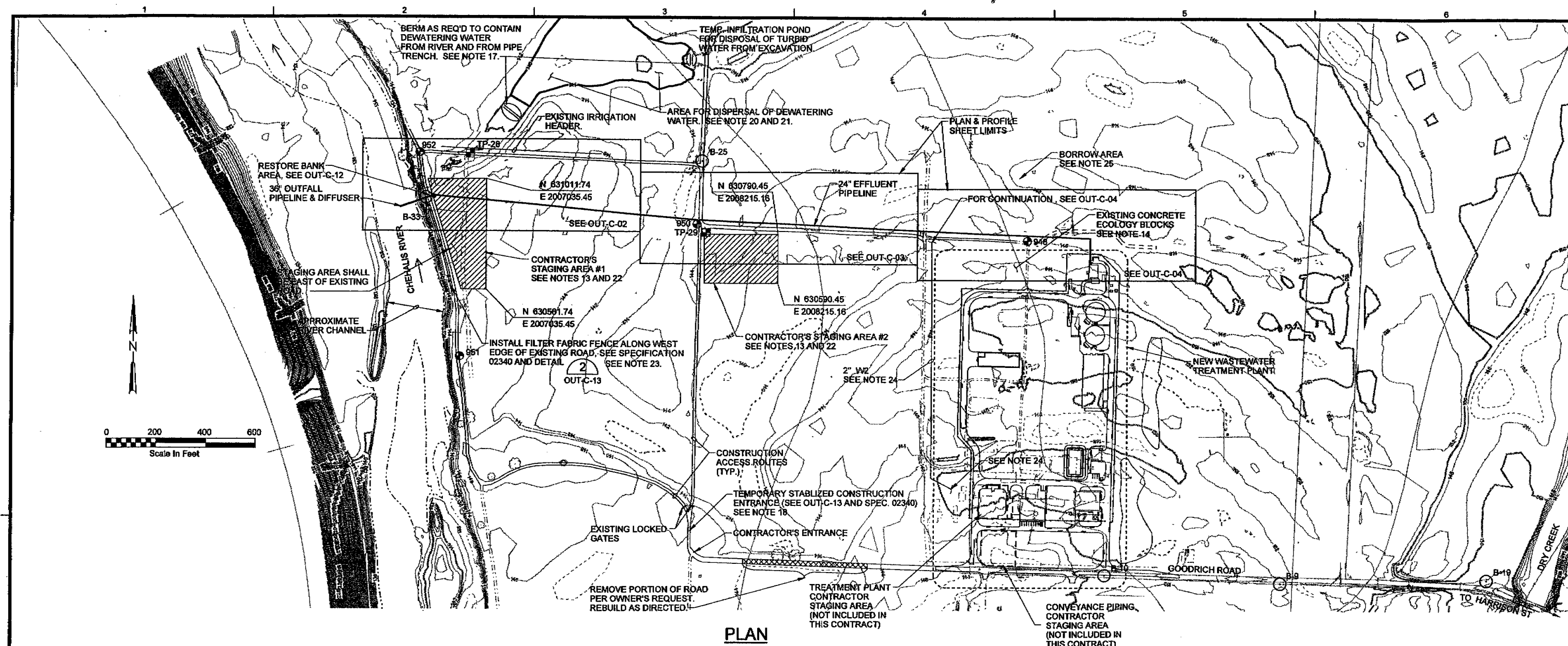
IN-WATER WORK NOTES

- IN-WATER WORK WINDOW FOR OUTFALL INSTALLATION IN CHEHALIS RIVER IS JULY 1 - AUGUST 31 ANNUALLY. CONTRACTOR SHALL BE COMPLETE WITH ALL IN-WATER WORK INCLUDING PIPE INSTALLATION, DIFFUSER INSTALLATION, FINAL IN-RIVER GRADING AND REMOVAL OF TEMPORARY IN-WATER STRUCTURES SUCH AS PILING, DOCKS AND DEWATERING EQUIPMENT.
- DISCHARGE OF TURBID WATER TO THE CHEHALIS RIVER IS STRICTLY PROHIBITED AS DESCRIBED IN THE PERMIT RESTRICTIONS.

ARCHAEOLOGICAL NOTES

- ARCHAEOLOGICAL FINDS MAY BE ENCOUNTERED DURING EXECUTION OF WORK. REFER TO SPECIFICATION 01015 ARCHAEOLOGICAL FINDS.

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GENERAL NOTES:

- DATE OF SURVEY: JULY, 2001
- CONTOUR INTERVAL IS TWO FEET.
- ELEVATIONS ARE IN FEET.
- THIS CHART REPRESENTS GENERAL BATHYMETRY. IT IS NOT INTENDED TO BE A LEAST DEPTH SURVEY AND SHOULD NOT BE USED FOR NAVIGATION.
- HORIZONTAL DATUM: PROJECT DATUM
- VERTICAL DATUM: NAVD 88
- BASED ON WSDOT MONUMENTS GP21005-36 AND GP21005-61
- REFER TO ENGINEERS GEOTECHNICAL REPORT FOR DETAILED LOGS OF BORING AND TEST PITS

- CONTRACTOR TO ASSESS CONDITION OF EXISTING ROADS & MAKE IMPROVEMENTS AS REQUIRED TO PERFORM WORK.
- CONTRACTOR VEHICLES SHALL BE LIMITED TO THE ACCESS ROUTES AND STAGING AREAS SHOWN.
- ALL ROADS, FIELDS, AND WORK AREAS SHALL BE RESTORED TO THE SATISFACTION OF THE OWNER AT THE COMPLETION OF CONSTRUCTION.
- CONTRACTOR RESPONSIBLE FOR PROVIDING ADEQUATE SURFACING AND MAINTAINING SURFACING FOR STAGING AREA AND ACCESS ROUTES.
- STAGING AREA SHALL BE FOR CONTRACTOR EMPLOYEE PARKING, CONTRACTOR TRAILERS, AND MATERIALS STORAGE.

- CONTRACTOR SHALL MOVE EXISTING CONCRETE ECOLOGY BLOCKS AS NECESSARY FOR CONSTRUCTION. COORDINATE W/ ENGINEER IF BLOCKS REQUIRE RELOCATION.
- ALL NEW GRAVEL SURFACES SHALL BE COMPACTED TO 95% ASTM D1557.
- EXISTING STRUCTURES ON SITE MAY NOT BE SHOWN ON THE PLAN. AVOID DAMAGE TO EXISTING STRUCTURES.
- PROVIDE BERM OF ADEQUATE HEIGHT TO CONTAIN ALL WATER DISCHARGED UNDER THIS CONTRACT TO THIS AREA. MAINTAIN BERM AS REQ'D DURING CONSTRUCTION. REMOVE BERM AND RESTORE TO ORIGINAL CONDITION AFTER DEWATERING IS FINISHED. CONTRACTOR SHALL DETERMINE LOCATION AND EXTENT OF BERM.

- STABILIZED CONSTRUCTION ENTRANCE SHALL BE LOCATED AT AREA OF EXISTING ASPHALT PAVEMENT. SAW CUT EDGE OF EXISTING ASPHALT AND REMOVE ASPHALT AS REQUIRED. RESTORE SURFACE WITH 4" LAYER OF BASE COURSE ROCK FOLLOWING REMOVAL OF STABILIZED CONSTRUCTION ENTRANCE.
- CONTRACTOR SHALL SUPPLY OWN LOCK FOR GATES AND SHALL CLOSE AND LOCK GATES AT END OF EACH WORK DAY. INSTALL LOCKS IN SERIES WITH CITY LOCK SO BOTH CONTRACTOR AND CITY MAY OPEN GATE.
- DISPERSE WATER SO AS NOT TO CAUSE ANY EROSION DURING DISCHARGE.
- CONTRACTORS FROM THE OTHER THREE CONTRACTS (SEE NOTE 5 ON DWG OUT-G-04) MAY ALSO DISCHARGE DEWATERING WATER IN THIS AREA. ENGINEER WILL COORDINATE DISCHARGES.

- INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROL MEASURES FOR ALL SOIL STOCKPILES IN ACCORDANCE WITH SPECIFICATIONS.
- FENCE SHALL EXTEND FROM ROAD INTERSECTION AT THE NORTH TO THE SOUTH END OF CONTRACTOR'S STAGING AREA #1. IF DIRT ACCUMULATES ON ROAD SURFACE SOUTH OF THIS, CONTRACTOR SHALL EXTEND FILTER FABRIC ALONG WEST EDGE OF ROAD.
- INSTALL 2" W2 IRRIGATION LINE. 2" MIN BURIAL WITH TRACE WIRE CONNECT AT RESIDENCE WATER SERVICE. COORDINATE W/ ENGINEER FOR ACCESS TO PERFORM WORK. SEE 1 OUT-G-07
- COORDINATE WITH ENGINEER FOR ACCESS TO BORROW AREA PRIOR TO EXCAVATION OF BORROW MATERIAL FOR OUTFALL BANK RESTORATION.

SURVEY CONTROL MONUMENT TABLE

NO.	NORTHING	EASTING	ELEVATION	DISCRPTION
948	630766.758	2009220.803	145.238	2x2 H&T
950	630830.940	2007885.328	145.457	2x2 H&T
951	630290.355	2006931.329	147.305	2x2 H&T
952	631120.368	2006766.494	146.354	2x2 H&T

NOTE:

HORIZONTAL DATUM: PROJECT

TO GET TO WASHINGTON STATE PLANE COORDINATE SYSTEM, (WASHINGTON SOUTH - 4602, NAD83/91) SUBTRACT 100,000,000 FEET FROM THE NORTHING AND 1,000,000,000 FEET FROM THE EASTING. THEN MULTIPLY EACH BY COMBINED GRID FACTOR 0.9999132480. HORIZONTAL CONTROL SURVEY PERFORMED USING LEICA SR530 GPS UNITS. BASIS FOR CONTROL BEING WSDOT MONUMENTS 272, 301, 302, 2350, 2351, AND 2514.

VERTICAL DATUM: NAVD 88

ELEVATIONS ESTABLISHED FROM WSDOT MONUMENTS 301, 2350, AND 2514. CONTROL ELEVATIONS ESTABLISHED USING A LEICA NA2002 ELECTRONIC LEVEL.

RECORD DRAWINGS

Revisions Drawn By **K. R. WEIGUM** Date **12/30/03**

DSGN	RB FULLER
DR	KR WEIGUM
CHK	JG MORRIS
APVD	DT REYNOLDS

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WWTP OUTFALL

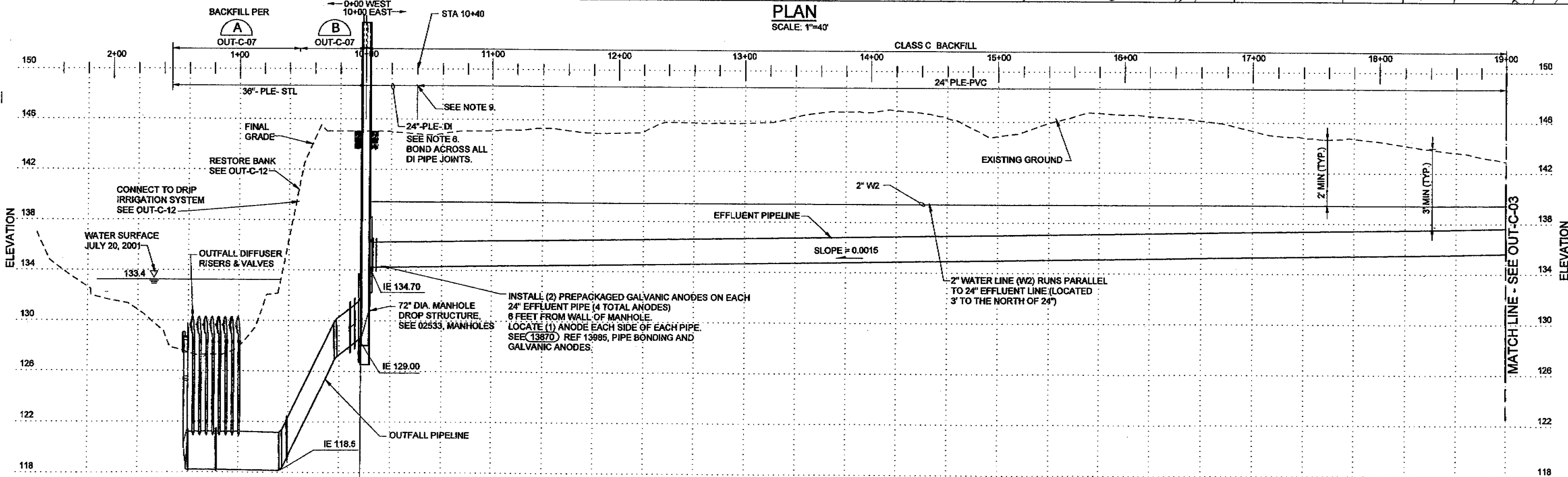
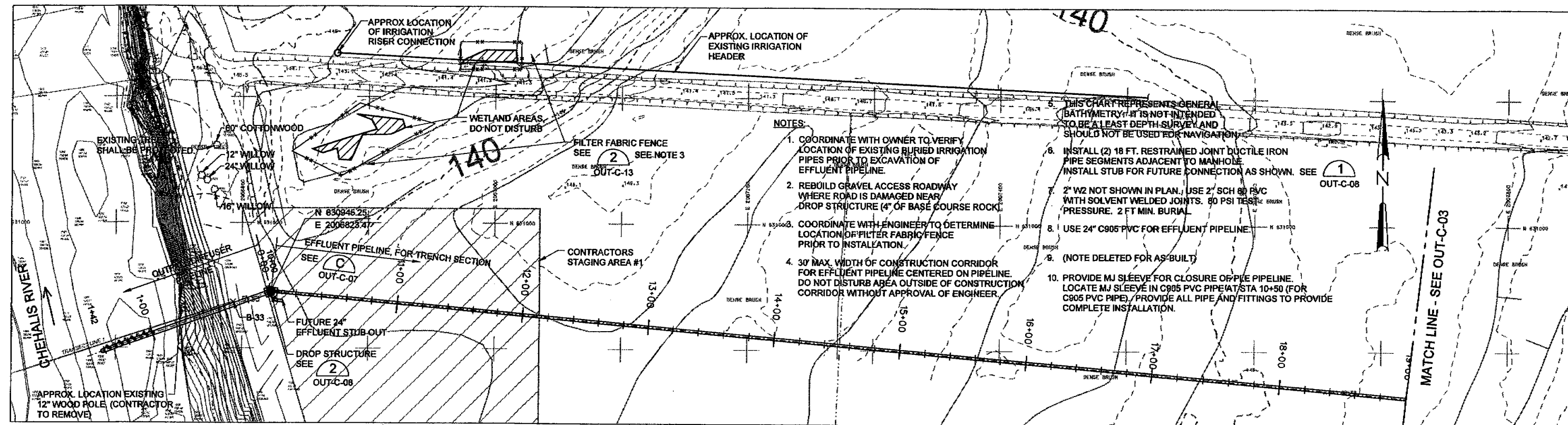
CITY OF CENTRALIA UTILITIES
CENTRALIA, WASHINGTON

