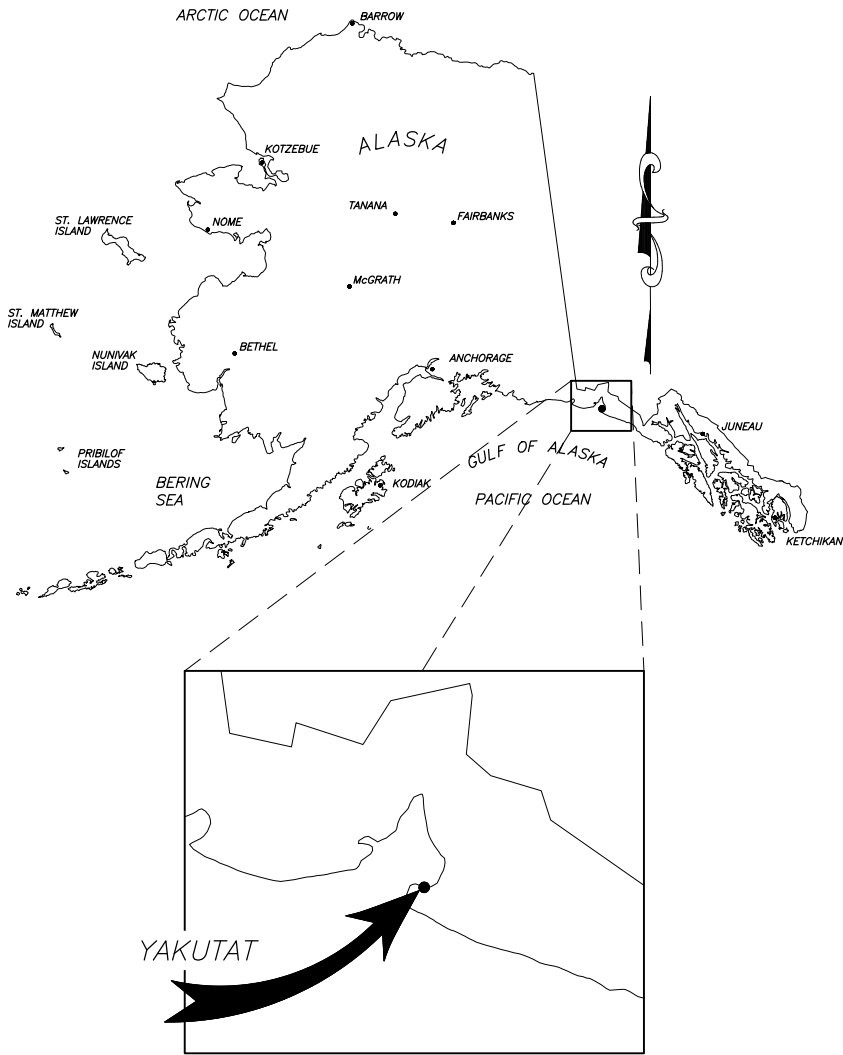


# THRHA YAKUTAT DUPLEXES

## CIVIL DESIGN



PROJECT LOCATION MAP  
NOT TO SCALE



PROJECT VICINITY MAP  
NOT TO SCALE

SHEET INDEX	
C0.1	TITLE SHEET
C0.2	LEGEND AND GENERAL NOTES
C0.3	GEOTECHNICAL INVESTIGATION
C0.4	SPECIFICATIONS
C0.5	SPECIFICATIONS
C1.0	EXISTING CONDITIONS/SURVEY CONTROL
C2.0	OVERALL SITE PLAN
C3.0	SITE PLAN AND PROFILE
C3.1	SITE PLAN AND PROFILE
C4.0	GRADING POINT TABLE AND DETAILS
C4.1	STORM DRAIN PROFILES AND TABLES
C5.0	DETAILS
C5.1	DETAILS
C5.2	DETAILS
C5.3	DETAILS

### PROJECT NARRATIVE

THIS PROJECT CONSISTS OF THE CONSTRUCTION OF (3) DUPLEXES – (1) DUPLEX ON EACH LOT. THE LOTS ARE TO BE SUBDIVIDED TO CREATE ZERO LOT LINE PROPERTIES. STORM DRAINAGE STRUCTURES SHALL CONSIST OF CATCH BASINS, CULVERT PIPE, AND CURTAIN DRAINS. WATER SHALL BE SUPPLIED TO THE UNITS VIA NEW 2" HDPE WATER MAIN FROM THE EXISTING WATER PIPING IN BOTH OCEAN CAPE AND OPHIR CREEK ROADS. SEWER SHALL CONSIST OF ONSITE WASTEWATER TREATMENT TANKS AND DRAINFIELDS. OTHER SITE FEATURES TO BE INSTALLED INCLUDE A SMALL RETAINING WALL, DRIVEWAYS, AND DRAINAGE SWALES.

REVISIONS:

THRHA YAKUTAT DUPLEX  
CIVIL AND STRUCTURAL  
DESIGN

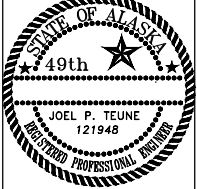
STATUS:  
**95% DESIGN**

DRAWN BY: JPT  
CHECKED BY: TSS  
DATE: 2/26/2024  
PROJECT #: 232807



R&M ENGINEERING-KETCHIKAN, INC.  
7180 REVILLA ROAD, SUITE 300  
KETCHIKAN, ALASKA 99901  
PH: 907.225.7187  
www.ketchikanengineer.com

AELC 576



SHEET DESCRIPTION:  
TITLE SHEET

**C0.1**

SHEET:  
01 of 15

GENERAL NOTES

HORIZONTAL DATA:

1) THE HORIZONTAL CONTROL IN THIS DRAWING ARE LOCAL GRID COORDINATES AT GROUND.

VERTICAL DATA:

1) ELEVATIONS DETERMINED ON THIS PROJECT ARE ASSUMED.

GENERAL NOTES:

- 1) ALL UTILITIES SHOWN WERE LOCATED FROM SURFACE EVIDENCE. NO UTILITY LOCATES PERFORMED; HOWEVER, R&M INTERVIEWED YAKUTAT PUBLIC WORKS STAFF REGARDING UTILITY LOCATIONS.
- 2) THE PROPERTY LINES SHOWN ON THIS SURVEY DO NOT CONSTITUTE A COMPLETE BOUNDARY RESOLUTION AND SHOULD ONLY BE USED AS APPROXIMATE WHEN PLACING NEW PERMANENT STRUCTURES. FURTHERMORE, THIS COMPANY WAS NOT PROVIDED A TITLE REPORT TO AID IN DEPICTING ALL EXISTING EASEMENTS THAT MAY EXIST.
- 3) THE PROFILES SHOWN IN THESE PLANS HAVE A VERTICAL EXAGGERATION OF 2.0 UNLESS OTHERWISE NOTED.
- 4) WATER DISTRIBUTION SYSTEM CONSTRUCTION SHALL BE ACCORDANCE WITH THESE PLANS, THE CITY OF YAKUTAT STANDARD SPECIFICATIONS, AND ADEC REGULATIONS AS CONTAINED IN 18--AAC--80, DRINKING WATER.
- 5) ALL TRENCHING, COMPACTION, AND AGGREGATES SHALL BE COMPLETED IN ACCORDANCE WITH THE CITY OF YAKUTAT STANDARD SPECIFICATIONS UNLESS OTHERWISE NOTED.
- 6) WASTEWATER SYSTEM CONSTRUCTION SHALL BE IN ACCORDANCE WITH THESE PLANS, THE CITY OF YAKUTAT STANDARD SPECIFICATIONS, AND ADEC REGULATIONS AS CONTAINED IN 18--AAC--72, WASTEWATER DISPOSAL.
- 7) MAINTAIN MINIMUM 10 FOOT HORIZONTAL, AND 18 INCH VERTICAL SEPARATION BETWEEN SEWER AND WATER MAIN LINES AT ANY POINT UNLESS OTHERWISE NOTED IN PLANS.
- 8) WATER MAINS SHALL CROSS OVER THE TOP OF SEWER MAINS WITH 18 INCHES OF SEPARATION BETWEEN OUTSIDE EDGES OF THE PIPES. THE WATER LINE JOINTS SHALL BE AT LEAST 9 FEET FROM THE SEWER JOINTS. SEE DETAILS.
- 9) WATER PIPE SHALL BE 4710 RESIN SDR11 HDPE PIPE.
- 10) GRAVITY SEWER MAINS AND SERVICES SHALL BE C900 PVC PIPE.
- 11) ALL PRESSURE SEWER MAINS AND LATERALS SHALL BE 4710 RESIN SDR11 HDPE PIPE.
- 12) DO NOT CHANGE UTILITY DESIGN, LINE, GRADE, SIZE, MATERIALS, ETC. WITHOUT APPROVAL FROM THE DESIGN ENGINEER.
- 13) THE WATER LINE DESIGN IS BASED ON HDPE PIPE WITH AN ALLOWABLE BENDING RADIUS = 10-D. THE CONTRACTOR SHALL SUBMIT ALIGNMENT SHOP DRAWINGS IF SELECTED HDPE PIPE MANUFACTURER'S ALLOWABLE BENDING RADIUS IS GREATER.
- 14) MAINTAIN 5' MINIMUM COVER ON WATER MAINS AND 5' MINIMUM COVER OVER SANITARY SEWER FORCE MAINS AND PRESSURE LATERALS.
- 15) SEWER PIPE ELEVATIONS ARE TO BOTTOM OF PIPE.
- 16) SEWER PIPE SLOPES ARE CALCULATED FROM FACE OF MANHOLE
- 17) SUBMITTALS – THE CONTRACTOR SHALL SUBMIT DATA SHEETS FOR ALL CONSTRUCTION MATERIALS TO THE DESIGN ENGINEER AND OBTAIN WRITTEN APPROVAL FOR THE CONSTRUCTION MATERIALS PRIOR TO PURCHASING AND INSTALLING THEM. THE CONSTRUCTION MATERIALS INCLUDE BUT ARE NOT LIMITED TO ALL PIPE, FITTINGS, VALVES, CURB STOPS, CORPORATION STOPS, TAPPING SADDLES, MANHOLES, FRAMES & LIDS, CLEANOUTS, AND HYDRANTS.
- 18) THE CONTRACTOR SHALL COORDINATE WITH THE CITY AND BOROUGH OF YAKUTAT TO DETERMINE THE LOCATION AND USABILITY OF EXISTING WATER SERVICE CONNECTIONS. THE WATER MAIN AND SERVICE CONNECTIONS SHOWN HEREON ARE BASED UPON THE BEST AVAILABLE INFORMATION AT THE TIME OF THIS DESIGN. THE CITY AND BOROUGH OF YAKUTAT BELIEVES THAT THERE ARE 1" COPPER SERVICES – WITH CORPORATION AND CURB STOPS – ENTERING THE PROJECT AREA FROM BOTH OPHIR CREEK ROAD AND OCEAN CREEK ROAD. IF FOUND, CONTACT THE DESIGN ENGINEER; THESE SERVICE LINES MAY BE USED IN LIEU OF THE WATER MAIN AND SERVICE LAYOUT SHOWN IN THIS DESIGN.

LEGEND

FEATURE DESCRIPTION	EXISTING	PROPOSED
PROPERTY LINE		
PROPERTY LINE (INFORMATIONAL)		N/A
CENTERLINE		
CONCRETE		
ASPHALT		
BUILDING LINE		
BUILDING OVERHANG		AS NOTED
EDGE OF ASPHALT/CONCRETE		(PATCH)
EDGE OF GRAVEL		N/A
TOP/TOE/DITCH (GENERAL)		
OVERHEAD UTILITY LINE		N/A
UNDERGROUDN UTILITY LINE		N/A
STORM DRAIN		
SEWER LINE		
SEWER LINE (RECORD)		N/A
SANITARY SEWER PRESSURE LINE		
SEWER SERVICE	N/A	
WATER LINE		
WATER SERVICE	N/A	
WATER LINE (RECORD)		N/A
RAW SALTWATER LINE		N/A
FUEL/GAS LINE		N/A
FENCE		
GUARD RAIL		N/A
MAJOR CONTOUR		
MINOR CONTOUR		
POSSIBLE UNKNOWN LINE DETECTED BY GPR		N/A
PAINT MARK		

FEATURE DESCRIPTION	EXISTING	PROPOSED
UTILITY POLE		
GUY ANCHOR		N/A
CONTROL POINT (AS NOTED)		N/A
FOUND MONUMENT (AS NOTED)		N/A
STORM DRAIN MANHOLE		
STORM CATCH BASIN		
STORM CLEANOUT		
SANITARY SEWER MANHOLE		
SANITARY SEWER CLEANOUT		
BOLLARD/POST (TYPE AS NOTED)		
WATER VALVE		
FIRE HYDRANT		
LIGHT POLE		N/A
ELECTRICAL METER		N/A
SIGN		N/A
TEST PIT		N/A
ROCK WALL		

REVISIONS:

THRHA YAKUTAT DUPLEX  
CIVIL AND STRUCTURAL  
DESIGN

STATUS:

95% DESIGN

DRAWN BY: JPT  
CHECKED BY: TSS  
DATE: 2/26/2024  
PROJECT #: 232807

R&M ENGINEERING-KETCHIKAN, INC.  
7180 REVILLA ROAD, SUITE 300  
KETCHIKAN, ALASKA 99901  
PH: 907.225.7187  
www.ketchikanengineer.com

AELC 576

SHEET DESCRIPTION:  
LEGEND

C0.2

SHEET:  
02 of 15

TEST HOLE NO. 1

DEPTH(FT.)	FROZEN	SOIL GRAPH	LOCATION SAMPLED	GENERAL SOIL DESCRIPTION
				SAND, PEAT, 2" COBBLES, 6" COBBLES, GAP GRADED, GRAY/BROWN (LOOSE)
				PEAT, ORGANICS, ROOTS, DARK BROWN (LOOSE)
				SAND, PEAT, 6" COBBLES, 18" BOUDLERS, GAP GRADED, GRAY/DARK BROWN (MODERATELY DENSE)
5				
				SAND, 2" COBBLES THROUGHOUT, 8" COBBLES, GAP GRADED, GRAY (MODERATELY DENSE)
10				

NOTE: TEST HOLE INVESTIGATION WAS SUSPENDED AT A DEPTH OF 10' DUE TO MACHINE LIMITATIONS.

NOTE: TEST HOLE INVESTIGATION WAS DIRECTED BY AN R&M REPRESENTATIVE. THE MAXIMUM REACH OF THE MACHINE WAS 8'-10'.

TEST HOLE NO. 2

DEPTH(FT.)	FROZEN	SOIL GRAPH	LOCATION SAMPLED	GENERAL SOIL DESCRIPTION
				SAND, PEAT, 2" COBBLES, 8" COBBLES, GAP GRADED, GRAY/BROWN (LOOSE)
				PEAT, ORGANICS, ROOTS, SOME 2" COBBLES, DARK BROWN (LOOSE)
				SAND, 2" COBBLES, 6" COBBLES, GAP GRADED, GRAY (LOOSE)
5				
				PERCOLATION TEST RESULTS: 4 MIN/IN
				SAND, 2" COBBLES THROUGHOUT, 6" COBBLES, FEW 12" BOULDERS, GAP GRADED, GRAY (MODERATELY DENSE)

NOTE: TEST HOLE INVESTIGATION WAS SUSPENDED AT A DEPTH OF 8' DUE TO MACHINE LIMITATIONS.

