

MEMORANDUM
DEPARTMENT OF NATURAL RESOURCES

State of Alaska
DIVISION OF FORESTRY
CENTRAL OFFICE

TO: Forestry Management Team
Area Foresters

DATE: February 4, 2016

FILE: PPM

FROM: John "Chris" Maisch
Director

PHONE: 269-8463

SUBJECT: DOF Road and Bridge Standards

The Division of Forestry (DOF) constructs and maintains forest road on State Forest as well as other State land in support of forest management activities. Forest road typically is constructed through timber sales, public works or force account projects to meet the State's forest management objectives. The DOF managed transportation infrastructure generally is accessible and is incidentally used by the public for a variety reasons. The DOF Road and Bridge Standards, adopted with this memo, represent a standard meeting guidelines for safety and engineered design of a forest road used by public and industrial users. The standards represent the minimum acceptable condition of State forest roads. The standards are applied based on a classification of a road's type of use. They shall guide all work on DOF managed roads during new construction, reconstruction and maintenance unless site specific plans are otherwise approved by the Resource Program Manager or his designee.

The standards are designed to meet regional conditions. They represent best management practices of the Alaska Forest Practices Act and Regulations, guidelines of professional organizations and are consistent with other forest road design practices used in western states. They are presented in a modular format that allows managers to focus the "boiler plate" as needed for the tasks being performed. The set of standards are predominately graphic in nature and will print full size in 11x17 format. The goal is to impart intent to a wider group of users without losing important detail.

Application:

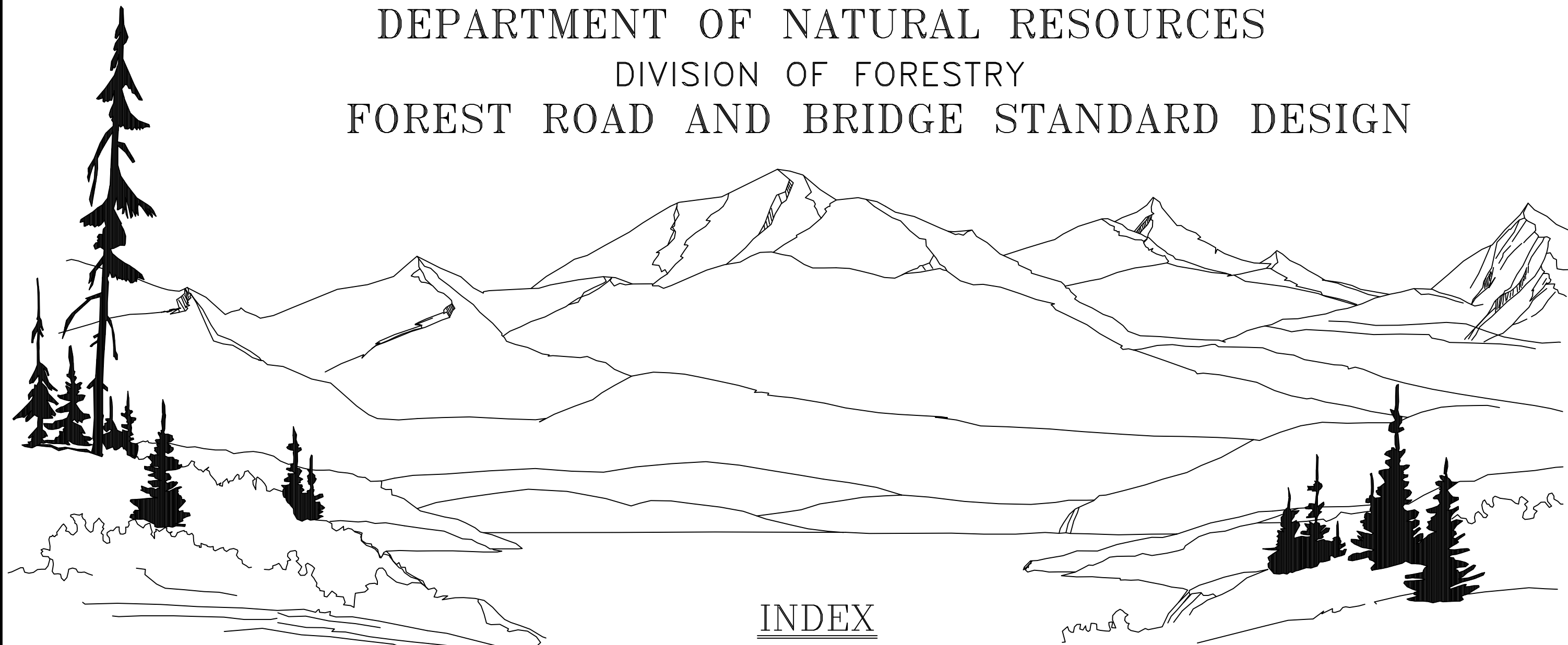
1. Timber Sale Contracts:
 - a. The Forest Road Performance Standard A-2 sheet and other sheets as applicable from the DOF Road and Bridge Standards set as listed on the Title Sheet A-1, shall replace in its entirety Exhibit "E" (Road Construction and Maintenance Requirements) in long form timber sale contracts requiring road construction or maintenance.
 - b. Road maintenance agreements or management requirements previously referenced in long form Exhibit "E" are to be addressed in the long form timber sale contract by adding language to the requirements of the Exhibit "D" "Operating Plan Requirements" and subsequently acknowledged by the DOF and the timber purchaser in Exhibit "H" the purchaser's "Approved Operating Plan".
2. Public Work Contracts (less than \$100,000)
 - a. All force account and contract work on roads by Areas shall be based on the DOF Road and Bridge Standards.