CIVIL

OUTFALL
GENERAL ARRANGEMENT - KEY MAP
AND SURVEY CONTROL

SHEET 5

DWG **OUT-C-01**
DATE **AUGUST, 2002**
PROJ **166367.00**



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DSGN RB FULLER
DR LJ WARE
CHK GR GRAHAM
APVD DT REYNOLDS

RECORD DRAWINGS
Revisions Drawn By K. R. WEIGUM Date 12/30/03

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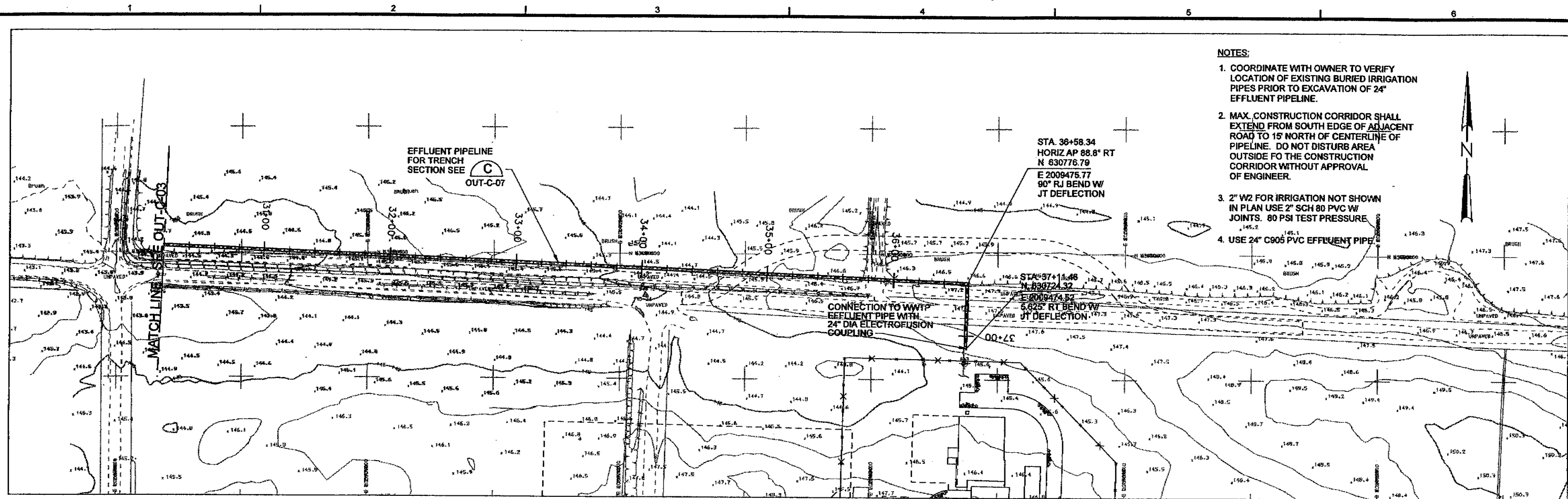
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WWTP OUTFALL
CITY OF CENTRALIA UTILITIES
CENTRALIA, WASHINGTON

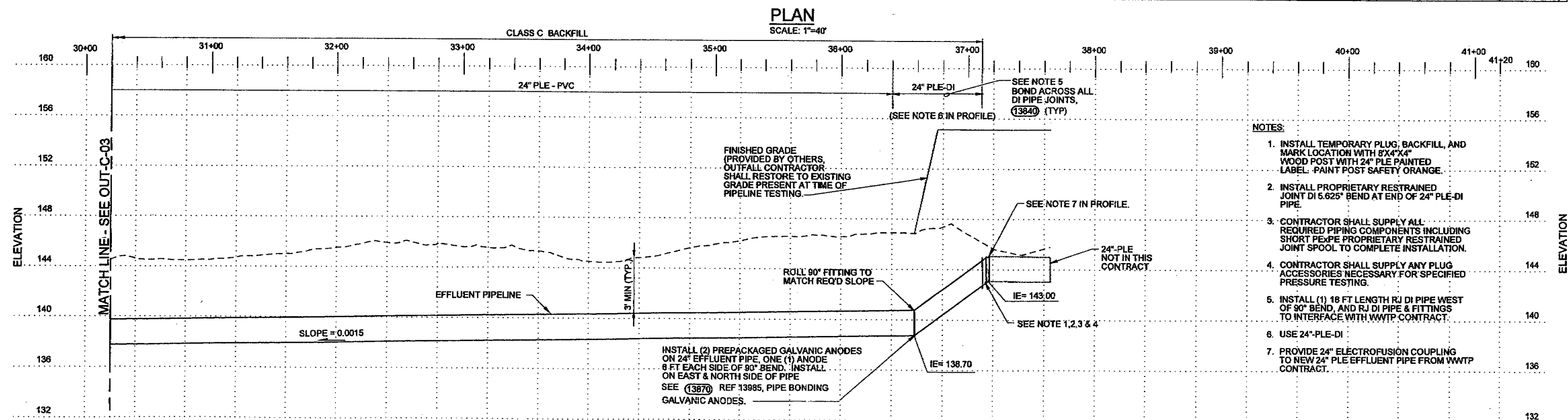
CIVIL
OUTFALL
DIFFUSER AND EFFLUENT PIPELINE
PLAN AND PROFILE

SHEET 6
DWG OUT-C-02
DATE AUGUST, 2002
PROJ 166367.0D

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- NOTES:**
1. COORDINATE WITH OWNER TO VERIFY LOCATION OF EXISTING BURIED IRRIGATION PIPES PRIOR TO EXCAVATION OF 24" EFFLUENT PIPELINE.
 2. MAX. CONSTRUCTION CORRIDOR SHALL EXTEND FROM SOUTH EDGE OF ADJACENT ROAD TO 15' NORTH OF CENTERLINE OF PIPELINE. DO NOT DISTURB AREA OUTSIDE OF THE CONSTRUCTION CORRIDOR WITHOUT APPROVAL OF ENGINEER.
 3. 2" W2 FOR IRRIGATION NOT SHOWN IN PLAN USE 2" SCH 80 PVC W/ JOINTS. 80 PSI TEST PRESSURE
 4. USE 24" C905 PVC EFFLUENT PIPE



- NOTES:**
1. INSTALL TEMPORARY PLUG, BACKFILL, AND MARK LOCATION WITH 8"x4"x4" WOOD POST WITH 24" PLE PAINTED LABEL. PAINT POST SAFETY ORANGE.
 2. INSTALL PROPRIETARY RESTRAINED JOINT DI 5.625" BEND AT END OF 24" PLE-DI PIPE.
 3. CONTRACTOR SHALL SUPPLY ALL REQUIRED PIPING COMPONENTS INCLUDING SHORT PIPE PROPRIETARY RESTRAINED JOINT SPOOL TO COMPLETE INSTALLATION.
 4. CONTRACTOR SHALL SUPPLY ANY PLUG ACCESSORIES NECESSARY FOR SPECIFIED PRESSURE TESTING.
 5. INSTALL (1) 18 FT LENGTH RJ DI PIPE WEST OF 90° BEND, AND RJ DI PIPE & FITTINGS TO INTERFACE WITH WWTP CONTRACT.
 6. USE 24"-PLE-DI
 7. PROVIDE 24" ELECTROFUSION COUPLING TO NEW 24" PLE EFFLUENT PIPE FROM WWTP CONTRACT.

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RECORD DRAWINGS

Revisions Drawn By K. R. WEIGUM Date 12/30/03

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 DR LJ WARE
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 APVD DT REYNOLDS

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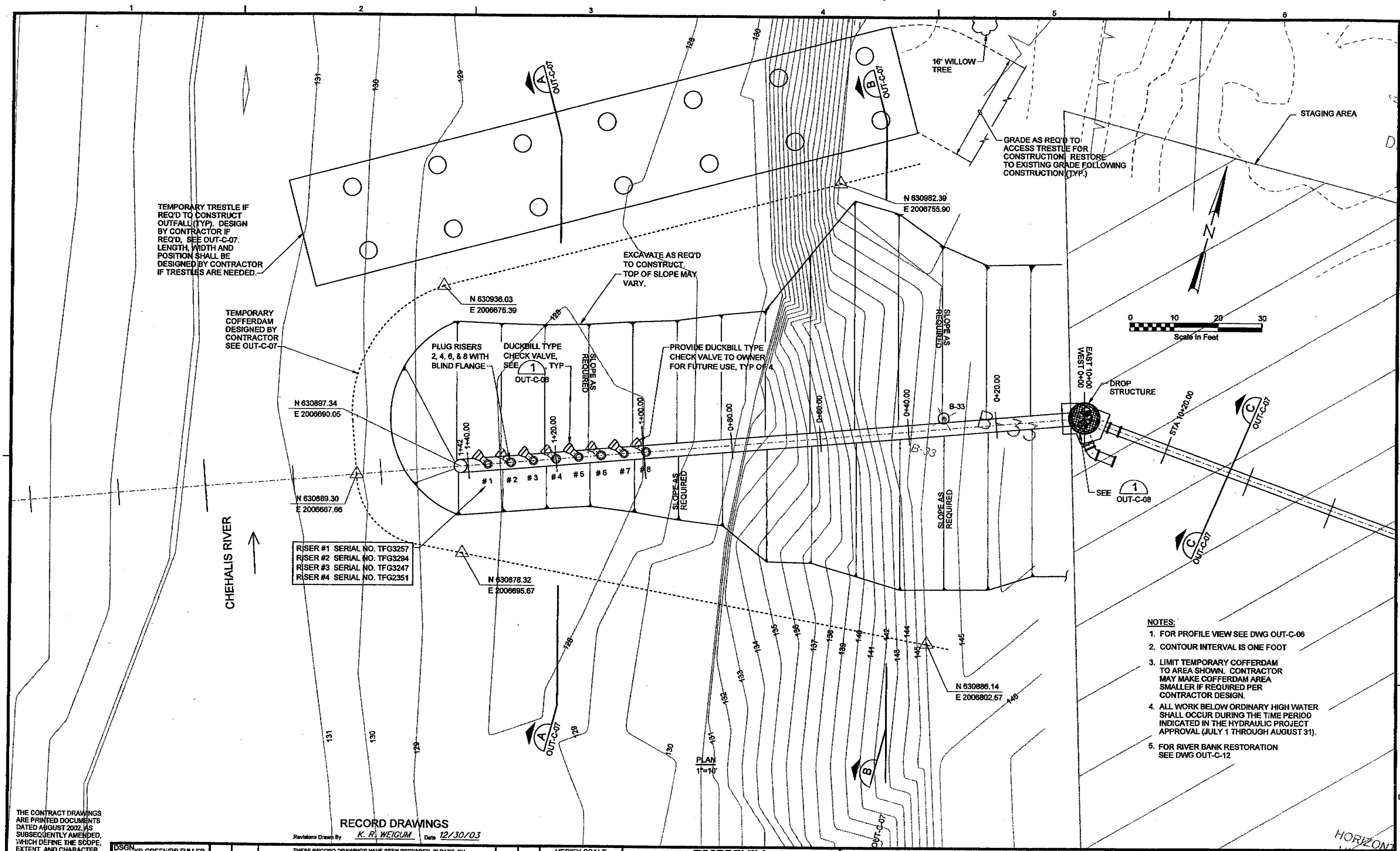
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WWTP OUTFALL
 CITY OF CENTRALIA UTILITIES
 CENTRALIA, WASHINGTON

CIVIL
OUTFALL
EFFLUENT PIPELINE
PLAN AND PROFILE

SHEET 8
DWG OUT-C-04
DATE AUGUST, 2002
PROJ 166367.0D



TEMPORARY TRESTLE IF REQ'D TO CONSTRUCT OUTFALL (TYP). DESIGN BY CONTRACTOR IF REQ'D. SEE OUT-C-07. LENGTH, WIDTH AND POSITION SHALL BE DESIGNED BY CONTRACTOR IF TRETTLES ARE NEEDED.

TEMPORARY COFFERDAM DESIGNED BY CONTRACTOR SEE OUT-C-07

EXCAVATE AS REQ'D TO CONSTRUCT. TOP OF SLOPE MAY VARY.

GRADE AS REQ'D TO ACCESS TRETTLE FOR CONSTRUCTION. RESTORE TO EXISTING GRADE FOLLOWING CONSTRUCTION (TYP.)