TEST HOLE NO. 7

DEPTH(FT.)	FROZEN	SOIL GRAPH	LOCATION SAMPLED	GENERAL SOIL DESCRIPTION
				PEAT, ORGANICS, ROOTS, DARK BROWN (LOOSE)
				SAND, 4" COBBLES, 12"-18" BOULDERS FROM 2'-3', GAP GRADED, GRAY (LOOSE)
				GROUNDWATER PRESENT
5				
				SAND, CLAY, 6" COBBLES, GAP GRADED, GRAY (MODERATELY DENSE)
				PERCOLATION TEST RESULTS: NO PERCOLATION OCCURRED
				SAND, 18" BOULDERS, GAP GRADED, GRAY (MODERATELY DENSE)

NOTE: TEST HOLE INVESTIGATION WAS SUSPENDED AT A DEPTH OF 10' DUE TO MACHINE LIMITATIONS.

TEST HOLE NO. 3

DEPTH(FT.)	FROZEN	SOIL GRAPH	LOCATION SAMPLED	GENERAL SOIL DESCRIPTION
				SAND, PEAT, 2" COBBLES, 6"-8" COBBLES, GAP GRADED, GRAY/BROWN (LOOSE)
				PEAT, ORGANICS, ROOTS, SOME 2" COBBLES DARK BROWN (LOOSE)
				SAND, 12"-18" BOULDERS, GAP GRADED, GRAY(MODERATELY DENSE)
				SAND, 2" COBBLES THROUGHOUT, 4"-6" COBBLES, GAP GRADED, GRAY (MODERATELY DENSE)
5				
				PERCOLATION TEST RESULTS: 3.75 MIN/IN

NOTE: TEST HOLE INVESTIGATION WAS SUSPENDED AT A DEPTH OF 8.5' DUE TO MACHINE LIMITATIONS.

TEST HOLE NO. 6

DEPTH(FT.)	FROZEN	SOIL GRAPH	LOCATION SAMPLED	GENERAL SOIL DESCRIPTION
				SAND, 4" COBBLES AND SMALLER, GAP GRADED, GRAY/BROWN (LOOSE)
				SAND, PEAT, MANY 18"-24" BOULDERS, GRAY/DARK BROWN (LOOSE)
				SAND, 2" COBBLES, 8" COBBLES, 18"-24" BOULDERS BETWEEN 3'-5', GRAY (MODERATELY DENSE)
5				
8				

NOTE: TEST HOLE INVESTIGATION WAS SUSPENDED AT A DEPTH OF 8' DUE TO MACHINE LIMITATIONS.

TEST HOLE NO. 4

DEPTH(FT.)	FROZEN	SOIL GRAPH	LOCATION SAMPLED	GENERAL SOIL DESCRIPTION
				SAND, PEAT, 3" COBBLES, GAP GRADED, GRAY/BROWN (LOOSE)
				SAND, PEAT, 2" COBBLES, FEW 18" BOULDERS BETWEEN 2'-3', GAP GRADED GRAY/DARK BROWN (MODERATELY DENSE)
5				
				SAND, 2" COBBLES, 18"-24" BOULDERS PREDOMINATELY AT 8', GAP GRADED, GRAY (MODERATELY DENSE)
10				

NOTE: TEST HOLE INVESTIGATION WAS SUSPENDED AT A DEPTH OF 10' DUE TO MACHINE LIMITATIONS.

TEST HOLE NO. 5

DEPTH(FT.)	FROZEN	SOIL GRAPH	LOCATION SAMPLED	GENERAL SOIL DESCRIPTION
				PEAT, ORGANICS, ROOTS, WOOD, LIGHT BROWN (LOOSE)
				SAND, 2" COBBLES, GAP GRADED, GRAY (LOOSE)
				SAND, MUD, ROOTS, LIGHT BROWN (LOOSE)
				GROUNDWATER PRESENT
				MUD, ROOTS, 24" BOULDERS, DARK BROWN (MODERATELY DENSE)
5				
				CLAY, SAND, 3"-6" COBBLES, 18"-24" BOULDERS, GRAY (MODERATELY DENSE)
				GROUNDWATER PRESENT
10				

NOTE: TEST HOLE INVESTIGATION WAS SUSPENDED AT A DEPTH OF 10' DUE TO MACHINE LIMITATIONS.

REVISIONS:	

THRHA YAKUTAT DUPLEX  
CIVIL AND STRUCTURAL  
DESIGN

STATUS:

95% DESIGN

DRAWN BY: JPT  
CHECKED BY: TSS  
DATE: 2/26/2024  
PROJECT #: 232807



R&M ENGINEERING-KETCHIKAN, INC.  
7180 REVILLA ROAD, SUITE 300  
KETCHIKAN, ALASKA 99901  
PH: 907.225.7187  
www.ketchikanengineer.com



SHEET DESCRIPTION:

GEOTECHNICAL  
INVESTIGATION

C0.3

SHEET:

GENERAL NOTE

ALL THE SPECIFICATIONS CONTAINED ON SHEETS ARE ASSOCIATED WITH THE CONSTRUCTION OF THIS PROJECT ONLY. IN FOR THESE SPECIFICATIONS THE TERM "CONTRACTOR" REFERS TO THE PURCHASER OR A HIRED SUBCONTRACTOR FOR THE PURCHASER.

CONSTRUCTION SURVEYING

1.0 SCOPE OF WORK

- A. THE CONTRACTOR SHALL FURNISH ALL LABOR AND MATERIALS NECESSARY TO PERFORM ALL SURVEYING AND STAKING ESSENTIAL FOR THE COMPLETION OF CONSTRUCTION IN CONFORMANCE WITH THE PLANS, SPECIFICATIONS, AND CONTRACT DOCUMENTS. THE CONTRACTOR SHALL PERFORM ALL THE NECESSARY WORK AND CALCULATIONS REQUIRED TO ACCOMPLISH THE WORK IN ACCORDANCE WITH THESE SPECIFICATIONS AND OTHER PORTIONS OF THE CONTRACT DOCUMENTS.
- B. THIS SECTION IS INTENDED TO ESTABLISH A STANDARD MINIMUM LEVEL OF ACCEPTABLE FIELD SURVEY SPECIFICATIONS AND PROCEDURES TO PROPERLY CONTROL CONSTRUCTION PROJECTS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE PROPER SURVEY METHODS AND PROCEDURES ARE FOLLOWED. ANY ERRORS RESULTING FROM THE SURVEY SHALL BE CORRECTED AT THE EXPENSE OF THE CONTRACTOR AND AT NO ADDITIONAL EXPENSE TO THE OWNER. ANY METHOD CONFLICTING WITH THESE SURVEY SPECIFICATIONS MUST BE APPROVED BY THE ENGINEER PRIOR TO ITS USE. ALL SURVEY WORK PERFORMED SHALL BE UNDER THE DIRECT SUPERVISION OF AN ALASKAN REGISTERED PROFESSIONAL LAND SURVEYOR.

1.1 PROJECT CONTROL

- A. THE OWNER HAS PROVIDED REFERENCE HORIZONTAL AND VERTICAL CONTROL DATA TO FACILITATE CONSTRUCTION STAKING. HOWEVER IT IS THE CONTRACTOR'S RESPONSIBILITY TO ESTABLISH AND CHECK ALL SURVEY CONTROL PRIOR TO ANY STAKING ACTIVITY TO ENSURE THE PROJECT IS PROPERLY LOCATED AND CONSTRUCTED ACCORDING TO THE CONSTRUCTION DOCUMENTS. IF DISCREPANCIES ARE FOUND, THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY. THE CONTRACTOR IS RESPONSIBLE FOR PRESERVING AND PROTECTING ALL LINE STAKES, GRADE STAKES, REFERENCE POINTS, AND HUBS. IN THE EVENT OF THEIR LOSS OR DESTRUCTION, THE CONTRACTOR SHALL PAY ALL COSTS FOR THEIR REPLACEMENT. THE CONTRACTOR SHALL REPLACE ANY MONUMENT THAT EXISTS WITHIN THE CONSTRUCTION LIMITS, IF IT IS DISTURBED OR REMOVED DUE TO CONSTRUCTION PROJECT ACTIVITY. ALL MONUMENTS DISTURBED OR REMOVED SHALL BE REPLACED WITH THE SAME TYPE MONUMENT OR A MONUMENT APPROVED BY THE ENGINEER.
- B. HORIZONTAL CONTROL ACCURACY
1. THE MAXIMUM PERMISSIBLE LINEAR ERROR ALLOWED IN ESTABLISHING HORIZONTAL CONTROL IS 1:5000 FEET. THE MAXIMUM ERROR ALLOWED IN UNADJUSTED ANGULAR CLOSURE SHALL BE CALCULATED BY THE FORMULA "30 X THE SQUARE ROOT OF N". THE TERM "N" SIGNIFIES THE NUMBER OF TRANSIT SET-UPS IN THE TRAVERSE AND "30" SIGNIFIES THIRTY SECONDS.
- C. VERTICAL CONTROL
1. ELEVATIONS SHALL ORIGINATE FROM A NGS VERTICAL LEVEL LINE SYSTEM. ALL LEVEL CIRCUITS RUN TO ESTABLISH TEMPORARY BENCH MARKS SHALL HAVE AN ACCURACY NO LESS THAN THE VALUE COMPUTED BY THE EQUATION (0.03 FEET X THE SQUARE ROOT OF THE DISTANCE IN MILES). FORESIGHTS AND BACKSIGHTS SHALL BE BALANCED. THE MAXIMUM SIGHTING DISTANCE SHALL NOT EXCEED 300 FEET. ALL LEVELING CIRCUITS ESTABLISHING TBM'S WILL BE ADJUSTED UTILIZING RECOGNIZED STANDARD SURVEYING ADJUSTMENT METHODS. SIDE SHOTS TO ESTABLISH AN ELEVATION ON TBM'S WILL NOT BE ALLOWED.
2. A MINIMUM OF TWO KNOWN BENCH MARKS WILL BE UTILIZED WHEN ESTABLISHING TBM'S TO VERIFY CORRECT ELEVATION INFORMATION. A SUFFICIENT NUMBER OF TBM'S SHALL BE SET TO CONTROL A PROJECT WITH A MAXIMUM SPACING OF 800 FEET BETWEEN MARKS. A TBM TYPICALLY SHOULD NOT BE GREATER THAN 200 FEET OUTSIDE THE CONSTRUCTION LIMITS OF THE PROJECT. ALL TBM'S SHALL BE LOCATED AND BE COMPRISED OF SUFFICIENT MATERIALS SUCH THAT THEIR INTEGRITY WILL NOT BE COMPROMISED THROUGHOUT THE LIFE OF THE PROJECT.

1.2 CLEARING AND GRUBBING STAKES

- A. THE CONTRACTOR SHALL STAKE THE CLEARING AND GRUBBING LIMITS FOR THE OWNERS REVIEW AND APPROVAL.
- B. DISTANCES SHALL BE MEASURED TO THE NEAREST FOOT AND STANDARD LATH/FLAGGING SHALL BE PLACED TO CLEARLY DESIGNATE THE INTENDED LIMITS. INTERVALS FOR PLACEMENT OF LATH/FLAGGING SHALL VARY BASED ON THE TERRAIN AND FOILAGE DENSITY, SPACING OF 50 TO 100 FEET WILL GENERALLY BE ADEQUATE.

1.3 VERTICAL CUT STAKES, GRADE STAKES, AND FINISHING STAKES

- A. VERTICAL CUT/FILL STAKES MAY BE USED WHERE THE DESIGN PRISM DOES NOT CONTAIN SLOPED SHOULDERS AND DITCHES AND A SLOPE STAKE WOULD NOT BE NEEDED. THE REFERENCE POINT SHALL BE A STANDARD WOOD HUB ACCOMPANIED BY A MINIMUM 3 FOOT LENGTH LATH WITH THE CUT, DISTANCE TO THE CUT POINT, DESCRIPTION OF THE POINT BEING CUT TO, AND A DISTANCE FROM CONSTRUCTION CENTERLINE TO THE STAKE. THE CENTERLINE STATION SHALL BE WRITTEN ON THE BACK OF THE LATH. CUTS SHALL BE GIVEN TO THE NEAREST 0.1 FEET. THE STAKES SHALL BE SET AT THE SAME POINTS THAT WERE IDENTIFIED FOR THE SLOPE STAKES IN SUBSECTION 1.8. A RECORD OF THE STAKING ELEVATIONS, THE DESIGNED GRADE, THE LOCATION OF STAKES, THE CENTERLINE STATION OF THE STAKE AND FEATURE WHICH IS BEING STAKED SHALL BE MADE IN THE SURVEY FIELD BOOK.
- B. FINISH GRADE HUBS (BLUETOPS) SHALL BE SET TO VERIFY THE DESIGN PRISM IS AT THE CORRECT ELEVATION PRIOR TO THE PLACEMENT OF FINAL LIFT COURSE MATERIAL. WOODEN HUBS, PAINTED OR TOPPED WITH COLORED WHISKERS SHALL BE SET AT THE TOP OF CLASSIFIED FILL, WITHIN 0.2 FEET TOLERANCE. FOR THE LTF AREA STAKED HUBS WILL BE SET ON A 50 FOOT GRID PATTERN UNLESS APPROVED OTHERWISE BY THE ENGINEER. THE FIELD BOOK SHALL CONTAIN THE GRADING POINT NUMBER, THE DESIGN FINISH GRADE ELEVATION OF THE POINT STAKED, THE ELEVATION SHOT THE HUB WAS SET AT, AND A DESCRIPTION OF THE POINT BEING STAKED.

1.4 DRAINAGE FACILITY STAKING

- A. THE LOCATION, TYPE, SIZE, LENGTH AND INVERT ELEVATIONS FOR DRAINAGE FACILITIES SHALL BE GIVEN ON THE CONSTRUCTION PLAN DRAWINGS. MINOR CHANGES IN LOCATIONS AND GRADES TO MEET EXISTING FIELD CONDITIONS MAY BE MADE WHERE NECESSARY, BUT ONLY WITH THE APPROVAL OF THE ENGINEER. IF A DISCREPANCY LARGE ENOUGH TO ADVERSELY AFFECT THE PLANNED DESIGN IS DISCOVERED THE ENGINEER SHOULD BE NOTIFIED IMMEDIATELY AND ALL GRADE STAKING ACTIVITY SHALL CEASE UNTIL FURTHER NOTICE.
- B. A GROUND LINE PROFILE SHALL BE RUN PRIOR TO EXCAVATION OF DRAINAGE FACILITIES. THE GROUND LINE PROFILE SHALL BE THE ELEVATION OF THE GROUND DIRECTLY ABOVE THE CENTERLINE OF THE PIPE BEFORE TRENCHING OCCURS. THE CONTRACTOR SHALL STAKE THE ALIGNMENT OF PIPE, LOCATION OF STRUCTURES, AND REFERENCE GRADES FROM WHICH THE SYSTEM CAN BE BUILT.
- C. DIKES/DITCHES SHALL BE STAKED TO THE ALIGNMENT, GRADE AND SLOPES SHOWN ON THE PLANS. DIKES/DITCHES SHALL BE SLOPE STAKED TO THE SHOULDER OR FLOW LINE OF THE IMPROVEMENT WITH DISTANCES REFERENCED TO THE IMPROVEMENT CENTERLINE.