3. Public Work Contracts (Greater than \$100,000)
 - a. Unless issues require a site specific engineered solution all work will be developed based on the DOF Road and Bridge Standards. All work greater than \$100,000 is required to be stamped by an Alaska Licensed Professional Engineer per AS 38.95.160.
4. Non-typical Infrastructure and Bridges.
 - a. Infrastructure such as sort yards, log transfer facilities, bridges and areas having notable public use shall be appropriate for its use and engineered by a knowledgeable professional.
 - b. Regardless, all bridge work managed by the DOF shall conform to the DOF Road and Bridge Standards. All DOF owned or managed bridge structures shall be designed by a Professional Engineer licensed in the State of Alaska. Records for these structures shall be centrally retained by the DOF through out the life of the bridge. The DOF standards assume conditions that shall be verified or inspected regularly. Bridge use and maintenance is a nationally recognized ownership risk. Care and fore thought is required with all action regarding bridges.

Attachments

DOF Road and Bridge Standards

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF FORESTRY
FOREST ROAD AND BRIDGE STANDARD DESIGN



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Revisions			
No.	Date	Description	By

STATE OF ALASKA
Department of Natural Resources
Division of Forestry

Approved: _____

Project Engineer or Forester _____ Date _____

Project or Contract No. _____

FOREST ROAD PERFORMANCE STANDARDS

1. ALL ROADS SHALL BE BUILT TO THE STANDARDS LISTED WITHIN THIS PERFORMANCE STANDARD UNLESS THE PROJECT ENGINEER HAS DETERMINED THAT A SITE SPECIFIC DESIGN IS PRUDENT. THE PERFORMANCE STANDARD FOR ADNIR FOREST ROADS AND THE ADNIR FOREST ROADS STANDARD DRAWINGS CONVEY THE DEPARTMENT'S INTENT. IN THE EVENT OF A CONFLICT BETWEEN DOCUMENTS, THE PROJECT ENGINEER WILL DETERMINE THE ORDER OF PRECEDENCE.
2. REFERENCE THE FOLLOWING RESOURCES FOR ADDITIONAL INFORMATION:

A. ALASKA FOREST RESOURCES & PRACTICES REGULATIONS (FRPA), 11 AAC 95, OCTOBER 2013;

B. ALASKA STATUTE 41.17, FOREST RESOURCES AND PRACTICES.
3. ROAD LOCATION AND CLASSIFICATION ARE IDENTIFIED IN THE TIMBER SALE CONTRACT OR THE BID DOCUMENTS. DEVIATION FROM THESE DOCUMENTS IS PERMITTED ONLY WITH THE WRITTEN PERMISSION OF THE PROJECT ENGINEER.
4. REGARDLESS OF REGION, ROADS WILL BE CLASSIFIED AS PRIMARY, SECONDARY, OR SPUR.