RISER #1 SERIAL NO. TFG3257
RISER #2 SERIAL NO. TFG3294
RISER #3 SERIAL NO. TFG3247
RISER #4 SERIAL NO. TFG2351

PLUG RISERS 2, 4, 6, & 8 WITH BLIND FLANGE

DUCKBILL TYPE CHECK VALVE, SEE 1 TYP

PROVIDE DUCKBILL TYPE CHECK VALVE TO OWNER FOR FUTURE USE, TYP OF 4

- NOTES:
1. FOR PROFILE VIEW SEE DWG OUT-C-06
 2. CONTOUR INTERVAL IS ONE FOOT
 3. LIMIT TEMPORARY COFFERDAM TO AREA SHOWN. CONTRACTOR MAY MAKE COFFERDAM AREA SMALLER IF REQUIRED PER CONTRACTOR DESIGN.
 4. ALL WORK BELOW ORDINARY HIGH WATER SHALL OCCUR DURING THE TIME PERIOD INDICATED IN THE HYDRAULIC PROJECT APPROVAL (JULY 1 THROUGH AUGUST 31).
 5. FOR RIVER BANK RESTORATION SEE DWG OUT-C-12

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RECORD DRAWINGS

Revisions Drawn By K. R. WEIGUM Date 12/30/03

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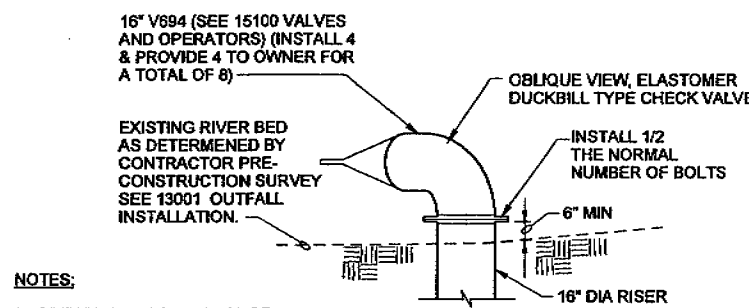
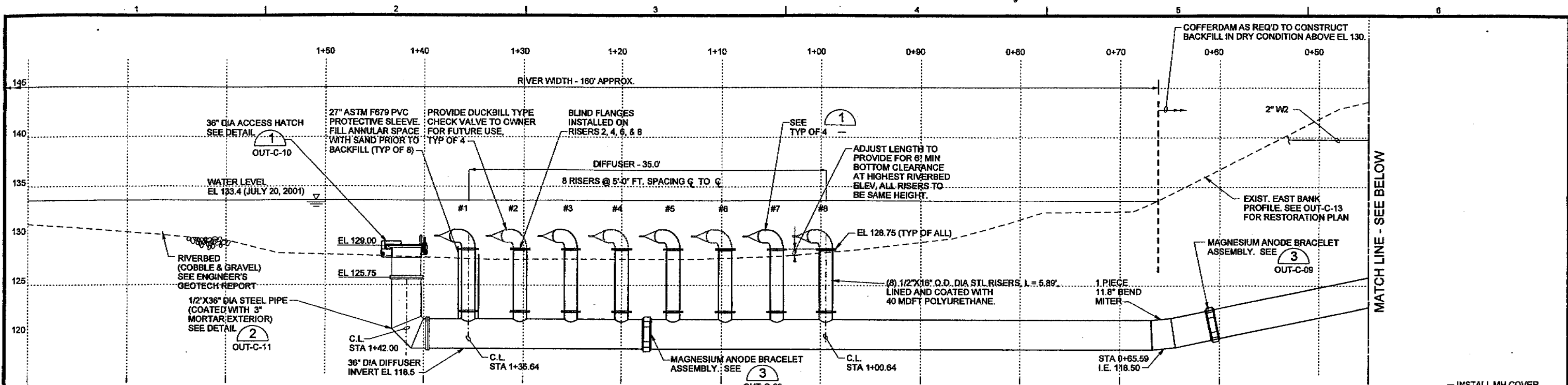
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CENTRALIA, WASHINGTON

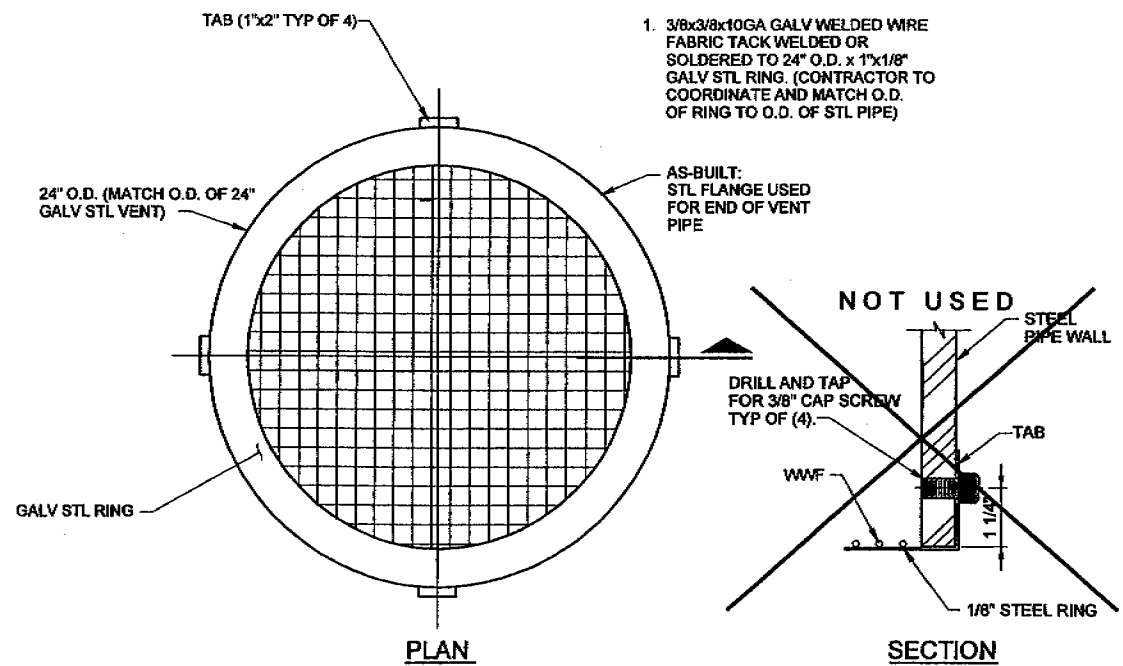
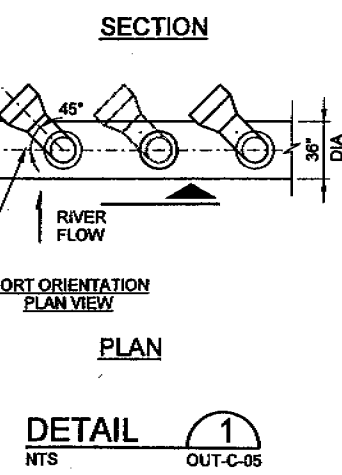
CIVIL
OUTFALL
COFFERDAM & EXCAVATION
PLAN

SHEET 9
DWG **OUT-C-05**
DATE AUGUST, 2002
PROJ 168367.0D

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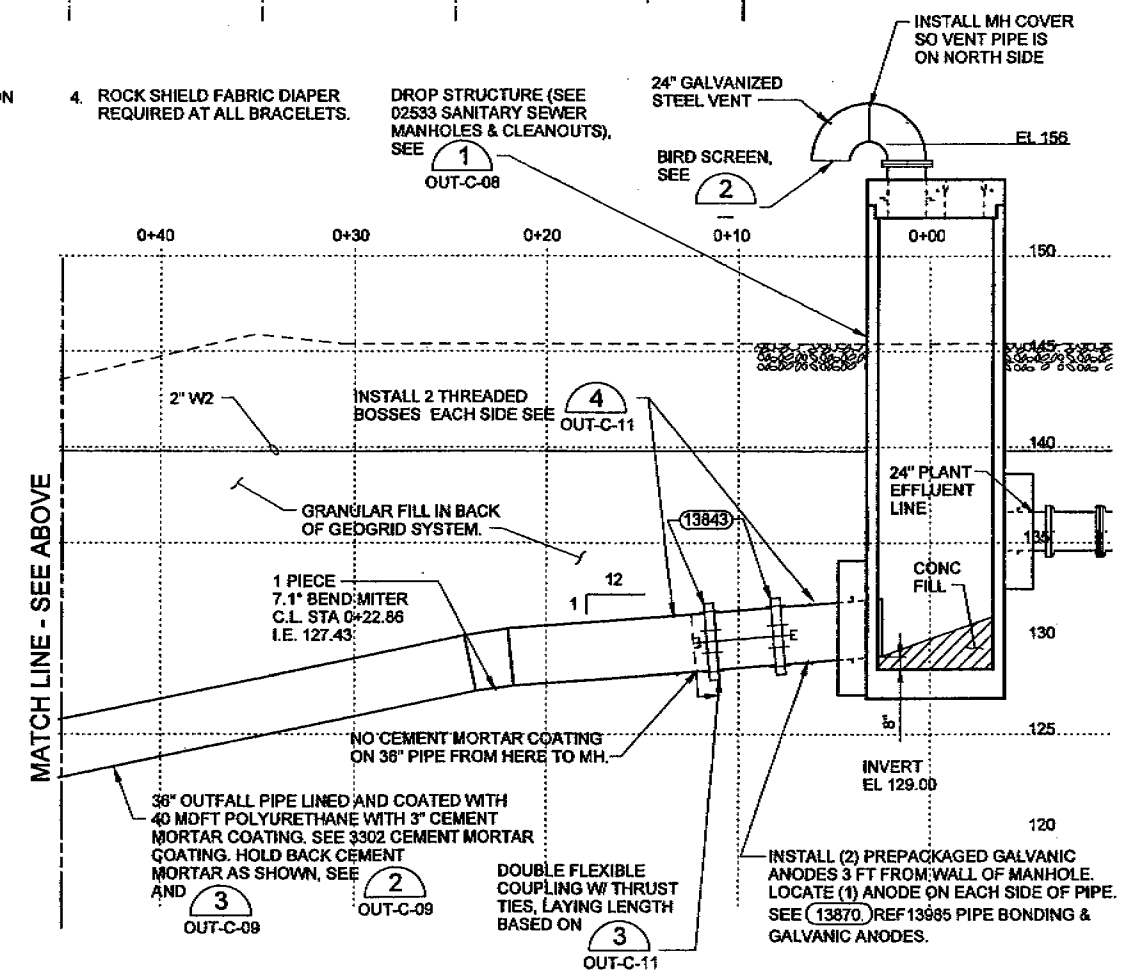
- NOTES:**
1. ORIENT V694 SO DISCHARGE END OF VALVE IS INSTALLED WITH WIDEST DIMENSION PARALLEL TO WATER SURFACE OF RIVER.
 2. ORIENT ELBOW AND VALVE SO DISCHARGE DIRECTION IS 45° TOWARD CENTER OF RIVER. (SEE PORT ORIENTATION PLAN VIEW)



BIRD SCREEN
 NTS

- NOTES:**
1. CONTRACTOR TO SELECT LOCATION OF PIPE JOINTS. (SEE NOTE 3)
 2. JOINT HARNESS ACROSS ALL PIPE JOINTS. SEE OUT-C-09
 3. JOINTS COVERS REQUIRED AT ALL JOINT HARNESS SEE 13001 OUTFALL INSTALLATION.
 4. ROCK SHIELD FABRIC DIAPER REQUIRED AT ALL BRACELETS.

- NOTE:**
1. 3/8"x3/8"x10GA GALV WELDED WIRE FABRIC TACK WELDED OR SOLDERED TO 24" O.D. x 1"x1/8" GALV STL RING. (CONTRACTOR TO COORDINATE AND MATCH O.D. OF RING TO O.D. OF STL PIPE)



OUTFALL DIFFUSER PROFILE
 1' = 5'

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DSGN	RB FULLER
DR	LJ WARE
CHK	GR GRAHAM
APVD	DT REYNOLDS

NO.	DATE	REVISION	BY	APVD

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WWTP OUTFALL
 CITY OF CENTRALIA UTILITIES
 CENTRALIA, WASHINGTON

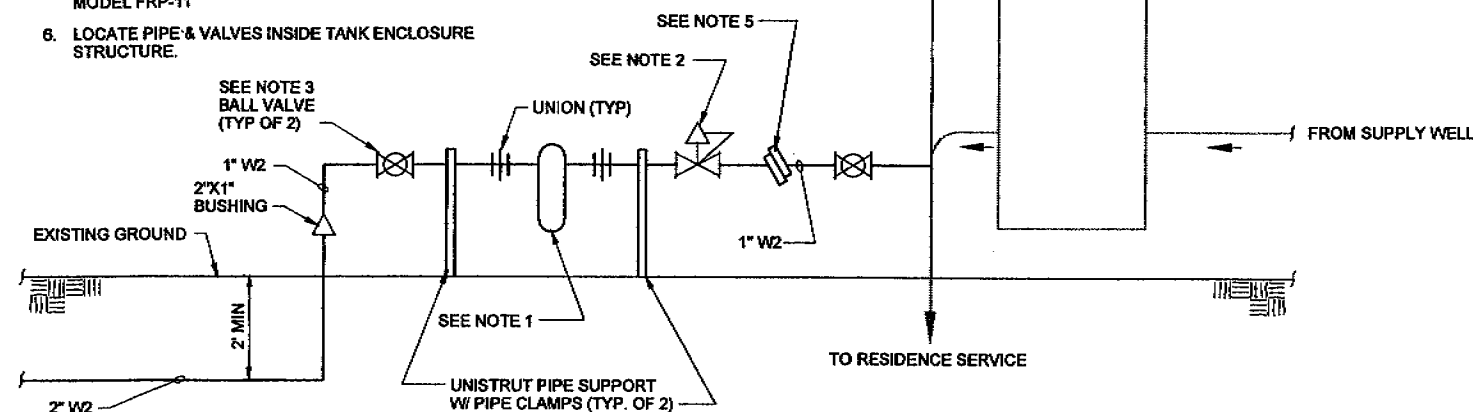
CIVIL
OUTFALL DIFFUSER SECTIONS AND DETAILS

SHEET	10
DWG	OUT-C-06
DATE	AUGUST, 2002
PROJ	166367.00

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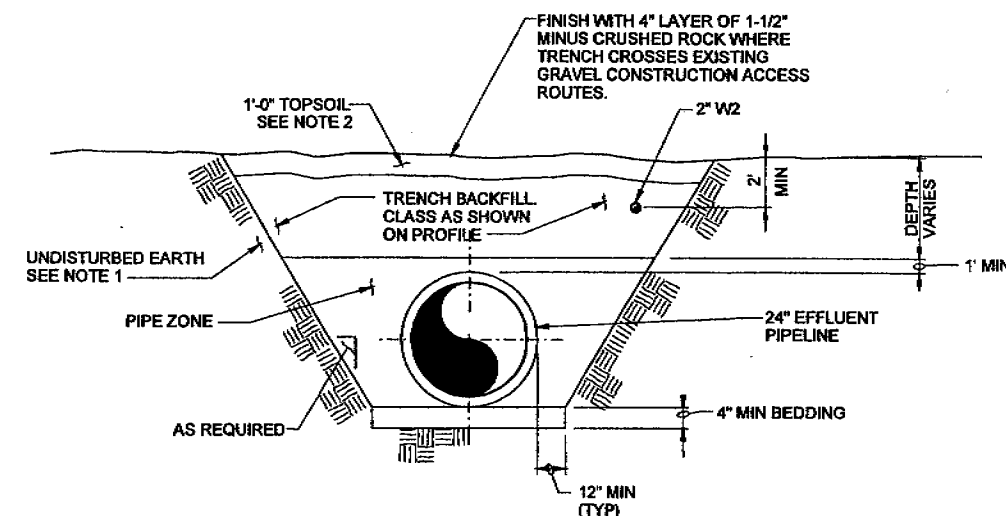
NOTES:

1. INSTALL 1" DISK FILTER (#120 MESH) WITH PURGE PETCOCK. NETA-FIM 1-INCH DISK FILTER (#120) OR EQUAL.
2. INSTALL 1" PRESSURE REDUCING VALVE RATED 0-100 PSI. SET AT 50 PSI. FISHER TYPE 75 OR WATTS NO 223, OR EQUAL.
3. INSTALL (2) BALL VALVES NIBCO, S-585.70 OR EQUAL.
4. COPPER TUBING AND PIPE SHALL BE USED ABOVE GRADE. USE SCH 80 PVC PIPE BELOW GRADE.
5. INSTALL 1" BACKFLOW PREVENTER CLA-VAL CO. CLAYTON RD-1 OR HERSEY PRODUCTS BEECO MODEL FRP-11
6. LOCATE PIPE & VALVES INSIDE TANK ENCLOSURE STRUCTURE.