1.5 MAJOR STRUCTURE STAKING

- A. CONSTRUCTION SURVEY PROCEDURES SHALL BE SUBMITTED TO THE ENGINEER PRIOR TO ANY CONSTRUCTION STAKING. HIS REVIEW AND APPROVAL IS NECESSARY FOR MAJOR STRUCTURES SUCH AS BRIDGES, DOCKS, PILING, DRAINAGE FACILITIES, AND LARGE BUILDINGS.

1.6 MISCELLANEOUS CONSTRUCTION STAKING

- A. THE CONTRACTOR SHALL PROVIDE SUFFICIENT STAKES FOR THE ADEQUATE CONTROL OF ALL STRUCTURES AND INCIDENTAL CONSTRUCTION NOT SPECIFICALLY COVERED ABOVE. A STAKING DIAGRAM WITH RESPECT TO CENTERLINE AND MEASUREMENTS FOR PAY QUANTITIES SHALL BE MAINTAINED IN THE FIELD NOTES. OTHER ITEMS SUCH AS HORIZONTAL AND VERTICAL CONTROL SHALL BE SHOWN IN THE FIELD BOOK AND SHALL BE GOVERNED BY PROCEDURES ESTABLISHED IN PREVIOUS ARTICLES OF THIS SPECIFICATION.

FIELD ENGINEERING

1.1 DESCRIPTION OF WORK

THE INTENT OF THIS SECTION IS TO DELINEATE THE RESPONSIBILITY FOR DIFFERENT ASPECTS OF THE CONSTRUCTION SURVEYING ASSOCIATED WITH THE WORK.

1.2 SURVEY REFERENCE POINTS

- A. ALL ELEVATIONS SHOWN ON THE PLANS ARE REFERENCED TO MEAN LOWER LOW WATER TIDE DATUM, BENCHMARKS FOR WHICH ARE ALSO OF RECORD.
- B. ALL SURVEY AND LAYOUT WORK SHALL BE PERFORMED BY THE CONTRACTOR AS PART OF THE WORK. THE CONTRACTOR SHALL TRANSFER LINES AND GRADES FROM EXISTING CONTROL TO HIS OWN WORK AT HIS OWN EXPENSE.

PROJECT DATA SUBMITTALS

1.0 GENERAL

THE CONTRACTOR SHALL ASSEMBLE AND SUBMIT, TO THE ENGINEER, PROJECT DATA AND SAMPLES AS SPECIFIED IN EACH SPECIFICATION SECTION. THE PROJECT DATA AND SAMPLES SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW AND CHECKING TO DETERMINE CONFORMANCE WITH THE INTENT OF THE PLANS AND SPECIFICATIONS. THE REVIEW AND CHECKING BY THE ENGINEER WILL BE SPECIFICALLY LIMITED TO THE PROJECT DATA AND SAMPLES SPECIFIED IN THESE SPECIFICATIONS.

1.1 PROJECT DATA

PROJECT DATA AND SAMPLES SHALL BE APPROVED BY THE ENGINEER PRIOR TO PLACEMENT OF PURCHASE ORDERS FOR EQUIPMENT AND MATERIALS. EQUIPMENT AND MATERIALS FOR WHICH PROJECT DATA AND SAMPLES ARE SPECIFIED, WHICH ARE CONSTRUCTED, INSTALLED OR INCORPORATED PRIOR TO REVIEW, CHECK AND APPROVAL BY THE ENGINEER MAY NOT BE ACCEPTED BY THE OWNER.

THE REVIEW BY THE ENGINEER OF PRODUCT DATA OR OTHER SUBMITTALS IS ONLY FOR CONFORMANCE WITH THE GENERAL DESIGN CONCEPT OF THE PROJECT AND DOES NOT EXTEND TO CONSIDERATION OF STRUCTURAL INTEGRITY, SAFETY, DETAILED COMPLIANCE WITH CONTRACT REQUIREMENTS OR ANY OTHER OBLIGATION OF THE CONTRACTOR. ANY ACTION SHOWN IS SUBJECT TO THE REQUIREMENTS OF THE PLANS AND SPECIFICATIONS.

THE CONTRACTOR IS RESPONSIBLE FOR PREPARATION AND REVIEW OF ALL SHOP DRAWINGS CONFIRMING AND CORRELATING ALL DIMENSIONS; FABRICATING AND CONSTRUCTION TECHNIQUES; COORDINATING HIS OR HER WORK WITH THAT OF ALL OTHER TRADES; AND THE SATISFACTORY PERFORMANCE OF HIS OR HER ENTIRE WORK IN STRICT ACCORDANCE WITH THE CONTRACT DOCUMENTS. THE REVIEW OF PROJECT DATA BY THE ENGINEER SHALL NOT RELIEVE THE CONTRACTOR FROM HIS OR HER OBLIGATION FULLY TO PERFORM ALL CONTRACT REQUIREMENTS, NOR SHALL SUCH REVIEW GIVE RISE TO ANY RIGHT OF ACTION OR SUIT IN FAVOR OF THE CONTRACTOR OR THIRD PERSONS, AGAINST THE ENGINEER OR THE OWNER.

1.2 MINIMUM REQUIREMENTS

- A) SHOP AND SUPPLEMENTAL DRAWINGS SHALL BE ASSEMBLED, LABELED WITH REFERENCE TO SPECIFICATION SECTION AND/OR DRAWING NUMBER, DETAIL NUMBER AND LOCATION WITH THE DELIVERY DATE AND ALL PERTINENT DATA NEEDED TO FULLY DESCRIBE THE ELEMENT OR ITEM OF THE WORK.
- B) SHOP AND SUPPLEMENTAL DRAWINGS SHALL INDICATE ALL ROUGH-IN, BACKING OR BLOCKING, SPACE REQUIREMENTS AND THAT FIELD MEASUREMENTS HAVE BEEN VERIFIED FOR CONFORMITY TO THE CONTRACT DOCUMENTS, CODE REQUIREMENTS, WHERE APPLICABLE, AND NECESSARY COORDINATION WITH ANY OTHER PARTS OF THE WORK.
- C) THE CONTRACTOR SHALL SIGN THE DRAWINGS OR PROJECT DATA TRANSMITTAL TO CERTIFY THAT HE OR SHE HAS REVIEWED THE SHOP AND SUPPLEMENTAL DRAWINGS SUBMITTAL, VERIFIED ALL FIELD MEASUREMENTS AND COMPLIED WITH ALL APPLICABLE PROVISIONS OF THE CONTRACT DOCUMENTS.

1.3 DISTRIBUTION

THE CONTRACTOR SHALL PROVIDE TWO COPIES OF PROJECT DATA AND SHOP AND SUPPLEMENTAL DRAWINGS. THE ENGINEER SHALL RETURN ONE MARKED COPY TO THE CONTRACTOR.

1.4 LIMITATION OF SUBMITTALS AND REVIEWS

THE CONTRACTOR SHALL SUBMIT PROJECT DATA AND SAMPLES FOR EQUIPMENT AND MATERIALS WHICH MEET OR EXCEED THE REQUIREMENTS OF THE SPECIFICATIONS. ACCORDINGLY, IT IS CONSIDERED REASONABLE THAT THE CONTRACTOR PROVIDE PROJECT DATA AND SAMPLES WHICH ARE COMPLETE AND ACCEPTABLE, IN THE JUDGMENT OF THE ENGINEER, BY THE SECOND SUBMISSION OF SPECIFIC PROJECT DATA AND SAMPLES. THE OWNER RESERVES THE RIGHT TO AND WILL WITHHOLD SUCH AMOUNT FROM PAYMENTS DUE TO THE CONTRACTOR TO COVER THE COST OF REVIEW BY THE ENGINEER OF THIRD AND SUBSEQUENT SUBMISSIONS OF SPECIFIC PROJECT DATA AND SAMPLES.

THE CONTRACTOR'S PROGRESS SCHEDULE SHALL INCLUDE TIME FOR THE SUBMITTAL OF PROJECT DATA AND SAMPLES AND FOR THE RESUBMITTAL OF PROJECT DATA AND SAMPLES REJECTED BY THE ENGINEER.

REVISIONS:

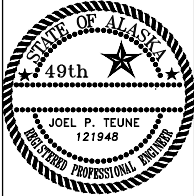
THRHA YAKUTAT DUPLEX  
CIVIL AND STRUCTURAL  
DESIGN

STATUS:

95% DESIGN

DRAWN BY: JPT  
CHECKED BY: TSS  
DATE: 2/26/2024  
PROJECT #: 232807

**R&M ENGINEERING-KETCHIKAN, INC.**  
7180 REVILLA ROAD, SUITE 300  
KETCHIKAN, ALASKA 99901  
PH: 907.225.7187  
www.ketchikanengineer.com  
AELC 576



SHEET DESCRIPTION:

SPECIFICATIONS

C0.4

SHEET:

04 of 15



SUBSURFACE CONDITIONS

1.0 SOIL REPORTS

- A. ANY DATA ON SOIL AND/OR SUBSURFACE CONDITIONS SHOWN IN THE PLANS OR SPECIFICATIONS IS NOT TO BE TAKEN AS A REPRESENTATION, BUT IS BASED ON LIMITED INFORMATION AND IS AT BEST ONLY AN OPINION; CONSEQUENTLY, SUCH DATA CANNOT BE CONSIDERED PRECISE OR COMPLETE AND THERE IS NO GUARANTEE AS TO ITS COMPLETENESS, ACCURACY, OR PRECISION.
- B. A LIMITED SOILS INVESTIGATION WAS PERFORMED FOR THIS PROJECT TO DETERMINE GENERAL CHARACTERISTICS OF THE EXISTING SUBSURFACE WHILE PERFORMING A WETLANDS DETERMINATION FOR THE SITE. DUE TO LIMITED PROJECT BUDGET, THE SCOPE WAS LIMITED AND MAY NOT HAVE ADEQUATELY ADDRESSED THE SUBSURFACE CONDITIONS IN ALL AREAS.
- C. ADDITIONAL INVESTIGATION:
1. CONTRACTOR SHOULD VISIT THE SITE AND ACQUAINT HIMSELF WITH SITE CONDITIONS BEFORE SUBMITTING A BID, AND THE SUBMISSION OF A BID WILL BE PRIMA FACIE EVIDENCE THAT HE HAS DONE SO.
2. PRIOR TO BIDDING, CONTRACTOR MAY MAKE HIS OWN SUBSURFACE INVESTIGATIONS TO SATISFY HIMSELF WITH SITE AND SUBSURFACE CONDITIONS.

EARTHWORK

1.0 EXCAVATION

ALL EXCAVATION IS UNCLASSIFIED. THE TERMS EARTHWORK OR EXCAVATION SHALL INCLUDE ALL MATERIALS EXCAVATED OR REMOVED REGARDLESS OF MATERIAL CHARACTERISTICS. THE CONTRACTOR SHALL MAKE HIS OWN ESTIMATE OF THE KIND AND EXTENT OF MATERIAL, WHICH WILL BE ENCOUNTERED IN THE EXCAVATION.

1.1 ROCK PRODUCTS

A SHOT ROCK EMBANKMENT

SHOT ROCK EMBANKMENT SHALL BE NATURALLY APPEARING BLASTED ROCK FROM A QUARRY. IT SHALL BE FREE OF MUCK, PEAT, FROZEN MATERIAL, ROOTS, SOD, OR OTHER DELETERIOUS MATTER. IT SHALL GENERALLY BE 6" MINUS IN SIZE.

B DRAIN ROCK

GRAVEL CONSISTING OF CRUSHED OR NATURALLY OCCURRING GRANULAR MATERIAL CONTAINING NOT MORE THAN 1% CLAY LUMPS OR OTHER READILY DECOMPOSED MATERIAL (AASHTO T 112). MEET THE GRADING REQUIREMENTS OF THE FOLLOWING GRADATION:

U.S. STANDARD SIEVE SIZE	PERCENT PASSING BY WEIGHT
3"	100
1"	0-10
No. 200	0-5

1.2 PLACEMENT AND COMPACTION REQUIREMENTS

A. SHOT ROCK EMBANKMENT

- 1) EMBANKMENT SHALL BE PLACED IN LIFTS WHOSE LOOSE THICKNESS DOES NOT EXCEED 2 FEET. MATERIAL SHALL BE DUMPED ON THE EXISTING FILL AND DOZED INTO PLACE. IN ADDITION TO MECHANICAL COMPACTION, IT SHALL BE COMPACTED BY ROUTING THE HAULING AND PLACING EQUIPMENT OVER THE ENTIRE AREA PRIOR TO PLACING THE NEXT LIFT.

STORM DRAINAGE

1.1 PRODUCTS

A. BEDDING MATERIALS

PIPE BEDDING MATERIAL SHALL CONSIST OF SCREENED SHOT ROCK MATERIAL FROM A QUARRY. IT SHALL BE FREE OF MUCK, FROZEN MATERIALS, ROOTS, SOD, OR OTHER DELETERIOUS MATTER. IT SHALL BE GENERAL WELL GRADED 2" MINUS MATERIAL.

B. SMOOTH INTERIOR CORRUGATED POLYETHYLENE PIPE

- 1) TWELVE THROUGH THIRTY-SIX INCH DIAMETER SHALL CONFORM TO AASHTO M294 TYPE S.
- 2) COUPLING BANDS SHALL COVER AT LEAST ONE FULL CORRUGATION OF EACH SECTION OF PIPE.
- 3) PIPE FITTINGS SHALL CONFORM TO AASHTO M252 OR AASHTO M294.

1.2 COMPACTION

A. BEDDING FOR CORRUGATED STEEL/PLASTIC PIPE


- 1) MATERIAL FOR SIDEFILL AROUND AND TO THE CROWN ELEVATION OF CORRUGATED PLASTIC PIPE SHALL BE SELECTED AND SHALL NOT CONTAIN STONES LARGER THAN 3 INCHES IN GREATEST DIMENSION, FROZEN LUMPS, ROOTS, OR MOISTURE IN EXCESS OF THAT PERMITTING THOROUGH COMPACTION.
- 2) MATERIAL PLACED WITHIN THE PIPE COMPACTION ZONE SHALL BE BROUGHT UP SIMULTANEOUSLY ON EACH SIDE OF THE PIPE TO THE TOP OF THE PIPE AND COMPACTED UNTIL THE SUBGRADE CAN PASS A STANDARD HEAL TOE TEST.