OUTFALL IRRIGATION CONNECTION DETAIL
NTS

1
OUT-C-04

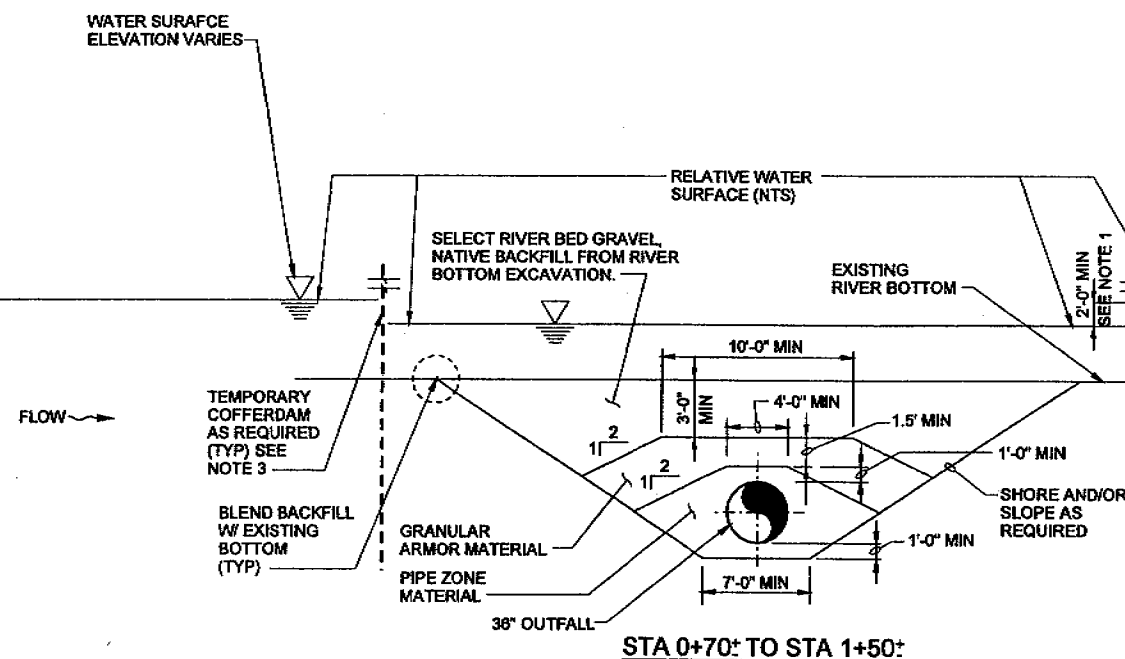


NOTES:

1. EXCAVATION SIDE SLOPES ARE SHOWN SCHEMATICALLY TO ILLUSTRATE BACKFILL ZONES. BY SCHEMATICALLY SHOWING SIDE SLOPES, THE ENGINEER IS NOT INTENDING ANY PARTICULAR SLOPE SHALL BE USED, OR WILL BE STABLE. CONTRACTOR TO DETERMINE ALL OUT SLOPES AND TRENCH SAFETY MEASURES IN CONFORMANCE WITH ALL APPLICABLE SAFETY REGULATIONS.
2. WITHIN TRENCH AREA, REMOVE AND DISPOSE OF VEGETATION AND ROOTS. THEN REMOVE TOP 1'-0" OF SOIL AND STOCKPILE SEPARATELY. REPLACE TOPSOIL IN TOP OF TRENCH EXCEPT WHERE TRENCH CROSSES EXISTING GRAVEL CONSTRUCTION ACCESS ROAD. SEED WITH MEADOW / CROP MIX ALL DISTURBED AREA EXCEPT GRAVELED AREAS.

EFFLUENT PIPELINE
TYPICAL TRENCH SECTION
EAST OF DROP STRUCTURE
NTS

OUT-C-02 - OUT-C-05



NOTES:

1. CONSTRUCT OUTFALL PIPE BY WORKING UNDER WATER AS SHOWN.
2. DURING CONSTRUCTION, LOWER WATER 2'-0" MIN. AS REQ'D TO PREVENT RELEASE OF TURBID WATER THROUGH JOINTS IN SHEET PILE.
3. TYPE OF COFFERDAM AND DESIGN SHALL BE SELECTED BY CONTRACTOR.

NOTE:

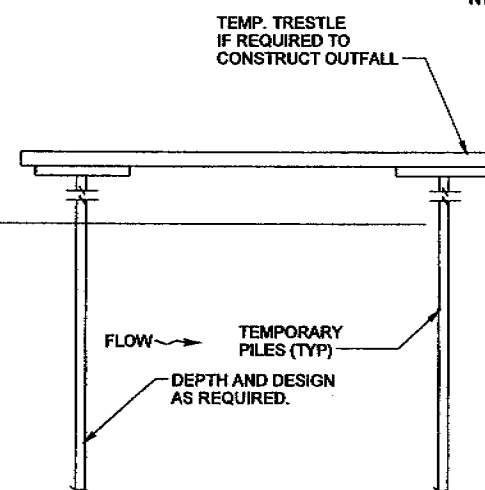
AREA INSIDE COFFERDAM WAS DEWATERED SO ALL WORK WAS DONE IN THE DRY.

SECTION IN RIVER
NTS

RECORD DRAWINGS

Revisions Drawn By K. R. WEIGUM Date 12/30/03

A
OUT-C-05



NOTES:

1. CONSTRUCT OUTFALL PIPE BY WORKING UNDER WATER AS SHOWN.
2. DURING CONSTRUCTION, LOWER WATER 2'-0" MIN. AS REQ'D TO PREVENT RELEASE OF TURBID WATER THROUGH JOINTS IN SHEET PILE.

NOTE:

AREA INSIDE COFFERDAM WAS DEWATERED SO ALL WORK WAS DONE IN THE DRY.

SECTION ONSHORE
NTS

B
OUT-C-05

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DR	KR WEIGUM
CHK	GR GRAHAM
APVD	DT REYNOLDS

NO. DATE

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BY APVD

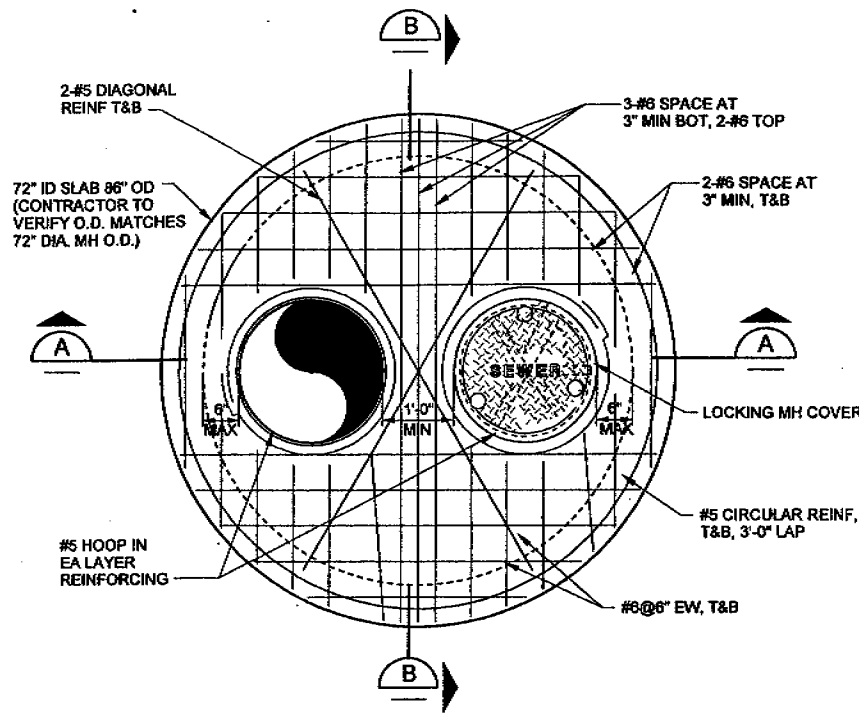
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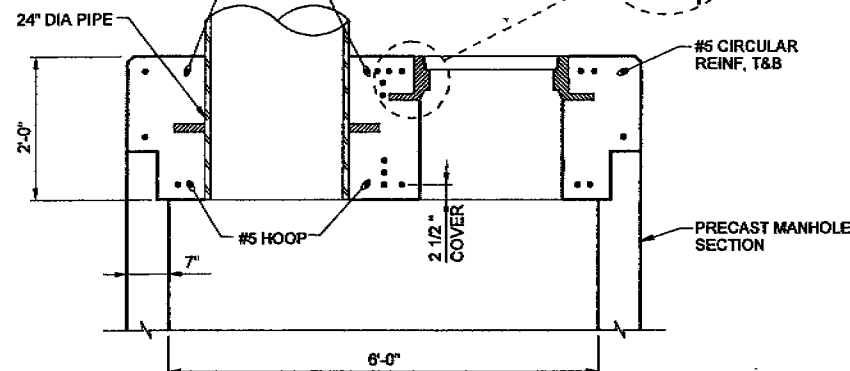
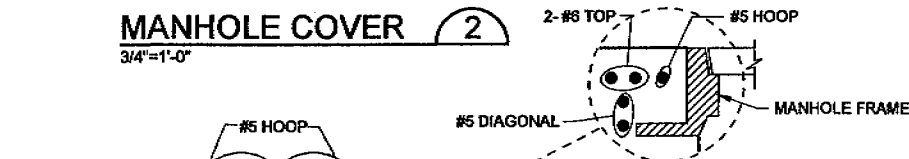
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OUTFALL
COFFERDAM & EXCAVATION
SECTIONS AND DETAILS

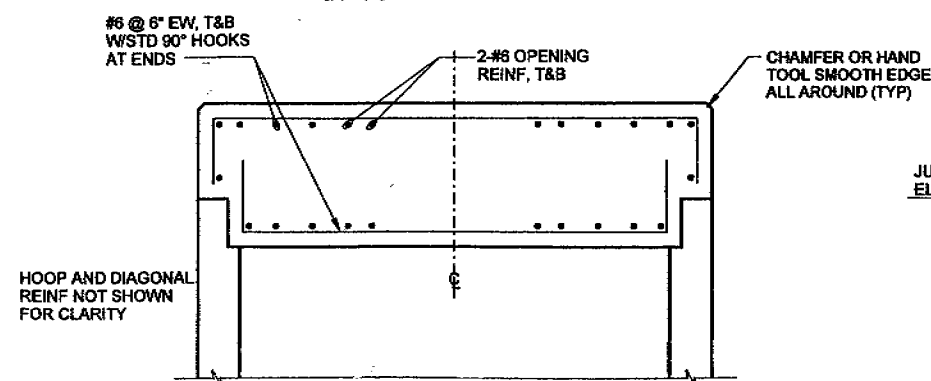
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DWG OUT-C-07
DATE AUGUST, 2002
PROJ 166367.0D



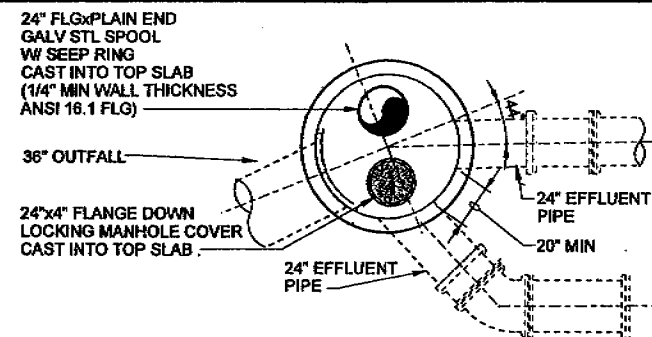
MANHOLE COVER 2
3/4"=1'-0"



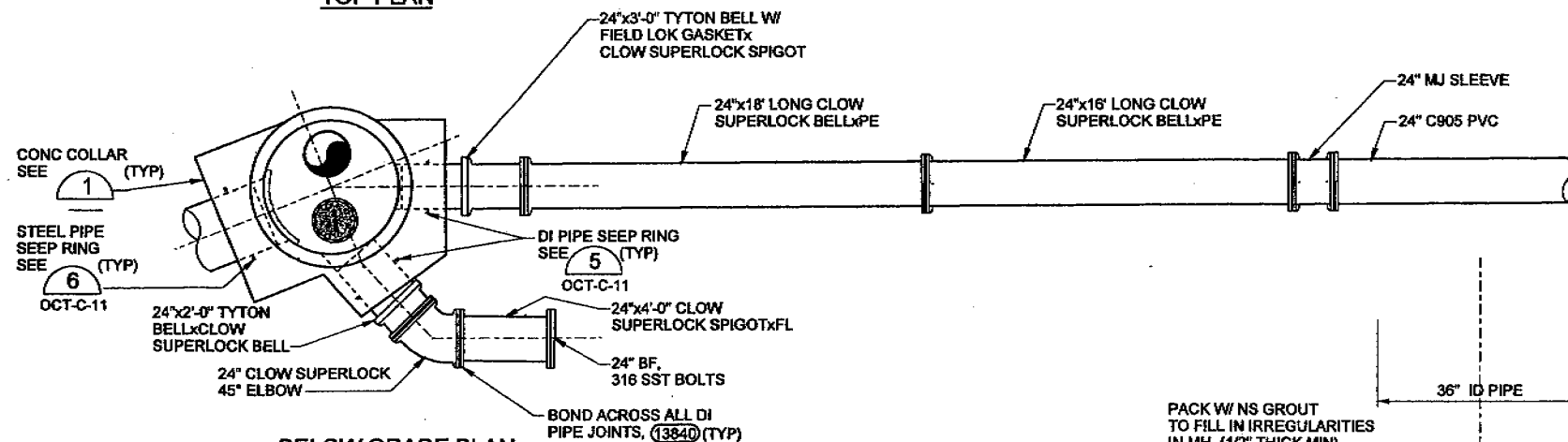
SECTION A
3/4"=1'-0"