REVISIONS:

THRHA YAKUTAT DUPLEX  
CIVIL AND STRUCTURAL  
DESIGN


STATUS:  
  
95% DESIGN

DRAWN BY: JPT  
CHECKED BY: TSS  
DATE: 2/26/2024  
PROJECT #: 232807



R&M ENGINEERING-KETCHIKAN, INC.  
7180 REVILLA ROAD, SUITE 300  
KETCHIKAN, ALASKA 99901  
PH: 907.225.7187  
www.ketchikanengineer.com

AELC 576

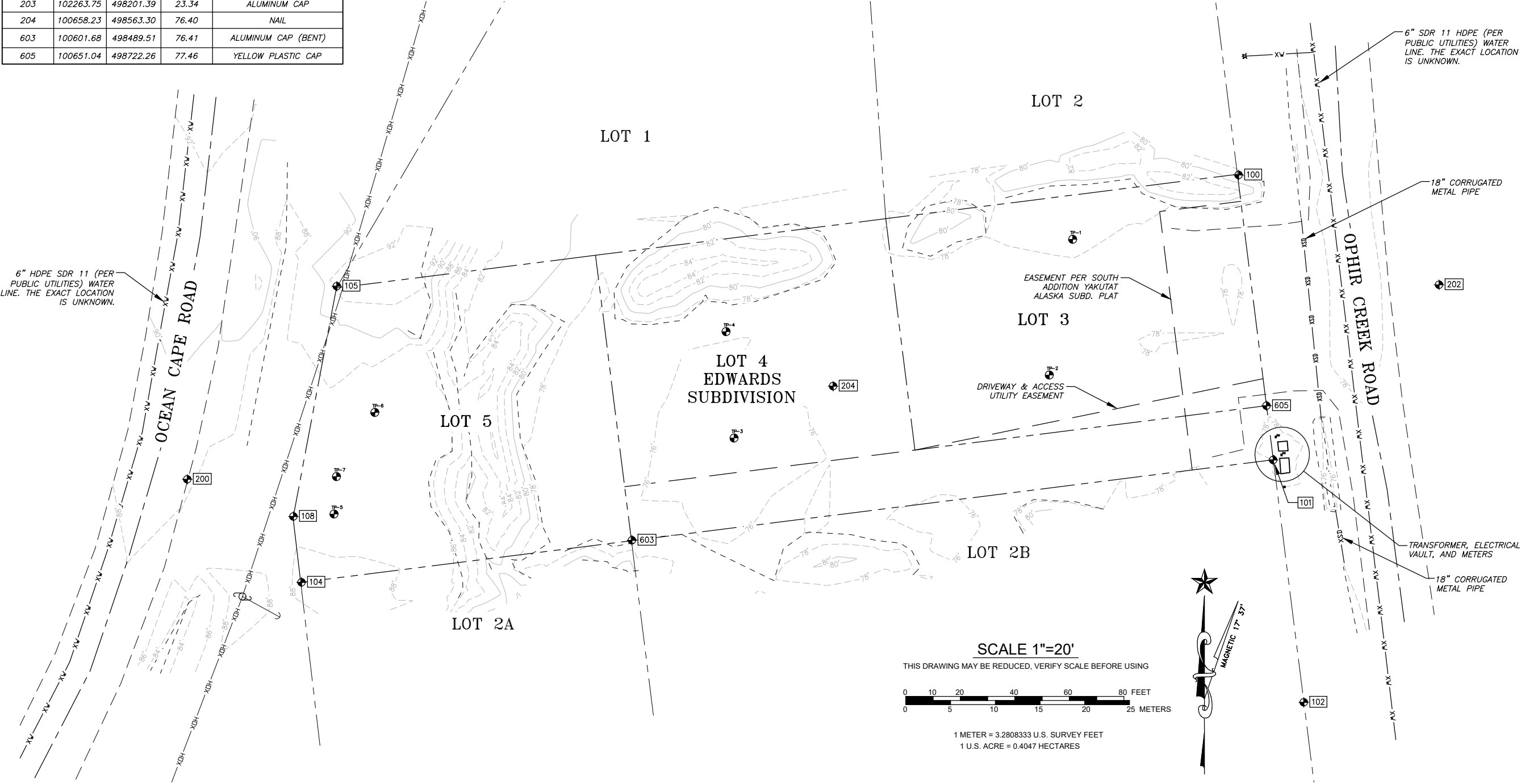


SHEET DESCRIPTION:  
SPECIFICATIONS

C0.5

SHEET:  
05 of 15

SURVEY CONTROL POINT TABLE				
POINT NO.	NORTHING	EASTING	ELEVATION	DESCRIPTION
100	100735.70	498712.02	78.16	YELLOW PLASTIC CAP (BENT)
101	100631.14	498724.71	78.04	ALUMINUM CAP
102	100542.21	498735.95	77.18	ALUMINUM CAP
103	100453.04	498747.10	77.12	ALUMINUM CAP
104	100586.25	498368.33	88.46	ALUMINUM CAP
105	100694.91	498381.27	92.46	ALUMINUM CAP
106	100274.40	498769.56	74.80	BRASS CAP
108	100610.40	498365.35	87.60	BRASS CAP
200	100624.04	498326.41	88.26	NAIL
201	101115.69	498680.80	88.80	NAIL
202	100695.44	498785.56	77.51	NAIL
203	102263.75	498201.39	23.34	ALUMINUM CAP
204	100658.23	498563.30	76.40	NAIL
603	100601.68	498489.51	76.41	ALUMINUM CAP (BENT)
605	100651.04	498722.26	77.46	YELLOW PLASTIC CAP



REVISIONS:

THRHA YAKUTAT DUPLEX  
CIVIL AND STRUCTURAL  
DESIGN

STATUS:

95% DESIGN

DRAWN BY: JPT  
CHECKED BY: TSS  
DATE: 2/26/2024  
PROJECT #: 232807

R&M ENGINEERING-KETCHIKAN, INC.

7180 REVILLA ROAD, SUITE 300  
KETCHIKAN, ALASKA 99901  
PH: 907.225.7187  
www.ketchikanengineer.com

AELC 576

STATE OF ALASKA  
49th  
JOEL P. TEUNE  
121948  
REGISTERED PROFESSIONAL ENGINEER

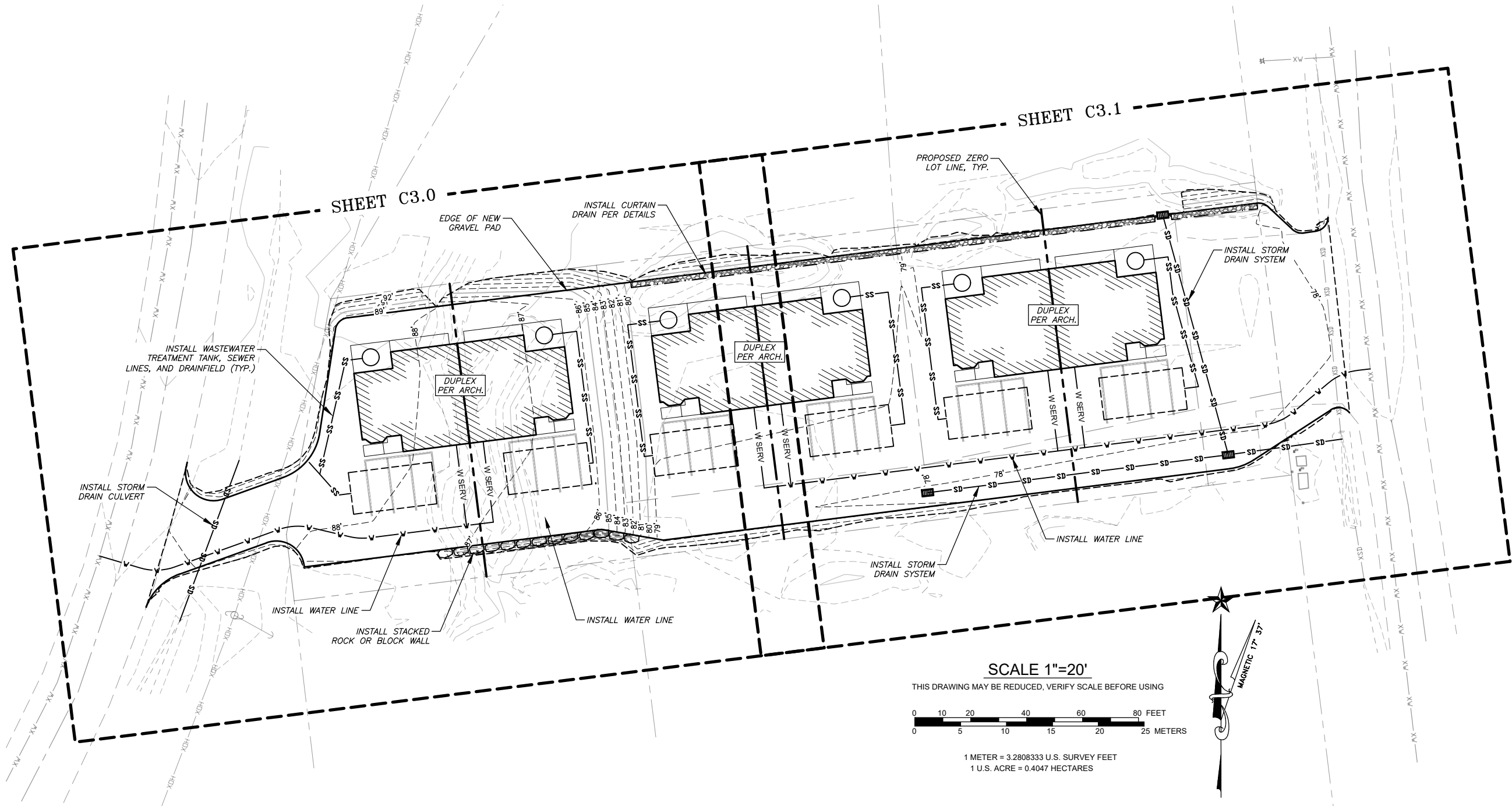
SHEET DESCRIPTION:

EXISTING CONDITIONS

C1.0

SHEET:

06 of 15



REVISIONS:

THRHA YAKUTAT DUPLEX  
CIVIL AND STRUCTURAL  
DESIGN

STATUS:

95% DESIGN

DRAWN BY: JPT  
CHECKED BY: TSS  
DATE: 2/26/2024  
PROJECT #: 232807

R&M ENGINEERING-KETCHIKAN, INC.

7180 REVILLA ROAD, SUITE 300  
KETCHIKAN, ALASKA 99901  
PH: 907.225.7187  
www.ketchikanengineer.com

AELC 576

STATE OF ALASKA  
49th  
JOEL P. TEUNE  
121948  
REGISTERED PROFESSIONAL ENGINEER

SHEET DESCRIPTION:

OVERALL SITE PLAN

C2.0

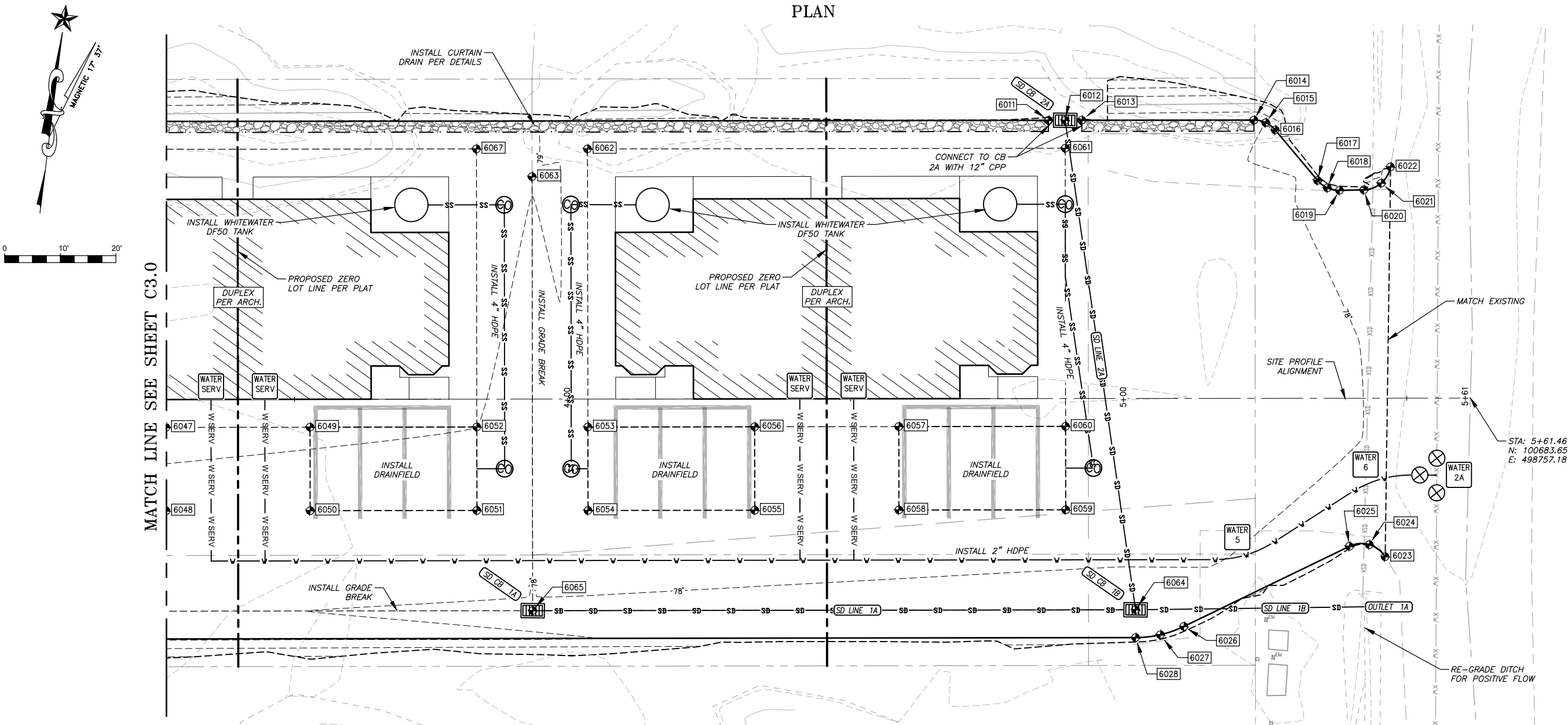
SHEET:

07 of 15

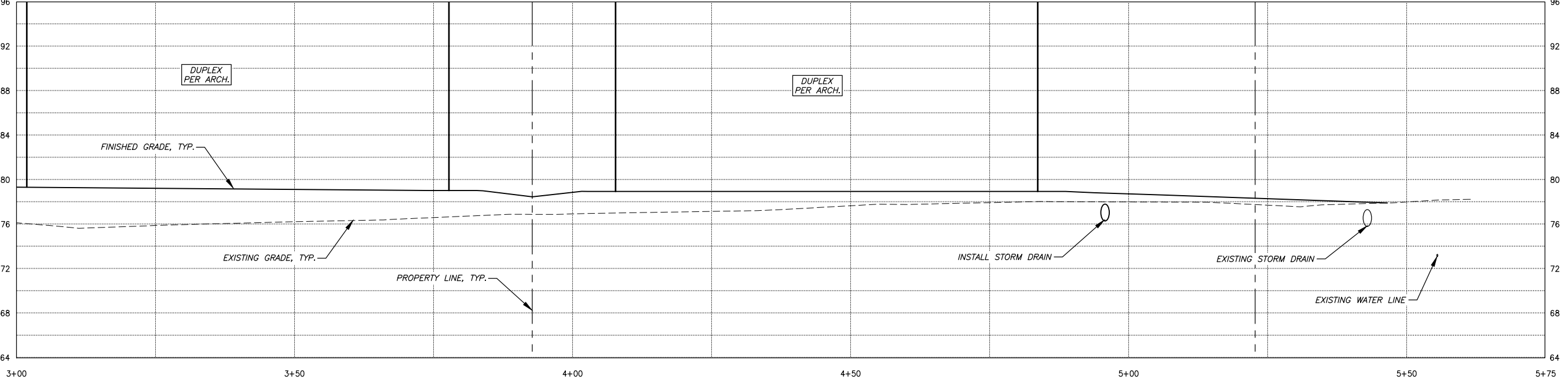




PLAN



PROFILE



REVISIONS:

THRHA YAKUTAT DUPLEX  
CIVIL AND STRUCTURAL  
DESIGN

STATUS:

95% DESIGN

DRAWN BY: JPT  
CHECKED BY: TSS  
DATE: 2/26/2024  
PROJECT #: 232807

R&M

R&M ENGINEERING-KETCHIKAN, INC.  
7180 REVILLA ROAD, SUITE 300  
KETCHIKAN, ALASKA 99901  
PH: 907.225.7187  
www.ketchikanengineer.com

STATE OF ALASKA

49th

JOEL P. TEUNE  
121948  
REGISTERED PROFESSIONAL ENGINEER

SHEET DESCRIPTION:

SITE PLAN AND PROFILE

C3.1

SHEET:

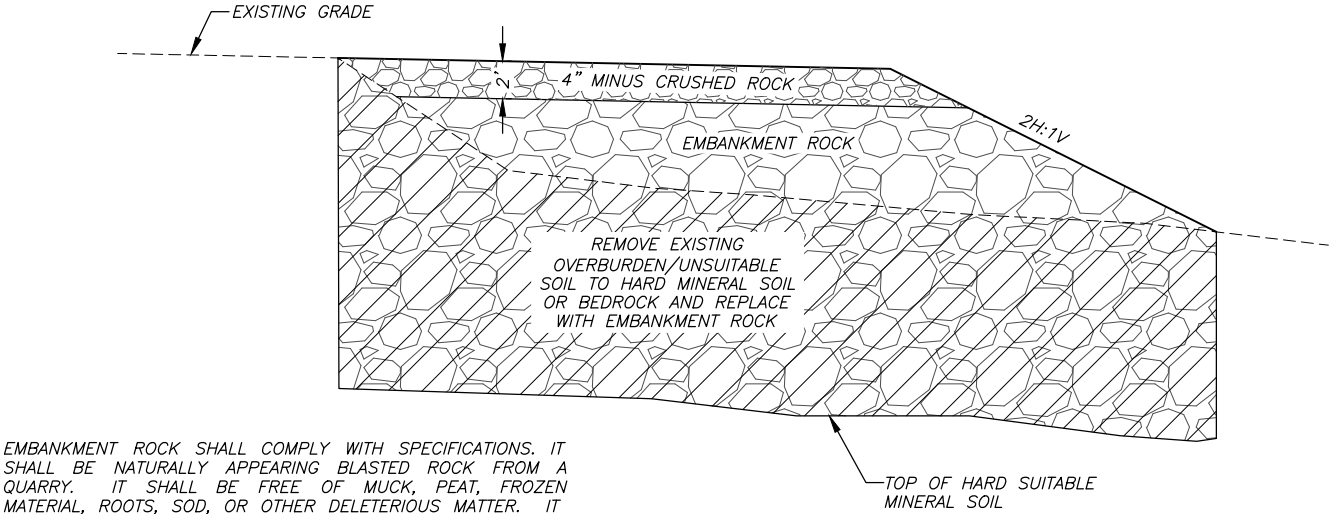
09 of 15

FINISHED GRADE POINT TABLE				
POINT NO.	NORTHING	EASTING	ELEVATION	DESCRIPTION
6000	100635.74	498329.77	88.64	MATCH EXISTING
6001	100624.48	498332.61	88.37	FINISHED GRADE
6002	100622.60	498342.58	88.68	FINISHED GRADE
6003	100630.35	498364.12	88.72	FINISHED GRADE
6004	100636.46	498372.79	88.73	FINISHED GRADE
6005	100646.15	498377.11	88.76	FINISHED GRADE
6006	100683.23	498382.78	88.50	FINISHED GRADE
6007	100686.06	498384.23	89.02	FINISHED GRADE
6008	100687.44	498387.10	88.50	FINISHED GRADE
6009	100697.53	498467.17	84.80	FINISHED GRADE
6010	100700.18	498488.20	79.25	CURTAIN DRAIN
6011	100723.81	498675.71	78.26	CURTAIN DRAIN
6012	100724.18	498678.68	78.24	CENTER OF RIM
6013	100724.56	498681.66	78.22	CURTAIN DRAIN
6014	100728.42	498712.36	78.01	CURTAIN DRAIN
6015	100728.22	498714.52	78.28	FINISHED GRADE
6016	100727.13	498716.39	77.99	FINISHED GRADE
6017	100719.07	498725.07	77.91	FINISHED GRADE
6018	100717.96	498726.99	77.90	FINISHED GRADE
6019	100717.79	498729.20	77.88	FINISHED GRADE
6020	100718.43	498733.53	77.85	FINISHED GRADE
6021	100720.01	498736.49	77.67	FINISHED GRADE
6022	100723.11	498737.79	77.80	FINISHED GRADE
6023	100653.46	498745.50	77.75	FINISHED GRADE
6024	100655.26	498742.40	77.75	FINISHED GRADE
6025	100654.52	498738.88	77.76	FINISHED GRADE
6026	100636.54	498711.14	77.80	FINISHED GRADE
6027	100634.53	498707.12	77.60	FINISHED GRADE
6028	100633.48	498702.76	77.81	FINISHED GRADE
6029	100607.90	498500.05	78.21	FINISHED GRADE
6030	100611.73	498477.99	85.87	FINISHED GRADE
6031	100598.31	498371.63	88.32	FINISHED GRADE
6032	100606.08	498366.90	88.51	FINISHED GRADE
6033	100606.98	498358.26	88.69	FINISHED GRADE
6034	100595.74	498327.04	87.84	FINISHED GRADE
6035	100591.16	498319.77	87.40	FINISHED GRADE
6036	100583.95	498315.09	87.39	MATCH EXISTING
6037	100632.04	498387.40	88.52	DRAINFIELD
6038	100617.16	498389.27	88.10	DRAINFIELD
6039	100620.92	498419.03	87.52	DRAINFIELD
6040	100635.80	498417.15	87.84	DRAINFIELD
6041	100624.16	498444.75	86.92	DRAINFIELD
6042	100639.04	498442.87	87.23	DRAINFIELD
6043	100642.80	498472.62	86.53	DRAINFIELD
6044	100627.92	498474.50	86.23	DRAINFIELD
6045	100645.63	498495.29	79.35	DRAINFIELD
6046	100630.75	498497.17	78.90	DRAINFIELD
6047	100649.38	498525.05	79.23	DRAINFIELD
6048	100634.50	498526.92	78.67	DRAINFIELD
6049	100652.63	498550.76	79.12	DRAINFIELD
6050	100637.75	498552.64	78.58	DRAINFIELD
6051	100641.50	498582.40	78.52	DRAINFIELD
6052	100656.38	498580.52	79.00	DRAINFIELD
6053	100658.85	498600.34	78.95	DRAINFIELD
6054	100643.97	498602.22	78.48	DRAINFIELD
6055	100647.72	498631.98	78.48	DRAINFIELD
6056	100662.60	498630.10	78.95	DRAINFIELD
6057	100665.85	498655.82	78.95	DRAINFIELD
6058	100650.97	498657.69	78.46	DRAINFIELD
6059	100654.72	498687.45	78.40	DRAINFIELD

FINISHED GRADE POINT TABLE				
POINT NO.	NORTHING	EASTING	ELEVATION	DESCRIPTION
6060	100669.60	498685.57	78.95	DRAINFIELD
6061	100719.20	498679.31	78.95	FINISHED GRADE
6062	100708.44	498594.08	78.95	FINISHED GRADE
6063	100702.27	498584.81	79.05	FINISHED GRADE
6064	100638.44	498702.14	77.71	CENTER OF RIM
6065	100624.86	498594.58	77.92	CENTER OF RIM
6066	100614.11	498509.35	78.09	FINISHED GRADE
6067	100705.98	498574.26	79.35	FINISHED GRADE
6068	100695.22	498489.03	79.35	FINISHED GRADE
6069	100642.98	498474.05	86.50	FINISHED GRADE
6070	100692.58	498467.79	86.50	FINISHED GRADE
6071	100632.23	498388.82	88.50	FINISHED GRADE
6072	100636.42	498348.33	86.21	CULVERT INLET
6073	100578.95	498327.08	83.34	CULVERT OUTLET
6074	100604.46	498420.38	87.20	BEGIN WALL
6075	100609.40	498491.40	81.21	END WALL

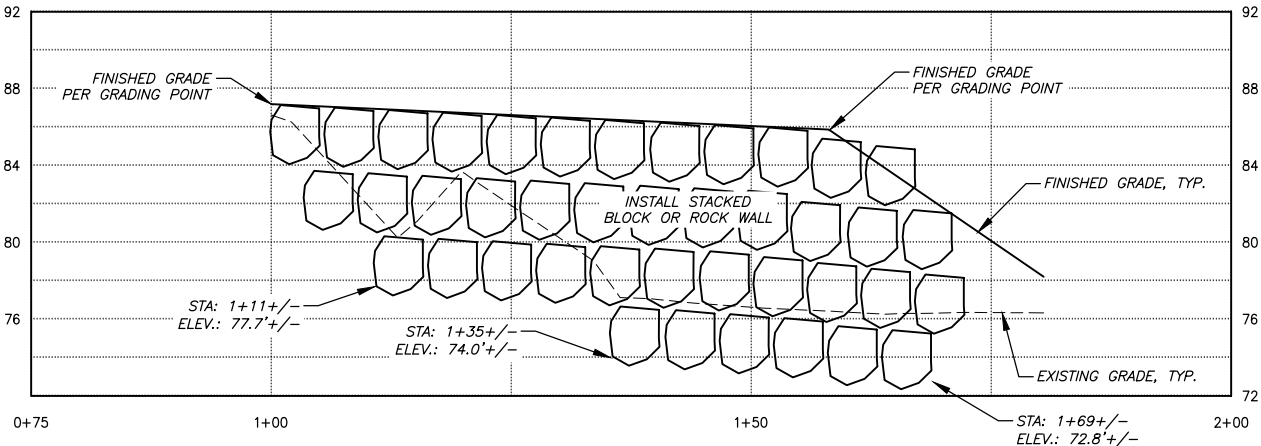
WATER CONSTRUCTION NOTES

<div>WATER 1A</div> <div>INSTALL VALVE CLUSTER N: 100602.14 E: 498298.44 SEE DETAILS</div>	<div>WATER 2</div> <div>INSTALL BEND N: 100597.10 E: 498319.68 R=20'</div>	<div>WATER SERVICE</div> <div>INSTALL 1" HDPE WATER SERVICE. SEE WATER SERVICE INSTALLATION DETAILS</div>
<div>WATER 2A</div> <div>INSTALL VALVE CLUSTER N: 100669.17 E: 498752.90 SEE DETAILS</div>	<div>WATER 3</div> <div>INSTALL BEND N: 100612.90 E: 498368.30 R=20'</div>	
	<div>WATER 4</div> <div>INSTALL BEND N: 100608.56 E: 498391.56 R=20'</div>	
	<div>WATER 5</div> <div>INSTALL BEND N: 100650.64 E: 498720.51 R=20'</div>	
	<div>WATER 6</div> <div>INSTALL BEND N: 100667.14 E: 498742.86 R=20'</div>	

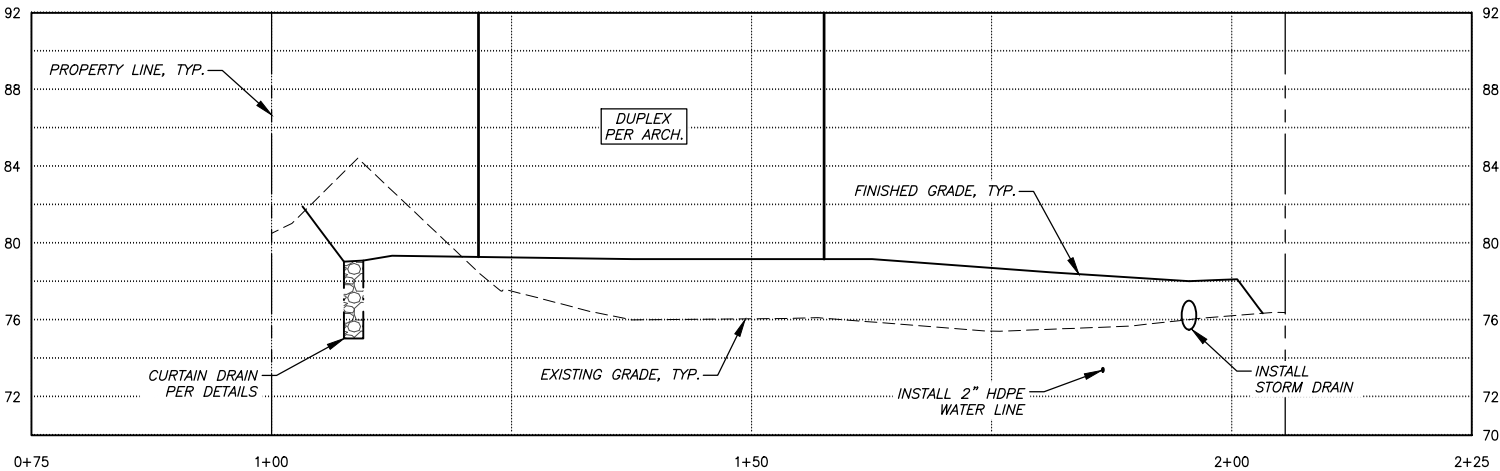


EMBANKMENT ROCK SHALL COMPLY WITH SPECIFICATIONS. IT SHALL BE NATURALLY APPEARING BLASTED ROCK FROM A QUARRY. IT SHALL BE FREE OF MUCK, PEAT, FROZEN MATERIAL, ROOTS, SOD, OR OTHER DELETERIOUS MATTER. IT SHALL GENERALLY BE 12" MINUS IN SIZE.