SECTION B
3/4"=1'-0"

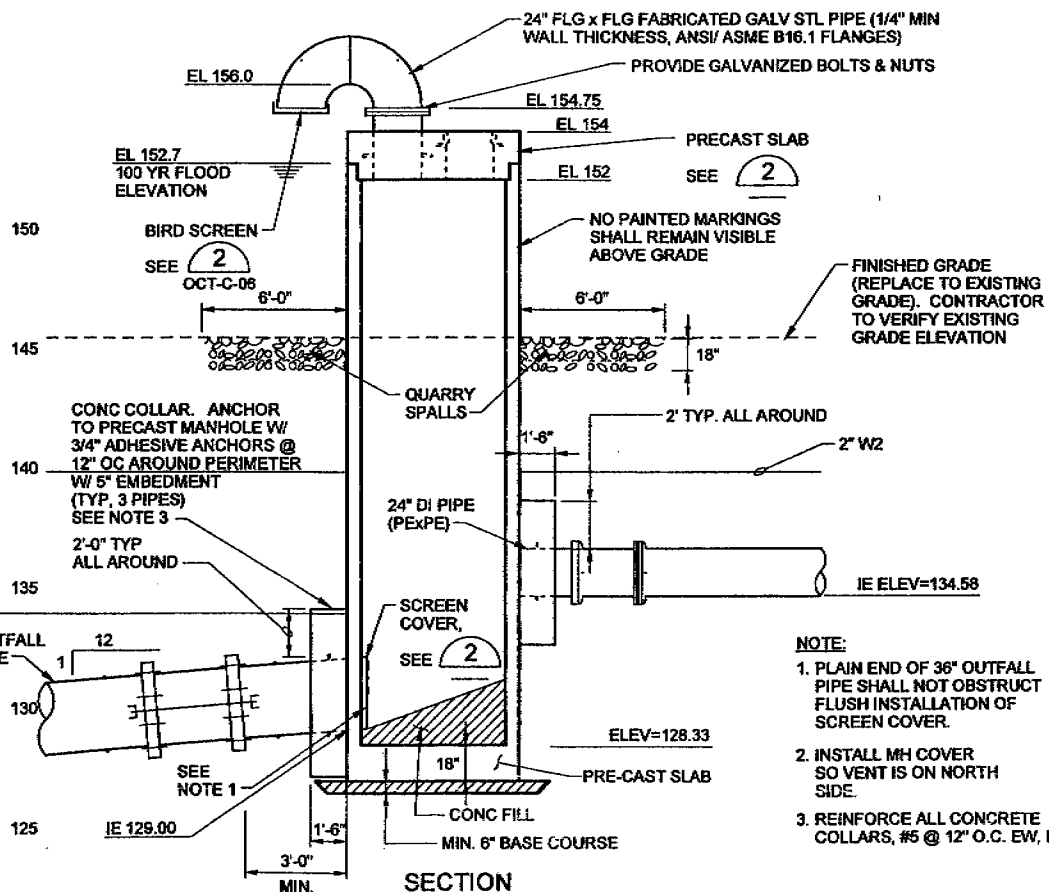


TOP PLAN

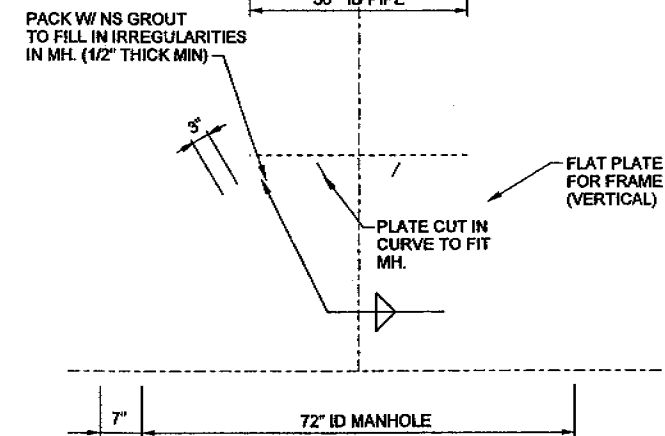


BELOW GRADE PLAN

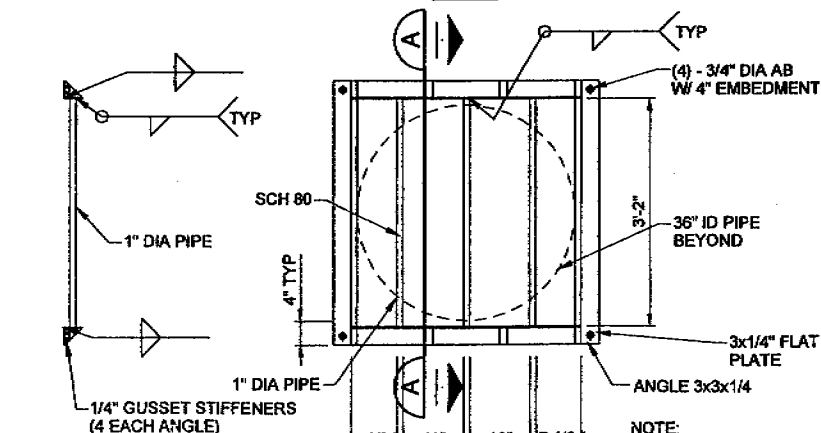
SEE AS-BUILT PHOTO ON DWG OUT-G-02



SECTION



PLAN



SECTION A

STL PIPE BAR SCREEN 2
3/4"=1'-0"

- NOTE:**
1. PLAIN END OF 36" OUTFALL PIPE SHALL NOT OBSTRUCT FLUSH INSTALLATION OF SCREEN COVER.
 2. INSTALL MH COVER SO VENT IS ON NORTH SIDE.
 3. REINFORCE ALL CONCRETE COLLARS, #5 @ 12" O.C. EW, EF.

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DR LJ WARE
CHK GR GRAHAM
APVD DT REYNOLDS

NO. DATE

RECORD DRAWINGS
Revisions Drawn By K. R. WEIGUM Date 12/30/03

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REVISION

BY

APVD

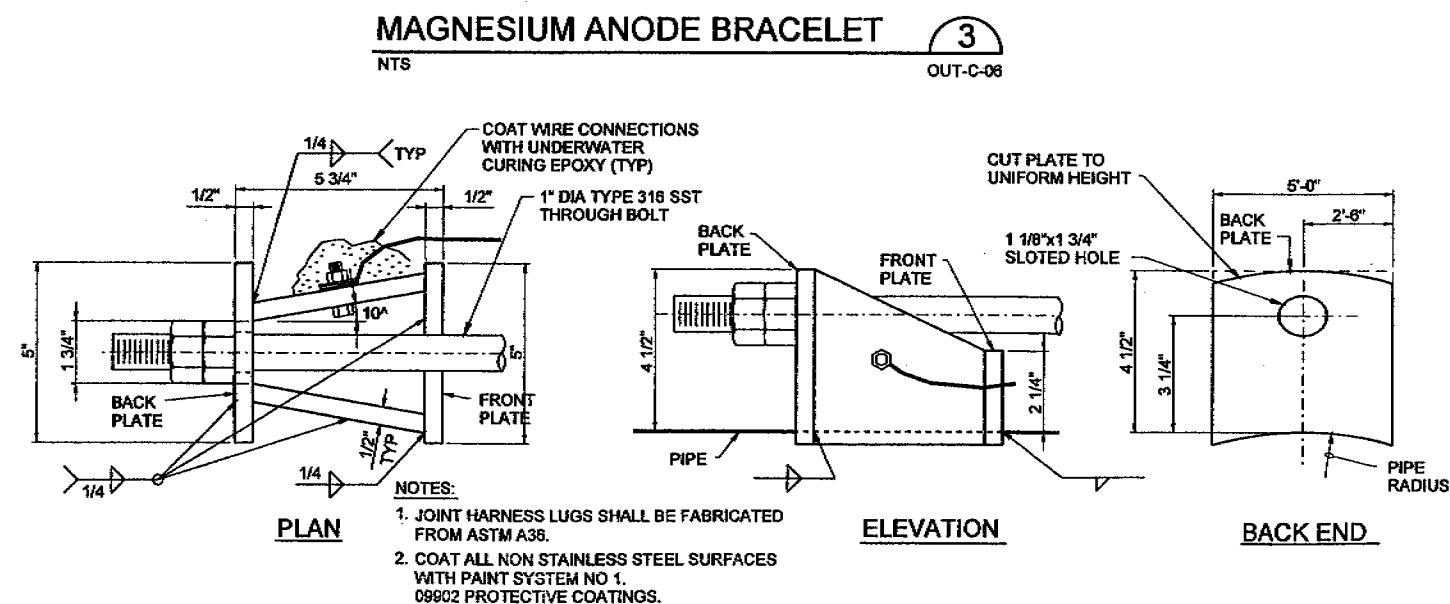
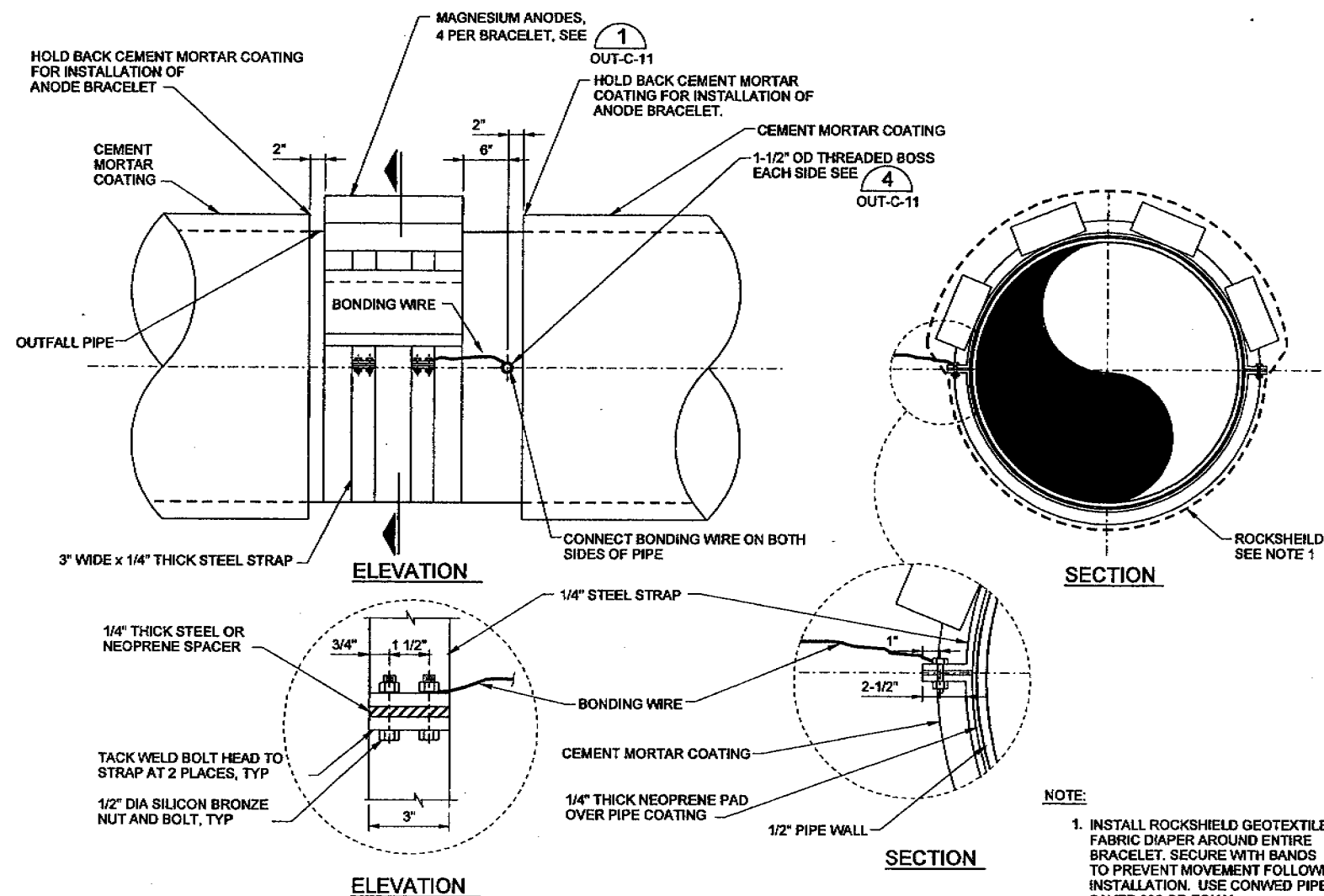
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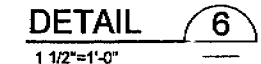
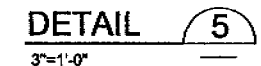
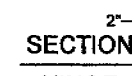
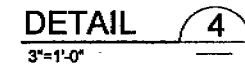
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SHEET 12
DWG OUT-C-08
DATE AUGUST, 2002
PROJ 166387.0D



SHEET	13
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DATE	AUGUST, 2002
PROJ	166367 CD

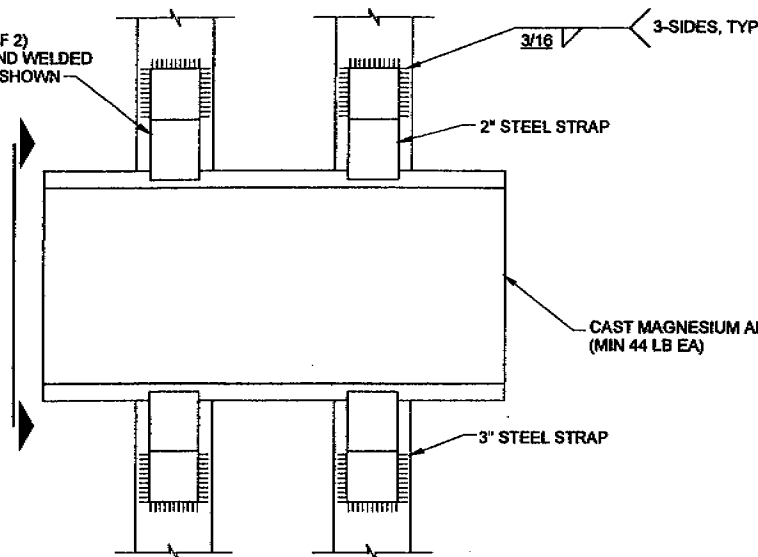


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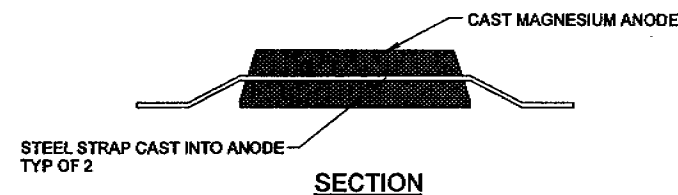
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STEEL STRAP (TYP OF 2)
CAST INTO ANODE AND WELDED
TO STEEL STRAP AS SHOWN



PLAN



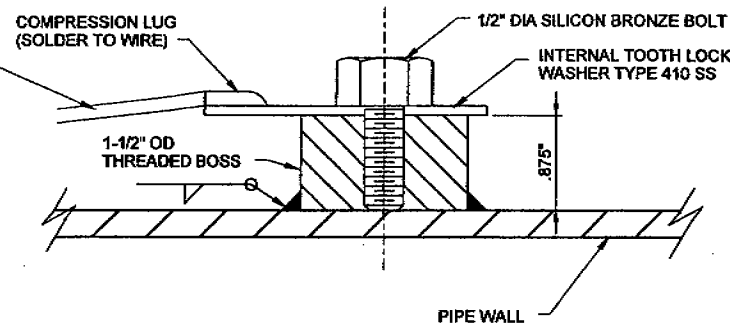
SECTION

CAST MAGNESIUM ANODE

NTS

1
OUT-C-09

(2) #10 AWG BOND WIRE
#8 AWG TEST STATION
WIRE OR ZINC ANODE TABE



NOTE:

1. COAT PIPE AFTER WELDING BOSS (PIPE COATING NOT SHOWN)
2. FILE TOP OF BOSS TO BRIGHT METAL BEFORE INSTALLING LUG (OR ANODE) AND BOLT.
3. TIGHTEN BOLT TO 40 FOOT POUNDS OF TORQUE WITH AN ACCURATE TORQUE WRENCH.
4. COAT ALL EXPOSED METAL AFTER CONNECTIONS ARE COMPLETED WITH UNDERWATER CURING EPOXY PER SYSTEM 50 03902 PROTECTIVE COATINGS.

BOLT WIRE AND ANODE CONNECTION

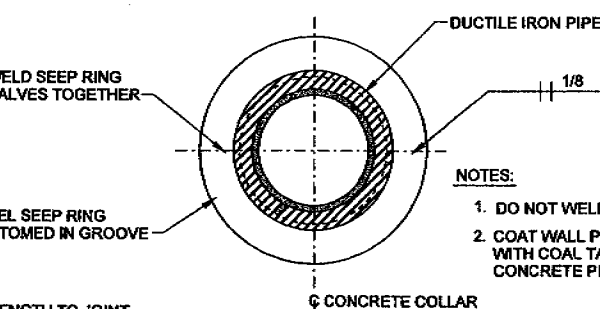
NTS

4
OUT-C-09

CEMENT MORTAR COATING

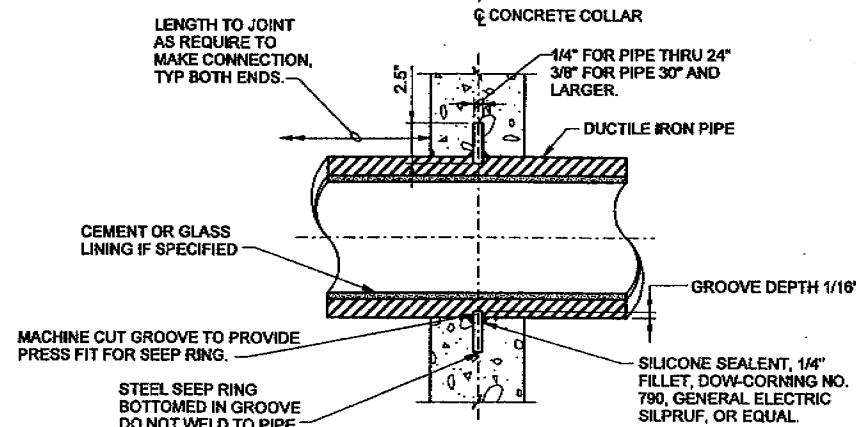
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2
OUT-C-06



NOTES:

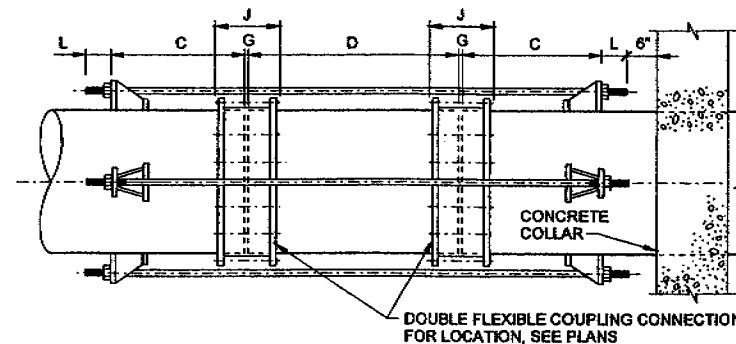
1. DO NOT WELD SEEP RING TO PIPE.
2. COAT WALL PIPE AFTER FABRICATION WITH COAL TAR EPOXY PRIOR TO CONCRETE PLACEMENT.



DUCTILE IRON SEEP RING

NTS

5
OUT-C-08



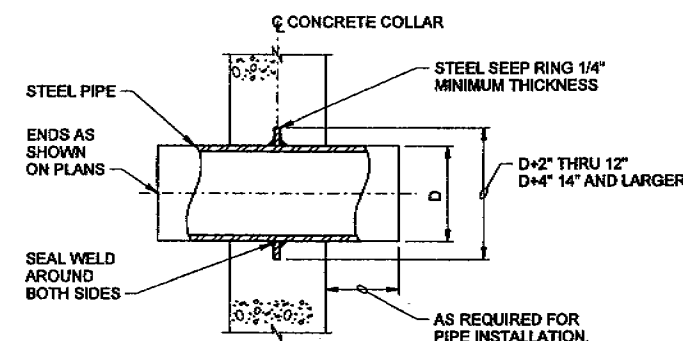
NOTES:

1. THE MIDDLE RING LENGTH OF THE FLEXIBLE COUPLING SHALL BE AS SPECIFIED.
2. THE CONTRACTOR SHALL DETERMINE THE LENGTH "J" (COUPLING BOLT LENGTH) FROM MANUFACTURER'S CATALOGS USING THE SPECIFIED MIDDLE RING LENGTH.
3. G = MANUFACTURER'S RECOMMENDED SPACE BETWEEN ENDS OF PIPE.
4. C = J+5.75+1 INCH, (ROUND THIS VALUE UP TO NEXT EVEN INCH), MINIMUM.
5. D = 2C+6 INCHES.
6. TIE ROD LENGTH = 8+2C+2G+D.
7. SIMILAR, TO TYPICAL THRUST TIE DETAIL EXCEPT AS NOTED.
8. TIE ROD NUTS SHALL BE TIGHTENED GRADUALLY AND EQUALLY IN STAGES TO PREVENT UNEVEN ALIGNMENT AND TO ALLOW EQUAL STRESS ON ALL TIE RODS UNDER PRESSURE. TIGHTEN UNTIL SNUG. THREADS SHALL PROTRUDE FROM NUTS. PEEN THREADS AFTER TIGHTENING NUTS.
9. TIE ROD LUGS SHALL BE SPACED EQUALLY AROUND PIPE.
10. CATHODIC PROTECTION FOR FLEXIBLE COUPLINGS REQUIRED WHERE NOTED ON DWGS OR IN THE SPECIFICATIONS.
11. 4 RODS REQUIRED, 1" DIAMETER, CARBON STEEL WITH FUSION BONDED EPOXY, OR 316 SST.

SPECIAL THRUST TIE FOR STEEL PIPE

NTS

3
OUT-C-06



NOTES:

1. LINE AND COAT PIPE AS SPECIFIED FOLLOWING SEEP RING INSTALLATION.

STEEL PIPE SEEP RING

NTS

6
OUT-C-08

RECORD DRAWINGS

Revisions Drawn By K. R. WEIGUM Date 12/30/03

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SHEET 15
DWG **OUT-C-11**
DATE AUGUST, 2002
PROJ 166367.00

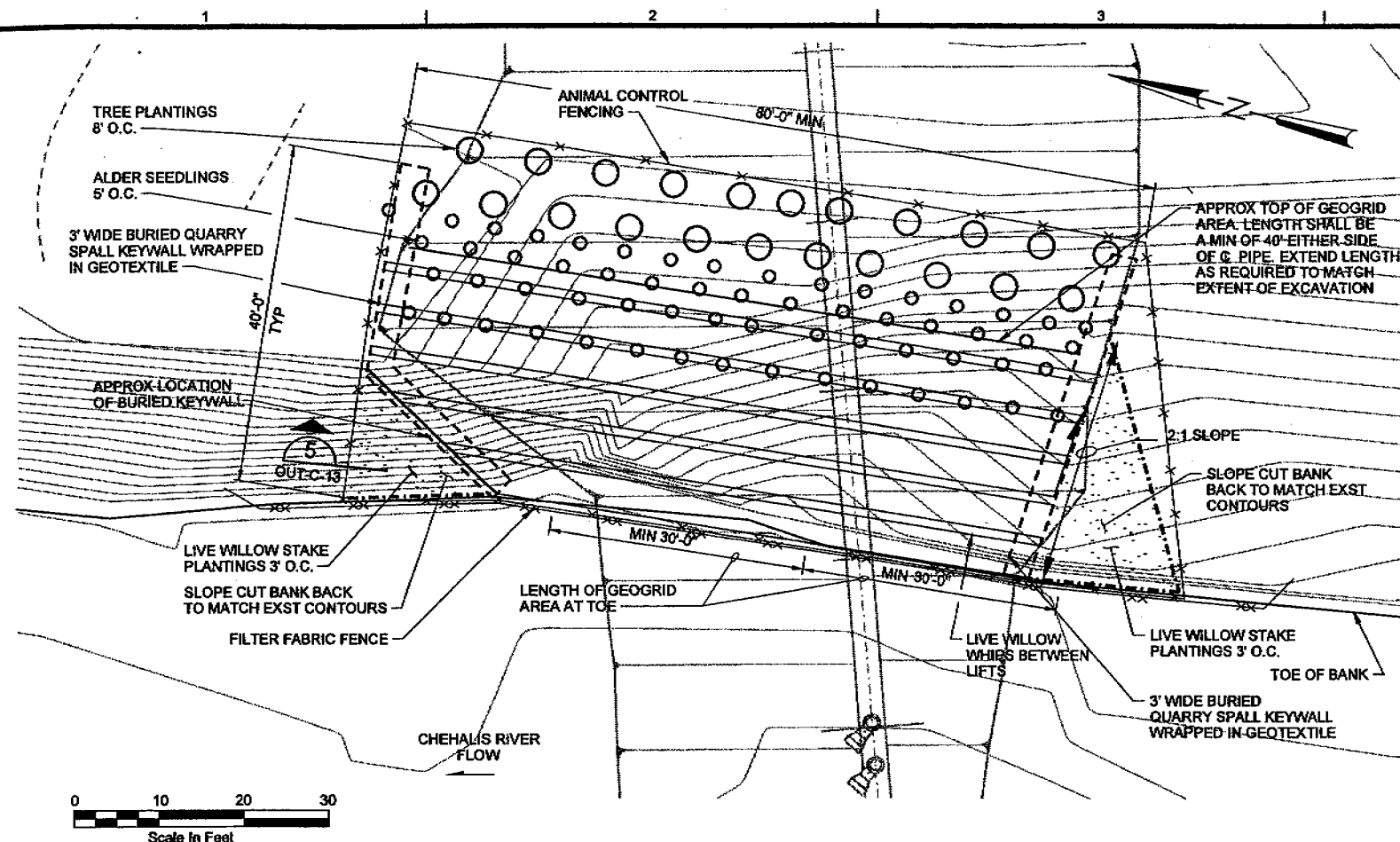
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APVD DT REYNOLDS