1 TYPICAL FILL SECTION  
C4.0 NOT TO SCALE



2 STACKED ROCK RETAINING WALL PROFILE  
C4.0 NOT TO SCALE



3 SITE SECTION VIEW  
C4.0 NOT TO SCALE

REVISIONS:

THRHA YAKUTAT DUPLEX  
CIVIL AND STRUCTURAL  
DESIGN

STATUS:

95% DESIGN

DRAWN BY: JPT  
CHECKED BY: ISS  
DATE: 2/26/2024  
PROJECT #: 232807

**R&M**  
R&M ENGINEERING-KETCHIKAN, INC.  
7180 REVILLA ROAD, SUITE 300  
KETCHIKAN, ALASKA 99901  
PH: 907.225.7187  
www.ketchikanengineer.com  
AELC 576

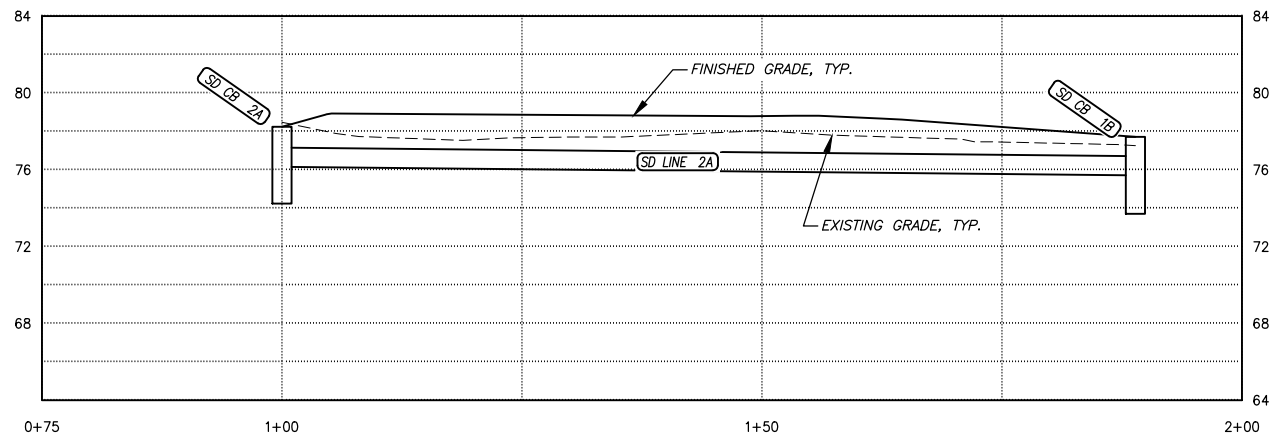
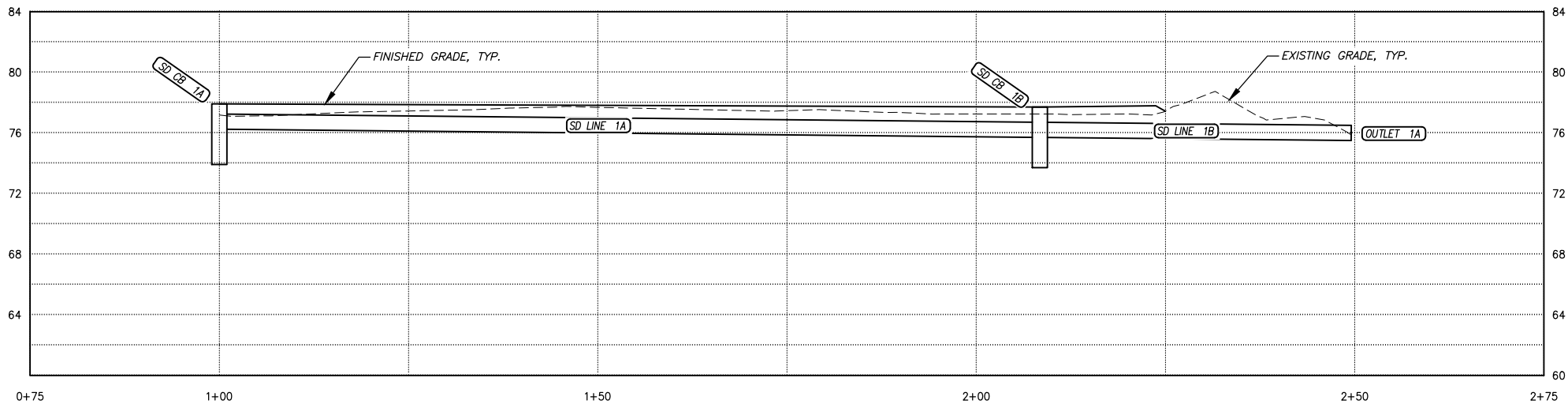


SHEET DESCRIPTION:  
TABLES, RETAINING WALL  
PROFILE, AND SITE  
SECTION

C4.0

SHEET:

<b>SD CB 1A</b> INSTALL CATCH BASIN STA 1+00.00 RIM=77.92' IE "SD LINE 1A"=76.24' N 100624.56, E 498594.58	<b>SD LINE 1A</b> INSTALL 110 LF 12" CPP S=0.05	<b>SD CB 1B</b> INSTALL CATCH BASIN STA 2+08.41 RIM=77.71' IE "SD LINE 1A"=75.71' IE "SD LINE 2A"=75.71' IE "SD LINE 1B"=75.71' N 100638.44, E 498702.14	<b>SD CB 2A</b> INSTALL CATCH BASIN STA 1+00 RIM=78.24' IE "SD LINE 2A"=76.15' N 100724.18, E 498678.68	<b>SD LINE 2A</b> INSTALL 90 LF 18" CPP S=0.05	<b>SD LINE 1B</b> INSTALL 42 LF 12" CPP S=0.05	<b>OUTLET 1A</b> OPEN OUTLET STA 2+49.54 IE "SD LINE 1B"=75.50' N 100644.06, E 498742.87
---------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------	---------------------------------------------------------	------------------------------------------------------------------------------------------------------



1  
C4.1

STORM DRAIN PROFILES AND TABLES

NOT TO SCALE

REVISIONS:

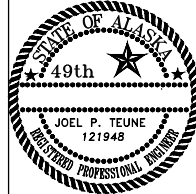
THRHA YAKUTAT DUPLEX  
CIVIL AND STRUCTURAL  
DESIGN

STATUS:

95% DESIGN

DRAWN BY: JPT  
CHECKED BY: TSS  
DATE: 2/26/2024  
PROJECT #: 232807

**R&M**  
R&M ENGINEERING-KETCHIKAN, INC.  
7180 REVILLA ROAD, SUITE 300  
KETCHIKAN, ALASKA 99901  
PH: 907.225.7187  
www.ketchikanengineer.com  
AELC 576

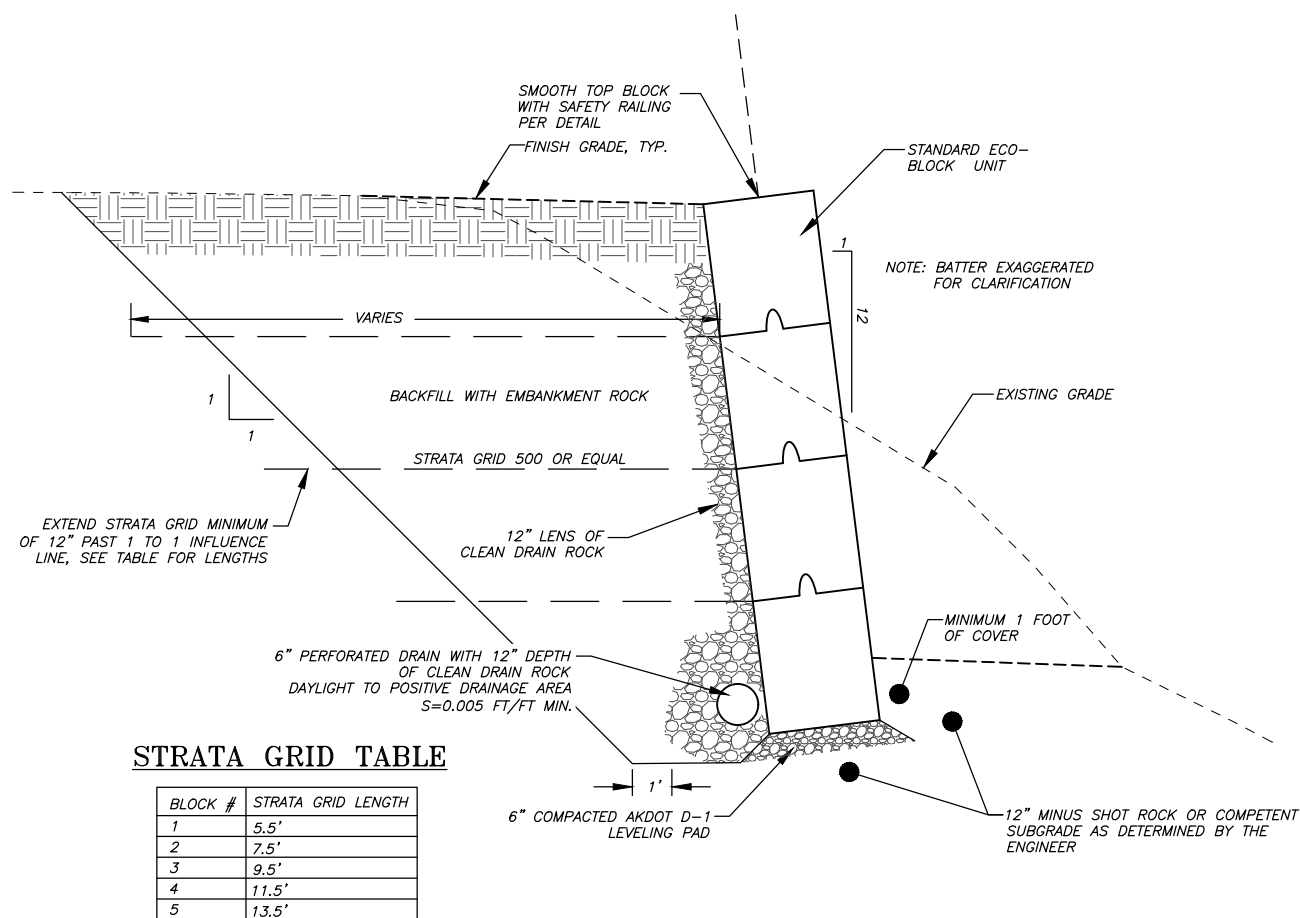


SHEET DESCRIPTION:  
STORM DRAIN PROFILES  
AND TABLES

C4.1

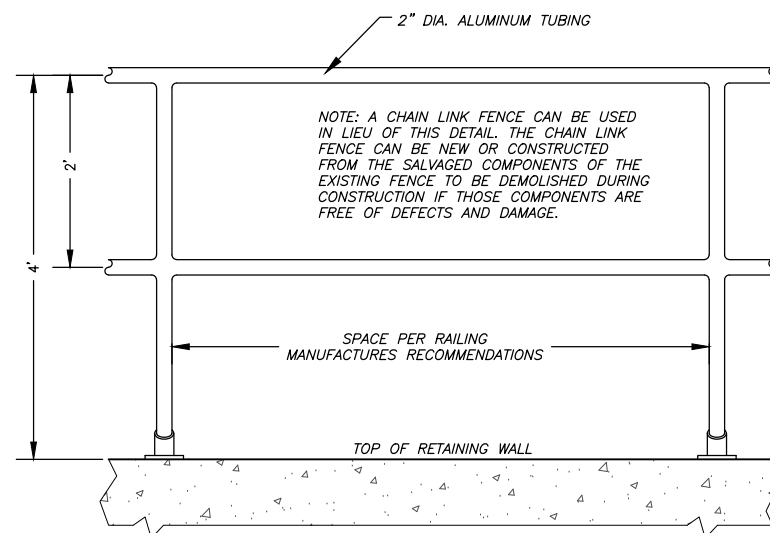
SHEET:

11 of 15

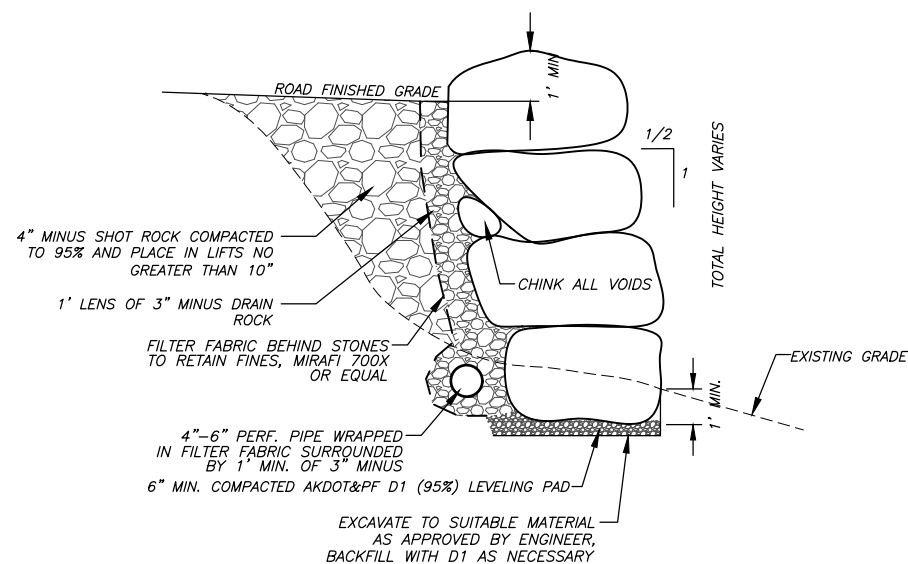


1  
C5.0
 

 STACKED ROCK RETAINING WALL SECTION DETAIL  
 NOT TO SCALE



3 ALUMINUM HANDRAIL DETAIL  
C5.0 NOT TO SCALE



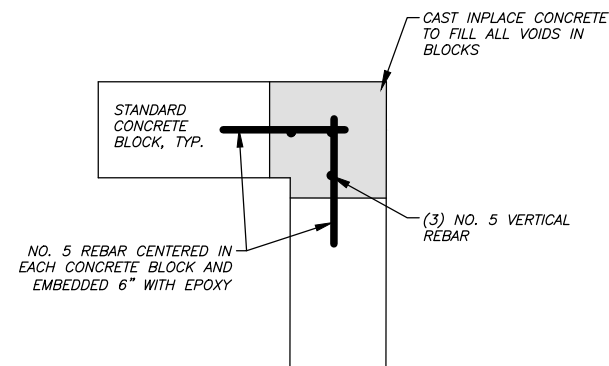
- ROCKERY RETAINING WALL DETAIL NOTES:

- 1) THE LONG DIMENSION OF THE ROCKS SHALL EXTEND INTO THE EMBANKMENT TO PROVIDE MAXIMUM STABILITY.
- 2) THE ROCK SHALL BE PLACED SO AS TO LOCK INTO TWO ROCKS; STAGGER JOINTS.
- 3) CONSTRUCT ROCKERY OF 5 MAN TO 2 MAN ROCKS WITH DECREASING SIZE FROM BOTTOM TO TOP.
  - 2 MAN ROCKS 200 LBS MIN, 700 LBS MAX, SIZE 18" TO 28"
  - 2 MAN ROCK LOCATION - TOP 3 FEET
  - 3 MAN ROCKS 700 LBS MIN, 2000 LBS MAX, SIZE 28" TO 36"
  - 3 MAN ROCK LOCATION - 2 TO 6 FEET FROM TOP
  - 4 MAN ROCKS 2000 LBS MIN, 4000 LBS MAX, SIZE 36" TO 48"
  - 4 MAN ROCK LOCATION - 4 TO 8 FEET FROM TOP
  - 5 MAN ROCKS 4000 LBS MIN, 6000 LBS MAX, SIZE 48" TO 54"
  - 5 MAN ROCK LOCATION - BOTTOM TO 8 FEET BELOW TOP

2
STACKED ROCK RETAINING WALL SECTION

---

C5.0
NOT TO SCALE



# 4 C5.0 CAST IN PLACE CONCRETE JOINT DETAIL --- NOT TO SCALE

REVISIONS:

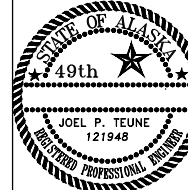
THRHA YAKUTAT DUPLEX  
CIVIL AND STRUCTURAL  
DESIGN

STATUS:

**95% DESIGN**

DRAWN BY: JPT  
CHECKED BY: TSS  
DATE: 2/26/2024  
PROJECT #: 232807

**R&M**  
**R&M ENGINEERING-KETCHIKAN, INC.**  
7180 REVILLA ROAD, SUITE 300  
KETCHIKAN, ALASKA 99901  
PH: 907.225.7187  
www.ketchikanengineer.com  
AELC 576