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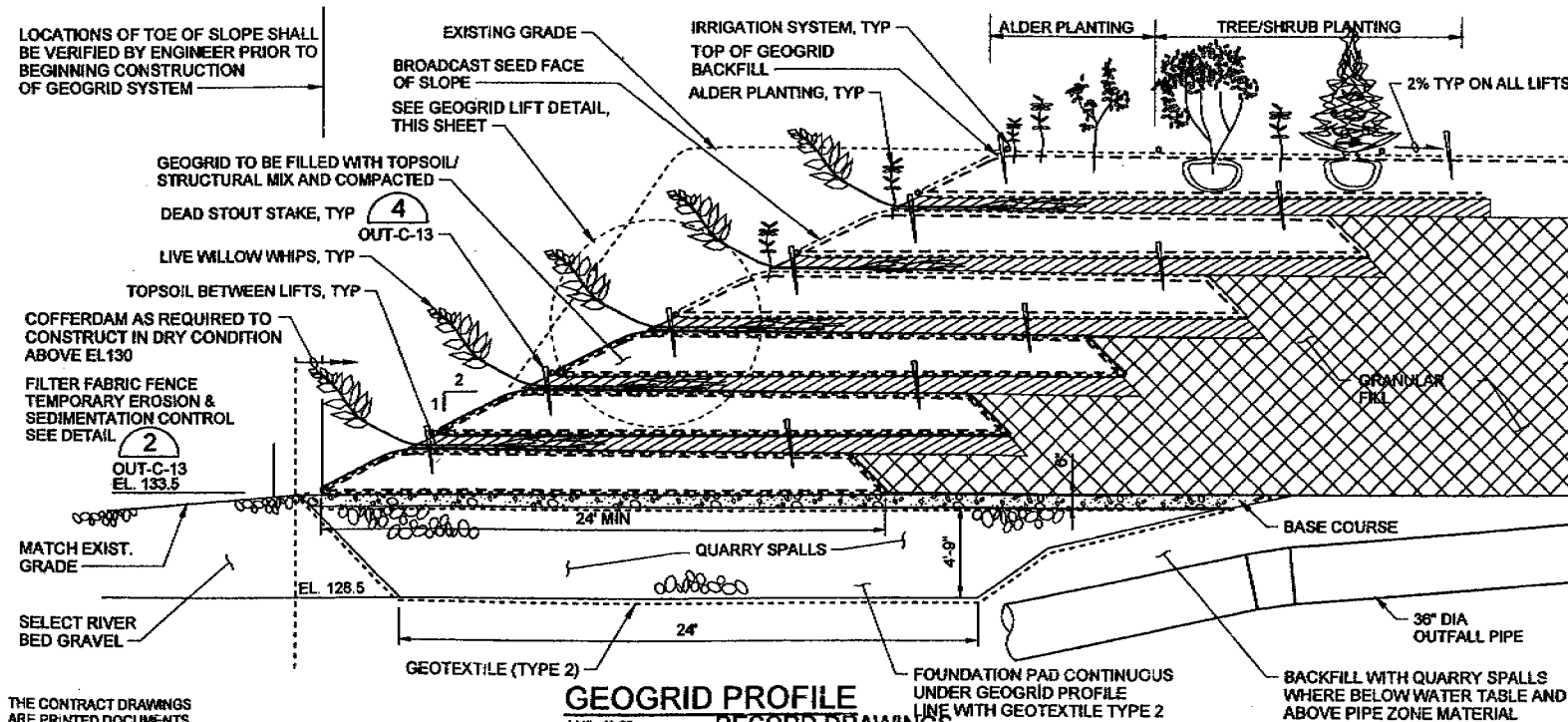
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GEOGRID PLAN

GEOGRID SYSTEM NOTES:

1. REFER TO 02930 RIVER BANK RESTORATION FOR SPECIAL REQUIREMENTS.
2. THE TOP SURFACE OF THE FOUNDATION PAD SHALL BE FLUSH WITH THE TOE OF BANK.
3. PLACE QUARRY SPALLS WITH AN EXCAVATOR, DROPPING THEM FROM A HEIGHT OF 3 FEET OR LESS.
4. THE TOP OF THE FOUNDATION PAD SHALL BE COVERED WITH A 6- INCH THICK LAYER BASE COURSE TO PLUG VOIDS AND TO PROVIDE A SMOOTH SURFACE FOR CONSTRUCTION.
5. THE GEOGRID SYSTEM SHALL BE INSTALLED AS A SERIES OF INDIVIDUAL LIFTS, WITH EACH SUCCESSIVE LIFT INSTALLED DIRECTLY ON TOP OF, AND OFFSET LANDWARD FROM, THE PREVIOUS LIFT. ALL FABRICS SHALL BE INSTALLED WITH LONG AXIS OF ROLL (LENGTH) ALIGNED PERPENDICULAR TO SHORELINE. SEAMS OF ALL FABRICS SHALL OVERLAP NO LESS THAN 3 FEET AT LAPS PARALLEL TO THE SLOPE. BETWEEN EACH SUCCESSIVE LIFT A COURSE OF LIVE WILLOW CUTTING WHIPS WITH TOPSOIL SHALL BE INSTALLED AT A DENSITY OF 6 WHIPS PER LINEAL FOOT. ALDER PLUGS SHALL BE PLANTED AT INCREMENTS OF 10'-0" ALONG EACH OF THE THREE UPPER LIFTS.
6. THE BANK RESTORATION COIR MATTING SHALL BE INSTALLED PERPENDICULAR TO THE SHORELINE. THIS CAN BE ACCOMPLISHED BY USING A COMBINATION OF 11.1 FOOT (4 METER) AND 9.8 FOOT (3 METER) WIDE ROLLS OF MATTING. ALL OVERLAPS OF EDGES PARALLEL TO THE SHORELINE SHALL BE 3 FEET MINIMUM. EXCESS MATTING SHALL BE ALLOWED TO DRAPE OUTSIDE THE GEOGRID PRIOR TO WRAPPING. THE BANK RESTORATION EROSION CONTROL MATTING SHALL BE INSTALLED AS INDICATED IN NOTE 6 AND THEN THE GEOGRID BACKFILL PLACED AND COMPACTED AS DISCUSSED BELOW. ONCE COMPLETED THE DRAPED COIRMAT AND OTHER FABRICS SHALL BE FOLDED OVER THE TOP OF THE GEOGRID AND STAKED IN PLACE EVERY 5 FEET, SEE **OUT-C-13** 4-6 INCHES OF TOPSOIL AND LIVE WILLOW WHIPS SHALL BE PLACED AND THE GEOGRID LIFT CONSTRUCTION PROCESS CONTINUED.
7. THE BANK RESTORATION COIR MATTING SHALL BE INSTALLED USING A COMBINATION OF 2, 9.8 AND/OR 11.1 FOOT WIDE ROLLS. OVERLAPPING WIDTH AND LOCATION AT LAPS SHALL BE AS INDICATED IN NOTE 4 FOR THE GEOGRID SYSTEM UNDER THE ADJOINING UPPER AND LOWER LIFTS.
8. THE GEOGRID REINFORCEMENT FOR THE FIRST THREE LIFTS (FROM BOTTOM) SHALL BE HUESKER FORTRAC 35/20-20 OR EQUAL. PLACED PERPENDICULAR TO THE SLOPE. GEOGRID REINFORCEMENT SHALL BE PLACED USING 9.8 OR 11.1 FOOT WIDE ROLLS AS REQUIRED, OVERLAPPING WIDTH AND LOCATION AT LAPS SHALL BE AS INDICATED IN NOTE 4. NOTE THAT THE FACE OF THE LOWER LIFTS ARE COMPLETELY WRAPPED IN GEOGRID REINFORCEMENT. (SEE GEOGRID LIFT DETAIL)
9. THE GEOGRID SYSTEM SHALL BE CONSTRUCTED AS FOLLOWS ASSUMING A GEOGRID LIFT HEIGHT OF 2'-0". LAY THE BANK RESTORATION COIR MATTING AND THE BANK RESTORATION EROSION CONTROL BLANKET, WITH GEOGRID REINFORCEMENT. INSTALL THE GEOGRID BACKFILL, COMPACT AND WATER. GRADUALLY ADD WATER TO THE SOIL MIX DURING ASSEMBLY TO ACHIEVE A RELATIVELY HOMOGENEOUS MIX. TAMP/COMPACT OVERALL LIFT TO TIGHT, SMOOTH FINISH USING EXCAVATOR BUCKET OR PLATE VIBRATOR. WRAP AND STAKE FABRICS. REPEAT PROCESS FOR FOLLOWING 2 LIFTS. TOP 3 LIFTS SHALL BE CONSTRUCTED IDENTICALLY OMITTING GEOGRID REINFORCEMENT.
10. LAWN SEED MIX SHALL BE INCREMENTALLY BROADCAST APPLIED OVER THE FACE OF THE GEOGRID AS SOIL FILL IS ADVANCED INTO THE LIFT ENVELOPE.
11. TIGHTEN FABRICS AND ANCHOR WITH DEAD STOUT STAKES DRIVEN ON 8-FOOT CENTERS ALONG LANDWARD EDGE OF GEOGRID FABRICS, THROUGH ALL FABRIC SEAMS CREATED BY JUNCTION POINTS IN ROLLS, AND THROUGHOUT UNDERSIDE AND FACIA PORTIONS OF THE GEOGRID LIFT AS REQUIRED.
12. TOP LAYER OF BANK RESTORATION EROSION CONTROL MATTING AND BANK RESTORATION COIR MATTING SHALL BE KEYED INTO EARTH AT THEIR LANDWARD EDGE BY MEANS OF A COMBINED TRENCH AND DEAD STOUT STAKE ASSEMBLY. TRENCH SHALL BE 6 INCHES DEEP AND 6 INCHES WIDE. DEAD STOUT STAKE SHALL BE DRIVEN THROUGH FABRIC AND THEN TRENCH BACKFILLED.
13. FENCING SHALL BE INSTALLED AROUND THE ENTIRE PERIPHERY OF THE CONSTRUCTED VEGETATED GEOGRID AND CUT BANKS TO RESTRICT ANIMAL GRAZING AND BROWSING IMMEDIATELY FOLLOWING PLANTING. FENCING SHALL BE 4FT MIN., GALVANIZED 4" x 4" W2.9 x W2.9 (6 GAUGE WIRE) WELDED WIRE MESH ANCHORED WITH 7 FOOT (1.25 LBS/FT MIN.) PAINTED STEEL T-POSTS (2FT. EMBEDMENT) COMPLETE WITH ALL FENCING HARDWARE. AT THE TOE OF SLOPE, FENCING SHALL BE INSTALLED PARALLEL TO AND LANDWARD OF FILTER FABRIC FENCE TO RESTRICT ANIMAL ACCESS TO NEWLY ESTABLISHED VEGETATION. SUBMIT FENCING PRODUCTS AND INSTALLATION DETAILS IN ACCORDANCE WITH 01300 SUBMITTALS. FENCING TO REMAIN FOLLOWING CONSTRUCTION AND WILL BE REMOVED BY OWNER AT LATER DATE.
14. GEOGRID SYSTEM SHALL REQUIRE TEMPORARY IRRIGATION AND MONITORING AFTER INSTALLATION TO ASSURE SUCCESSFUL ESTABLISHMENT OF VEGETATION. GEOGRID SYSTEM SHALL BE IRRIGATED UNTIL THE VEGETATION IS ESTABLISHED AND VIGOROUS. PERIODS OF IRRIGATION WILL DEPEND ON WEATHER CONDITIONS. MORTALITY SHALL ALSO BE MONITORED. SIGNS OF TOE EROSION, SOIL PUMPING, SETTLEMENT, AND EROSION SHALL BE MONITORED.
15. CUT BANKS ADJACENT TO GEOGRID SYSTEM SHALL BE GRADED TO PROVIDE A 2:1 MIN TRANSITION FROM GEOGRID TO EXISTING RIVER BANK CONTOURS. LAWN SEED SHALL BE INCREMENTALLY BROADCAST APPLIED OVER THE FACE OF THE CUT BANK AND PLANTED WITH WILLOW STAKES 3 FT. O.C.
16. SEE DRAWING OUT-C-13 FOR ADDITIONAL GEOGRID AND SITE SEEDING AND VEGETATION NOTES AND INSTALLATION DETAILS.



**GEOGRID PROFILE
RECORD DRAWINGS**

Revisions Drawn By **K. R. WEIGUM** Date **12/30/03**

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DR **CC DANNETT/ELL**
CHK **MW DAVIS**
APVD **DT REYNOLDS**

NO.	DATE	REVISION	BY	APVD

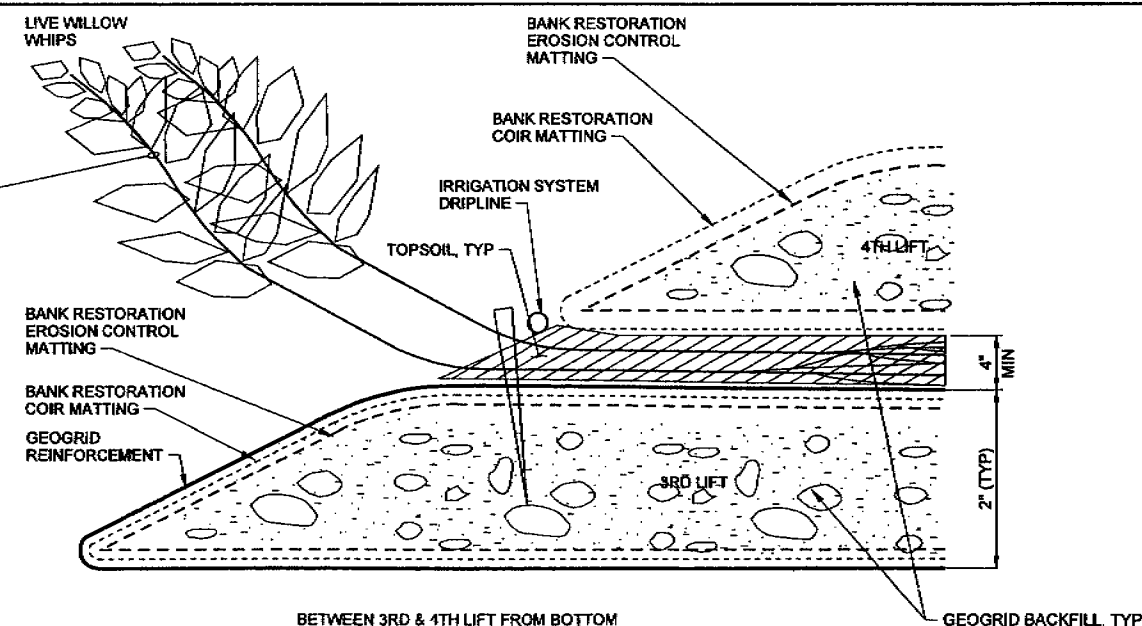
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SHEET **16**
DWG **OUT-C-12**
DATE **AUGUST, 2002**
PROJ **166367.0D**