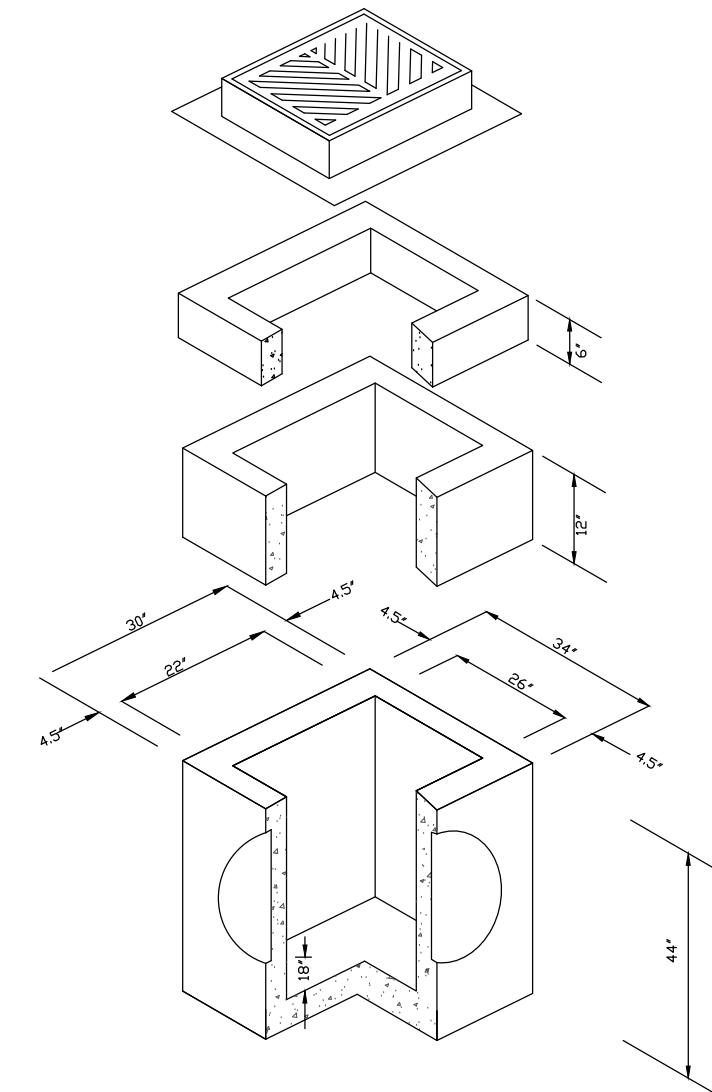
SHEET DESCRIPTION:

## DETAILS

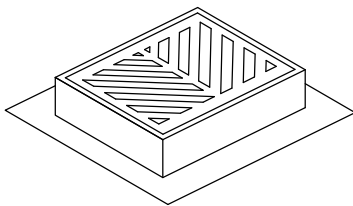
## C5.0

SHEET:

12 of 15

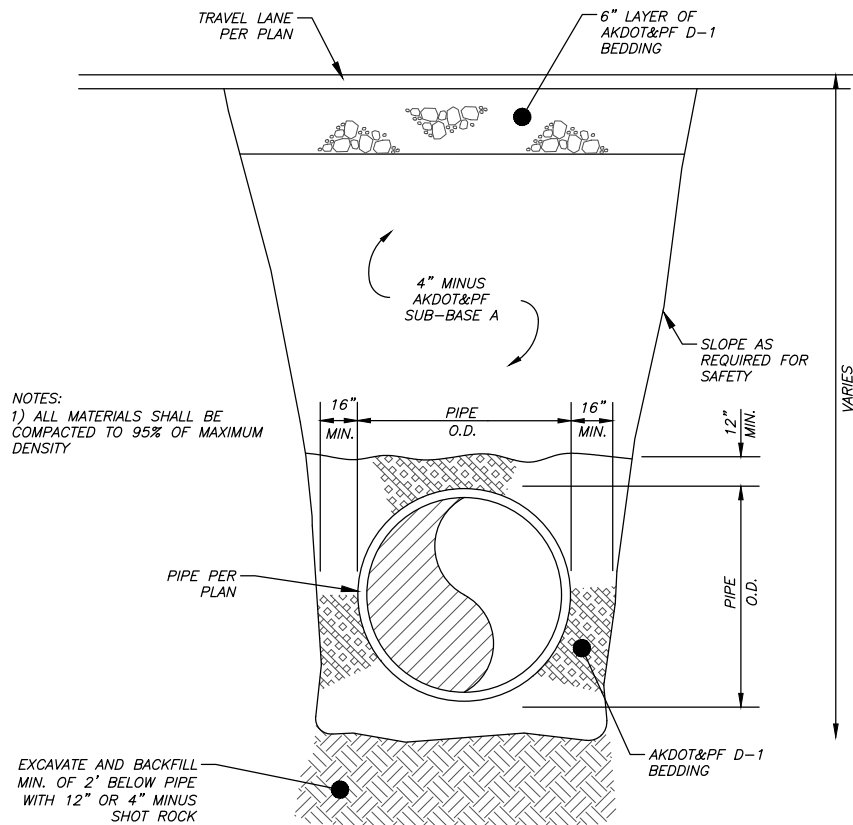


NOTE:  
1) CATCH BASINS SCHEDULED TO HAVE CURB INLETS SHALL HAVE NEENAH FOUNDRY TYPE R-3501-T INLET FOR ROLL TYPE CURB OR EQUAL.

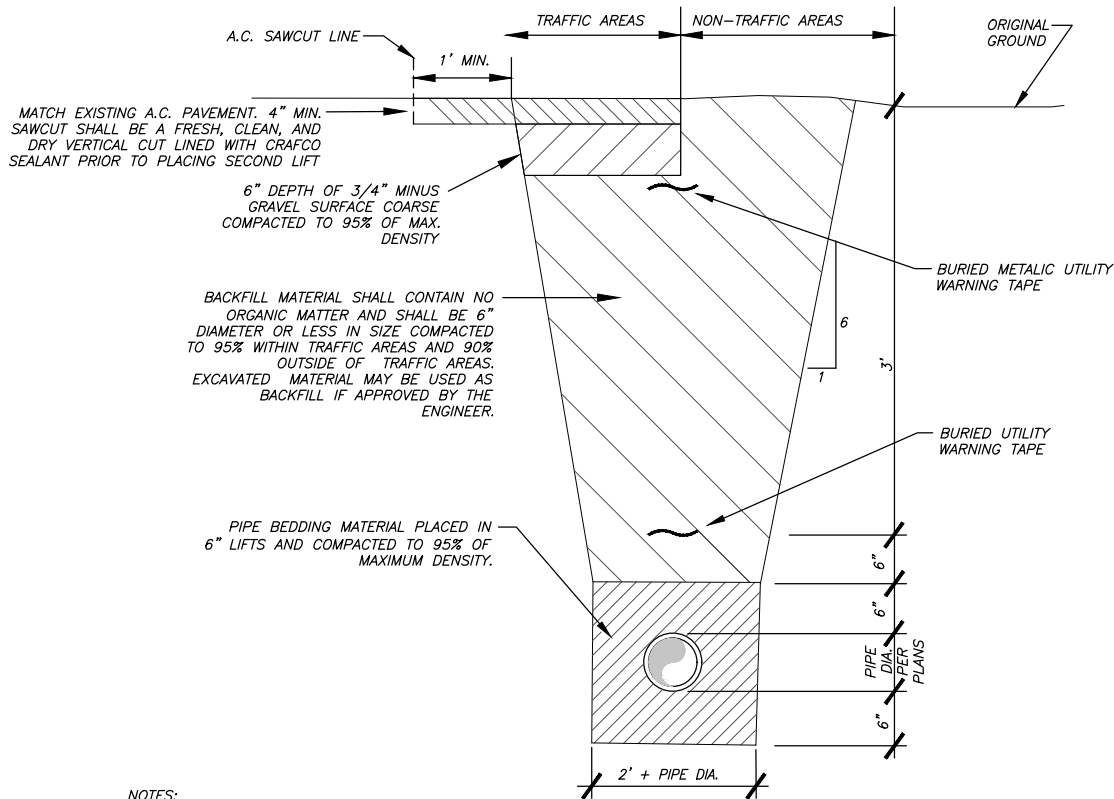


NOTES:  
1) CATCH BASINS SCHEDULED TO HAVE FIELD INLETS SHALL HAVE OLYMPIC FOUNDRY 18"x22"x4" REVERSIBLE, PART NO. SM60 OR EQUAL.  
2) CATCH BASINS SCHEDULED TO HAVE CURB INLETS SHALL HAVE NEENAH FOUNDRY TYPE R-3501-N INLET FOR ROLL TYPE CURB OR EQUAL.

**1**  
C5.1 CATCH BASIN DETAIL  
NOT TO SCALE



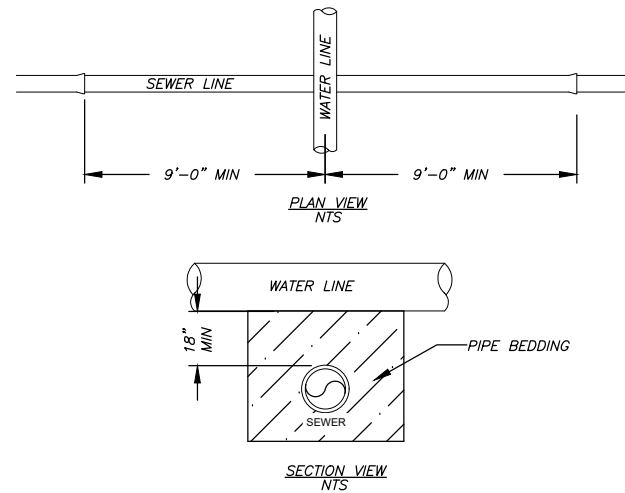
**2**  
C5.1 TYPICAL TRENCH DETAIL (STORM DRAIN PIPING)  
NOT TO SCALE



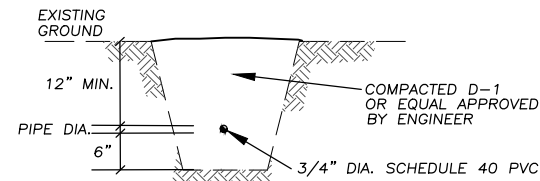
NOTES:

1. BACKFILL MATERIAL SHALL BE PLACED IN 12" MAXIMUM LIFTS.
2. TRENCH EXCAVATION AND SHORING SHALL COMPLY WITH LOCAL, STATE, AND OSHA REGULATIONS AND REQUIREMENTS.
3. INDICATED SLOPE IS FOR PAY QUANTITY DETERMINATION ONLY FOR IMPORTED BACKFILL GRAVEL AND RESURFACING REQUIREMENTS.
4. IF UNSUITABLE PIPE FOUNDATION MATERIAL IS ENCOUNTERED DURING EXCAVATION, ENGINEER MAY DIRECT THE CONTRACTOR TO OVER-EXCAVATE AND BACKFILL WITH SUITABLE MATERIAL.
5. THE DITCH LINE, IF ONE EXISTS, SHALL BE RESHAPED IN SUCH A MANNER TO ALLOW POSITIVE DRAINAGE TO MATCH PRE-CONSTRUCTION CONDITIONS.

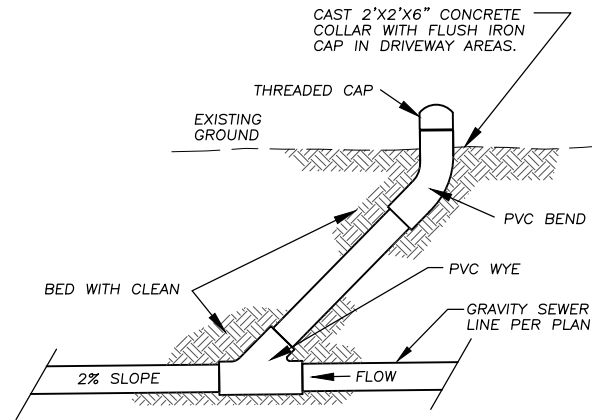
**4**  
C5.1 TYPICAL TRENCH DETAIL (WATER AND SEWER PIPING)  
NOT TO SCALE



**3**  
C5.1 WATER MAIN CROSSING SEWER DETAIL  
NOT TO SCALE



**5**  
C5.1 AIR PIPING DETAIL  
NOT TO SCALE



**6**  
C5.1 SANITARY SEWER CLEANOUT DETAIL  
NOT TO SCALE

REVISIONS:

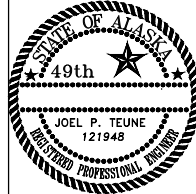
THRHA YAKUTAT DUPLEX  
CIVIL AND STRUCTURAL  
DESIGN

STATUS:

95% DESIGN

DRAWN BY: JPT  
CHECKED BY: TSS  
DATE: 2/26/2024  
PROJECT #: 232807

**R&M**  
R&M ENGINEERING-KETCHIKAN, INC.  
7180 REVILLA ROAD, SUITE 300  
KETCHIKAN, ALASKA 99901  
PH: 907.225.7187  
www.ketchikanengineer.com  
AELC 576



SHEET DESCRIPTION:

DETAILS

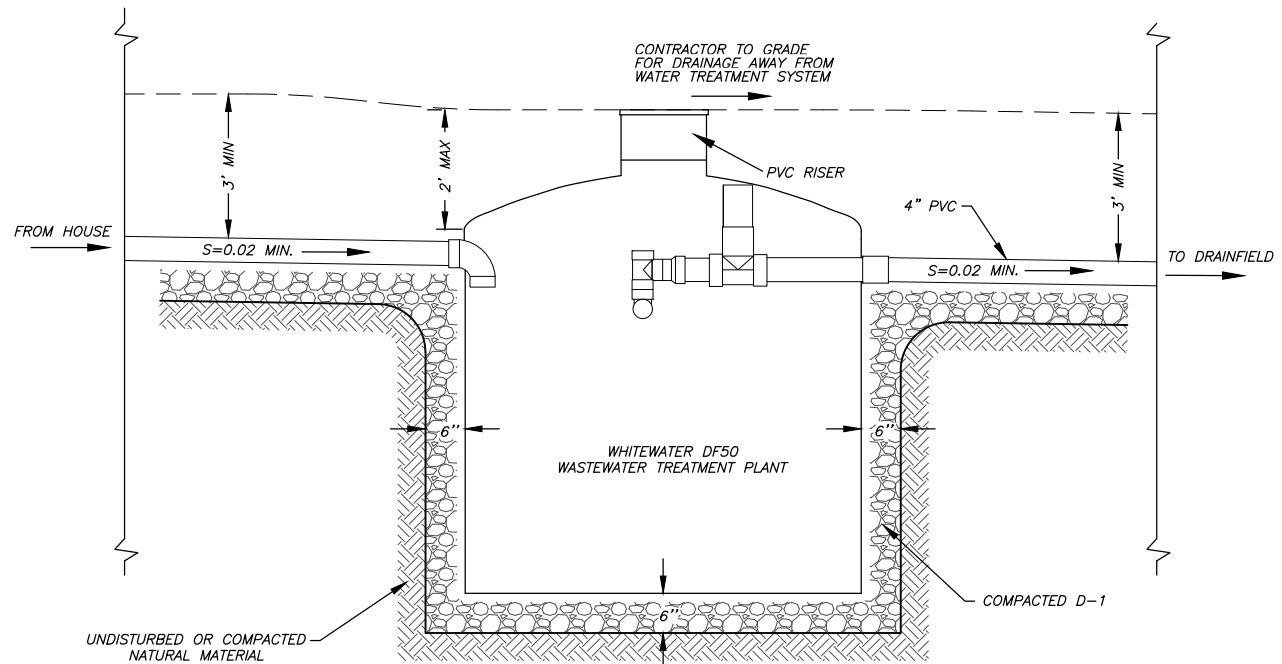
C5.1

SHEET:

13 of 15



1. INSTALL TOP OF VALVE BOX IN SIDEWALK AS SHOWN, 1/4" BELOW TOP OF PAVED SURFACE.
2. IN AREAS WITHOUT SIDEWALK, INSTALL VALVE BOX ENCASED IN THE CENTER OF A MIN. 12" x 12" x 6" CONCRETE PAD ADJACENT AND LEVEL WITH THE TOP BACK OF CURB
3. AT FINISHED GRADE, THE REMAINING OVERLAPPING PORTION OF THE VALVE BOX SHALL ALLOW FOR A MINIMUM 12" OF FUTURE ADJUSTMENT
4. ENLARGED BASE IS REQUIRED FOR 1" SERVICE VALVES AND LARGER.
5. A SERVICE VALVE ROD EXTENSION IS REQUIRED ON ALL SERVICE VALVES 6" OR MORE BELOW FINISHED GRADE.
6. EXTEND SERVICE PAST SERVICE VALVE TO EXISTING SERVICE PIPE AS REQUIRED TO ESTABLISH SERVICE OR AS INDICATED ON THE PLANS. WHERE SERVICE EXTENSION IS ABOVE GROUND, PIPE SHALL BE INSULATED WITH 2" OF FOAM INSULATION WITH PROTECTIVE COATING.
7. PLACE BOARD INSULATION w/ BURIED UTILITY WARNING TAPE ABOVE AS REQUIRED.
8. IN UNPAVED STREETS OR AREAS WITHOUT SIDEWALKS, EACH VALVE BOX TO BE SUPPORTED BY A 12"x 12"x 6" CONCRETE PAD POURED AROUND THE UPPER SERVICE BOX TOP.
9. SECURE THE COPPER THAW WIRE TO THE COUPLING USING A BRASS ELECTRICAL GROUND CLAMP  
ROUTE THE COPPER THAW WIRE ALONG THE OUTSIDE OF VALVE BOX, THROUGH THE HOLE AT TOP. SECURE WIRE TO OUTSIDE OF BOX WITH BRASS ELECTRICAL GROUND CLAMP OR FIBER TAPE.
10. CLEAN SAND MUST BE PLACED AROUND ALL VALVE BOXES.
11. THREADED VALVE BOX SECTIONS ARE NOT ALLOWED. CONTRACTOR SHALL REMOVE THREADED PORTIONS OF THE VALVE BOX WITH CUT-OFF SAW



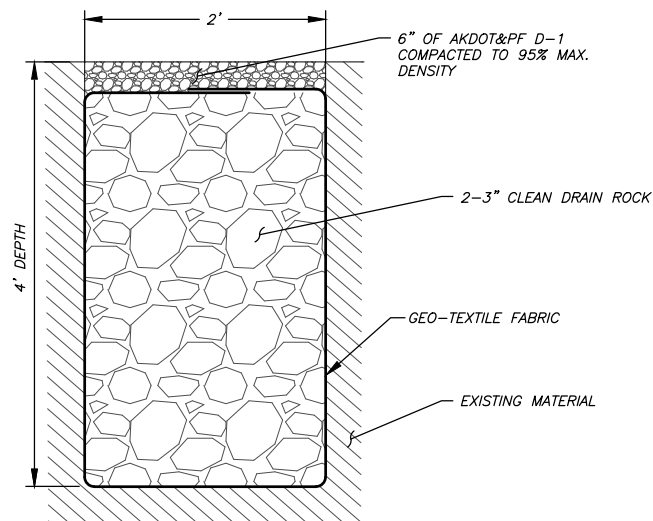
2
C5.2

## WASTEWATER TREATMENT TANK DETAIL

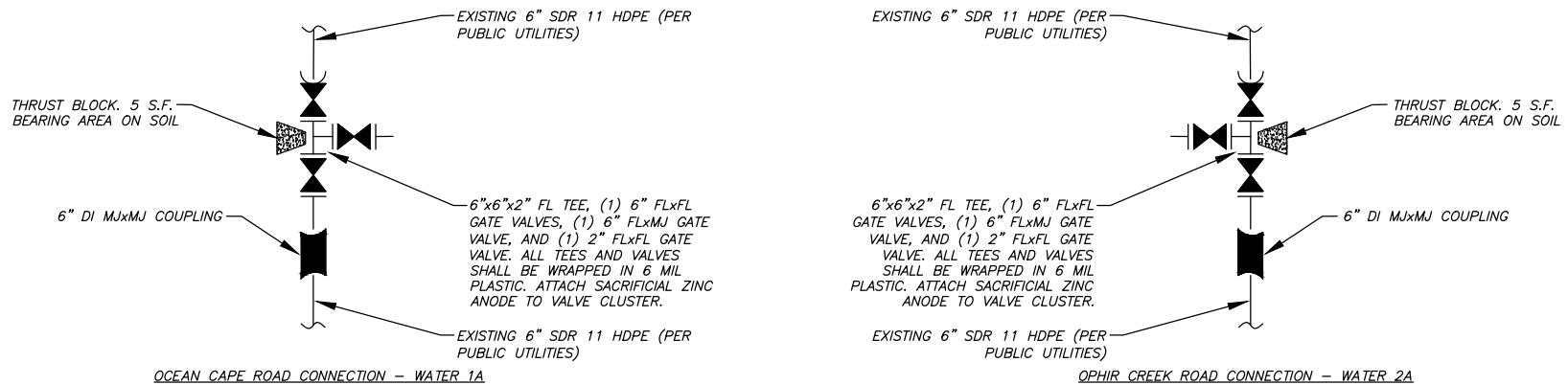
---

### NOT TO SCALE

1 2" AND SMALLER WATER SERVICE DETAIL  
C5.2 NOT TO SCALE



3 CURTAIN DRAIN DETAIL  
C5.2 NOT TO SCALE



1. SQ. FT. OF CONC. THRUST AREA BASED ON 200 PSI INTERNAL PRESSURE, SAFE SOIL BEARING OF 3,000 PSF AND A SAFETY FACTOR OF 1.5.
2. BEARING AREA MAY VARY IN SIZE TO SUIT DIFFERENT INTERNAL PRESSURES, DIFFERENT SOIL BEARING VALUES AND SITE CONDITIONS OF ENGINEERS APPROVAL.
3. CONCRETE BLOCKING SHALL BE CAST IN PLACE & HAVE A MIN. OF 1/4 SQ. FT. BEARING AGAINST THE FITTINGS.

4. BLOCK SHALL BE CLEAR OF ALL JOINTS TO PERMIT
5. THRUST BLOCKS NOT REQUIRED AT FITTINGS EXCEPT WHERE INDICATED.
6. 6 MIL POLYETHYLENE MUST BE INSTALLED  
BETWEEN CONC. THRUST BLOCK & PIPE.
7. MECHANICAL RESTRAINT MAY BE INSTALLED IN LIEU OF THRUST BLOCKS

## 4 VALVE CLUSTER DETAILS

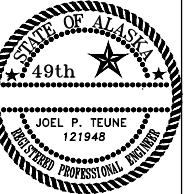
REVISIONS:

# THRHA YAKUTAT DUPLEX CIVIL AND STRUCTURAL DESIGN

STATUS:

## 95% DESIGN

DRAWN BY: JPT  
CHECKED BY: TSS  
DATE: 2/26/2024  
PROJECT #: 232807



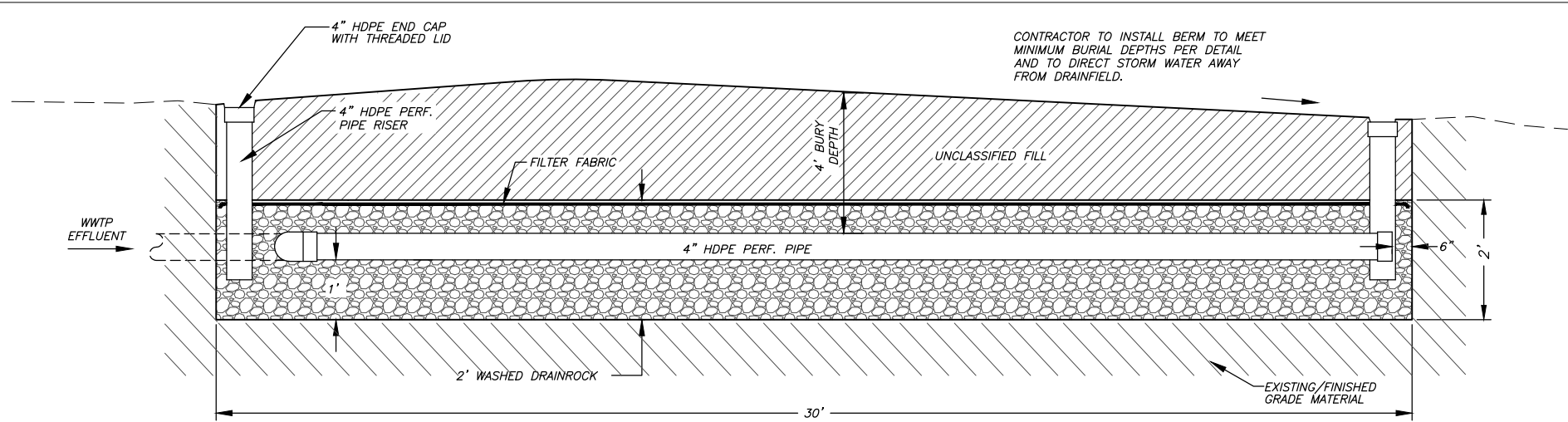
**SHEET DESCRIPTION:**

## DETAILS

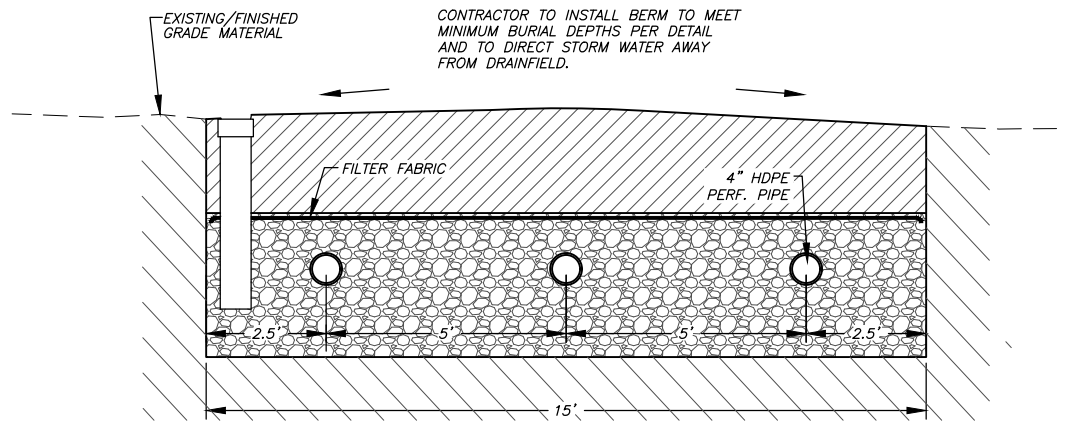
## C5.2

SHEET:

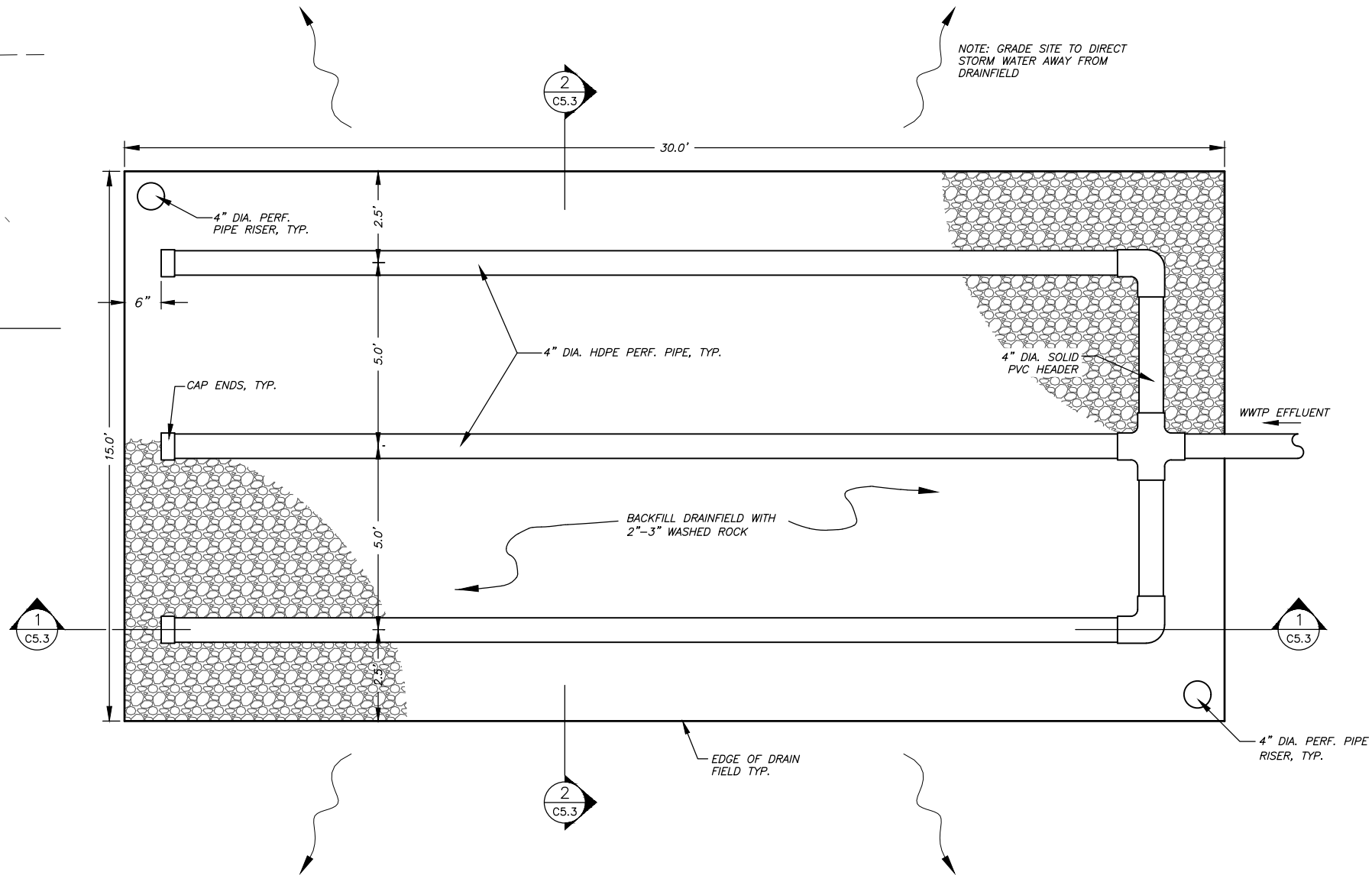
14 of 15



1 DRAINFIELD PROFILE DETAIL  
C5.3 NOT TO SCALE



2 DRAINFIELD SECTION DETAIL  
C5.3 NOT TO SCALE



3 DRAINFIELD LAYOUT DETAIL  
C5.3 NOT TO SCALE

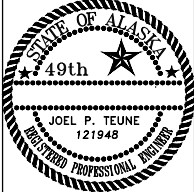
REVISIONS:

THRHA YAKUTAT DUPLEX  
CIVIL AND STRUCTURAL  
DESIGN

STATUS:  
**95% DESIGN**

DRAWN BY: JPT  
CHECKED BY: TSS  
DATE: 2/26/2024  
PROJECT #: 232807

**R&M**  
R&M ENGINEERING-KETCHIKAN, INC.  
7180 REVILLA ROAD, SUITE 300  
KETCHIKAN, ALASKA 99901  
PH: 907.225.7187  
www.ketchikanengineer.com  
AELC 576



SHEET DESCRIPTION:  
DETAILS

**C5.3**

SHEET:  
15 of 15