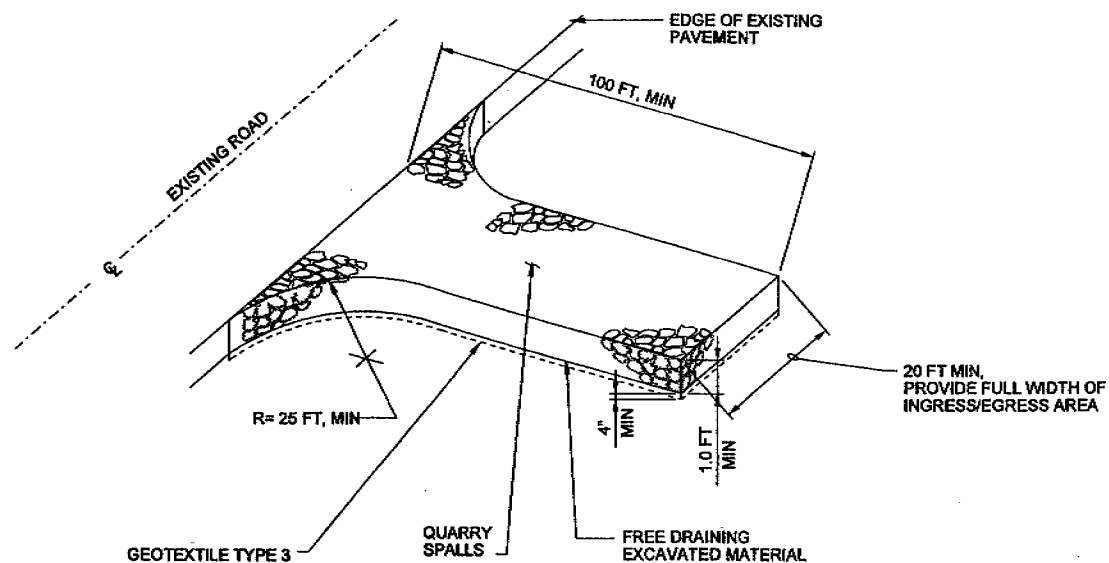


GEOGRID LIFT DETAIL
1"=1'-0"

GEOGRID AND SITE SEEDING AND VEGETATION (SEE OUT-C-12)

NOTES:

- LIVE WHIP CUTTINGS SHALL CONFORM TO THE FOLLOWING: 6-8' LENGTH; BASAL END DIAMETER OF 1" OR GREATER (UNLESS PURCHASED PRE-HARVESTED OR ROOTED); GREEN AND FREE OF ROT, VISIBLE DISEASE, AND SIGNS OF DESTRUCTIVE INSECT DAMAGE OR PRESENCE; INSTALL WITHIN 24 HOURS OF DELIVERY AND/OR HARVEST; WHIPS SHALL BE PREFERENTIALLY SELECTED, HARVESTED AND TRIMMED TO FASHION THE STRAIGHTEST AND TRUEST STOCK POSSIBLE.
- GEOGRID LIFT VEGETATION SHALL CONSIST OF SITKA AND PACIFIC WILLOW WHIPS PLANTED AT A DENSITY OF 8 PER LINEAL FOOT OF GEOGRID LIFT. ALSO, ON 5'-0" CENTERS ON EACH OF THE UPPER THREE GEOGRID LIFTS, A RED ALDER PLUG SHALL BE PLACED AGAINST THE UPPER GEOGRID FACES SHOWN ON THE DRAWINGS. THE RED ALDER PLUG SHALL HAVE A MINIMUM OF 5" TO 6" OF TOP GROWTH BEYOND THE TUBE. A SPECIAL PLANTING DEVICE SHALL BE USED TO BORE A HOLE FOR THE PLUG.
- COMPLETELY SEED THE SURFACE OF THE GEOGRID FACES AND UPPER LIFTS WITH THE LAWN SEED MIX (SECTION 02920). PLANT THE UPPER LIFT WITH THE FOLLOWING TREES TO A DISTANCE OF APPROXIMATELY 15 FEET FROM TOP OF SLOPE:
60 RED ALDER PLUGS
15-2 GAL. BLACK COTTONWOODS
7-2 GAL. WESTERN RED CEDARS.
ALL ALDER TUBES SHALL HAVE A MINIMUM OF 6 TO 8 INCHES OF GROWTH. GENERALLY PLANT COTTONWOODS AND CEDARS ON 8'-0" CENTERS AND ALDERS ON 5'-0" CENTERS.
- LIVE WILLOW STAKES SHALL BE SPACED 36 INCHES O. C. ON CUT BANKS. LIVE WILLOW STAKES SHALL CONFORM TO THE FOLLOWING: 3-4 FOOT LENGTH; BASAL END DIAMETER OF 0.5 FEET OR GREATER; GREEN AND FREE OF ROT, VISIBLE DISEASE, AND SIGNS OF DESTRUCTIVE INSECT DAMAGE OR PRESENCE; INSTALL WITHIN 24 HOURS OF DELIVERY AND/OR HARVEST; STAKES SHALL BE PREFERENTIALLY SELECTED, HARVESTED AND TRIMMED TO FASHION THE STRAIGHTEST AND TRUEST STOCK POSSIBLE.



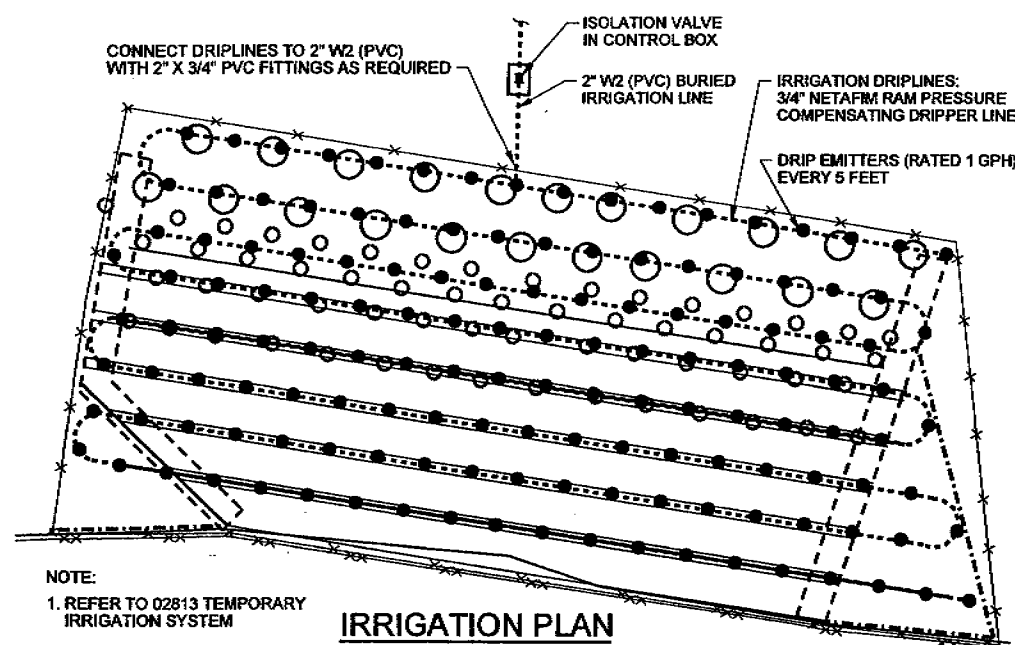
NOTES:

- REMOVE FOLLOWING CONSTRUCTION ACTIVITY. RESTORE ROAD SURFACE TO EXISTING GRADE WITH 4" LAYER OF 1" MINUS BASE COURSE ROCK.

STABILIZED CONSTRUCTION ENTRANCE

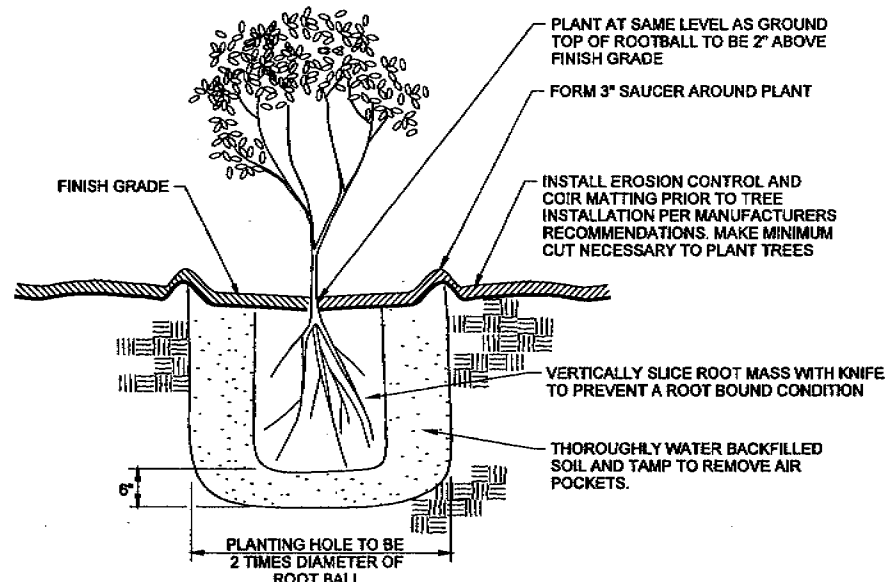
NTS

1
OUT-C-01



IRRIGATION PLAN

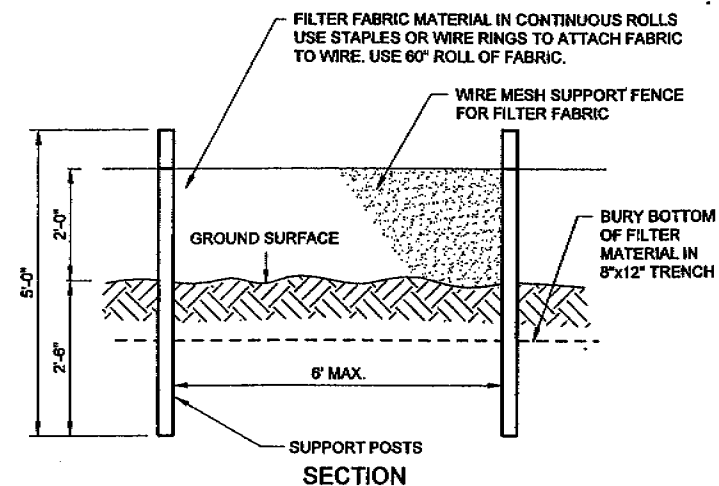
1"=10'



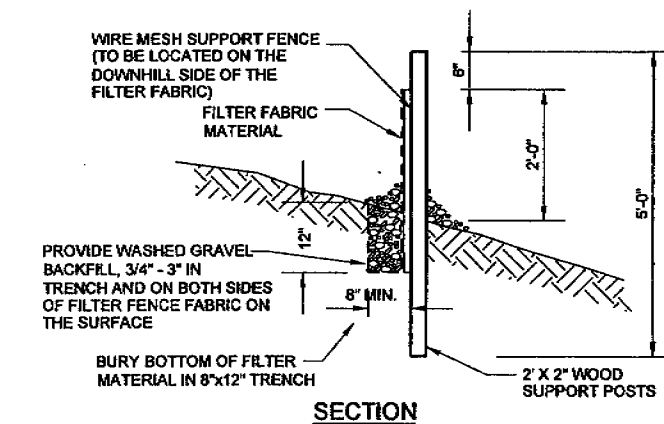
CEDAR/COTTONWOOD PLANTING

NTS

3



SECTION

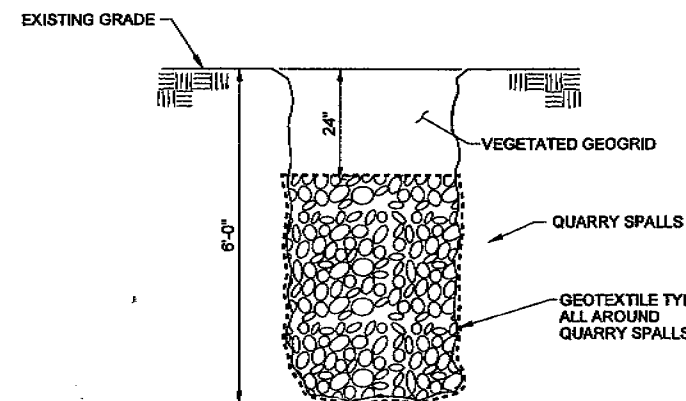


SECTION

FILTER FABRIC FENCE DETAIL

NTS

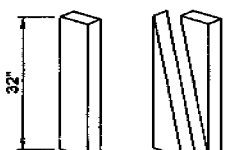
2
OUT-C-02



KEYWALL DETAIL

NTS

5
OUT-C-12



DEAD STOUT STAKE

NTS

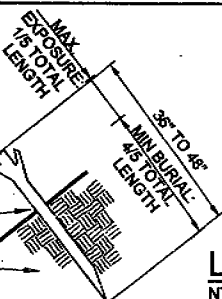
4
OUT-C-12

RECORD DRAWINGS

Revisions Drawn By **K. R. WEIGUM** Date **12/30/03**

THESE RECORD DRAWINGS HAVE BEEN PREPARED, IN PART, ON THE BASIS OF INFORMATION COMPILED BY OTHERS. THEY ARE NOT INTENDED TO REPRESENT IN DETAIL THE EXACT LOCATION, TYPE OF COMPONENT NOR MANNER OF CONSTRUCTION. THE ENGINEER WILL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THE RECORD DRAWINGS.

DIAMETER 0.5" - 3"
FOR OPTIMUM RESULTS LEAVE A MINIMUM OF 2 BUDS EXPOSED
TAMP SOIL AROUND CUTTING
EXISTING SOIL



LIVE STAKE INSTALLATION DETAIL

NTS

ROOTED STOCK 3 1/2" O.C. PER SUBMITTAL # 21

NOTE:

AVOID STRIPPING THE BARK AND NEEDLESS BRUISING OF STAKES DURING INSTALLATION. USE AN IRON BAR OR STAR DRILL TO PREPARE HOLES FOR THE STAKES. DO NOT USE AXE OR SLEDGE TO DRIVE STAKES INTO HOLES. PUSH LIVE STAKE IN PREPARED HOLE AND TAMP SOIL AROUND LIVE STAKE MAKING SURE A TIGHT SEAL WITH SOIL IS MADE.

THE CONTRACT DRAWINGS ARE PRINTED DOCUMENTS DATED AUGUST 2002, AS SUBSEQUENTLY AMENDED, WHICH DEFINE THE SCOPE, EXTENT, AND CHARACTER OF THE WORK. THE ORIGINAL DOCUMENT DRAWING WAS SEALED AND SIGNED BY KENNETH R. GREEN, STATE OF WASHINGTON, P.E. NO 17706.

DSGN	KR GREEN/BL DeROSA
DR	CC DANNETTELL
CHK	MW DAVIS
APVD	DT REYNOLDS

NO. DATE

REVISION

BY APVD

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

CH2MHILL
in association with
Pfaff Architects
RB Engineering
Foresight Surveying

WWTP OUTFALL
CITY OF CENTRALIA UTILITIES
CENTRALIA, WASHINGTON

CIVIL
OUTFALL
EROSION CONTROL
DETAILS

SHEET	17
DWG	OUT-C-13
DATE	AUGUST, 2002
PROJ	166367.0D