A. A PRIMARY ROAD IS A HIGH USE PERMANENT ROAD WITH THE FOLLOWING CHARACTERISTICS:

I. MINIMUM 16 FOOT WIDE RUNNING SURFACE;

II. TYPICALLY SINGLE LANE;

III. VERTICAL GRADE: MAXIMUM FAVORABLE GRADE IS 10%, MAXIMUM ADVERSE GRADE IS 6%;

IV. MINIMUM HORIZONTAL CURVE RADIUS OF 360 FEET; AND

V. DESIGN SPEED OF 40 MPH.

B. A SECONDARY ROAD IS A MODERATE TO LOW USE, YEAR ROUND, PERMANENT ROAD WITH THE FOLLOWING CHARACTERISTICS:

I. MINIMUM 14 FOOT WIDE RUNNING SURFACE;

II. SINGLE LANE;

III. VERTICAL GRADE: MAXIMUM FAVORABLE GRADE IS 10%, MAXIMUM ADVERSE GRADE IS 8%;

IV. MINIMUM HORIZONTAL CURVE RADIUS OF 140 FEET; AND

V. DESIGN SPEED OF 25 MPH.

C. A SPUR ROAD IS A TEMPORARY, LOW USE ROAD WITH THE FOLLOWING CHARACTERISTICS:

I. MINIMUM 14 FOOT WIDE RUNNING SURFACE;

II. SINGLE LANE;

III. VERTICAL GRADE: MAXIMUM FAVORABLE GRADE IS 20%, MAXIMUM ADVERSE GRADE IS 12%;

IV. MINIMUM HORIZONTAL CURVE RADIUS OF 50 FEET; AND

V. DESIGN SPEED OF 15 MPH.

D. A WINTER ROAD SUPPORTS VEHICLE TRAFFIC DURING WINTER MONTHS ONLY. IT IS CONSTRUCTED USING FROST, SNOW, AND/OR ICE. WINTER ROADS HAVE THE FOLLOWING CHARACTERISTICS:

I. MINIMUM 14 FOOT WIDE RUNNING SURFACE;

II. SINGLE LANE;

III. VERTICAL GRADE: MAXIMUM FAVORABLE GRADE IS 10%, MAXIMUM ADVERSE GRADE IS 10%;

IV. MINIMUM HORIZONTAL CURVE RADIUS OF 75 FEET; AND

V. DESIGN SPEED OF 20 MPH.

5. CROWN or SLOPE TRAVELED WAY OR ROADBED 3–5% FOR ALL SECTIONS.

6. ALL FILL SLOPES SHALL BE 2:1 (OR FLATTER) AND ALL CUT SLOPES SHALL BE 1:1 (OR FLATTER) IN COMMON MATERIAL OR 1/4:1 (OR FLATTER) IN BEDROCK. TERRACED SLOPES ARE PERMITTED IF THEY FIT WITHIN THE RIGHT-OF-WAY.

7. UTILIZE APPROVED MATERIAL LOCATED WITHIN THE RIGHT-OF-WAY TO CONSTRUCT THE ROAD. IF SUFFICIENT MATERIAL IS NOT AVAILABLE OR OF SUITABLE QUALITY, THE PROJECT ENGINEER MAY AUTHORIZE THE IMPORT OF BORROW. IN GENERAL,ALL ROADS EXCEPT WINTER ROADS ARE TYPICALLY CONSTRUCTED AS FOLLOWS:

A. REGION I ROADS HAVE A 12 –24" SUBGRADE CONSISTING WELL-GRADED ANGULAR STONE WITH A D50 OF 3 INCHES OR GREATER (SHOT ROCK) OR A POORLY GRADED NATURAL SAND AND GRAVEL MIX WITH A MAX GRAIN SIZE OF 12" (PIT RUN GRAVEL). IF AUTHORIZED BY THE PROJECT ENGINEER, THAT MATERIAL MAY ALSO BE USED AS THE RUNNING SURFACE.

B. REGION II AND III ROADS HAVE A 12–24" SUBGRADE CONSISTING OF SAND, GRAVEL ROCK, OR COMBINATIONS THEREOF CONTAINING NO MUCK, PEAT, FROZEN MATERIAL, ROOTS, SOD, OR OTHER DELETERIOUS MATTER (DOT&PF TYPE "C" MATERIAL). THE PROJECT ENGINEER MAY AUTHORIZE THE USE OF NATIVE MATERIAL FROM DITCHES. A SURFACING MATERIAL MEETING THE REQUIREMENTS OF DOT&PF TYPE E–1 MATERIAL MAY BE REQUIRED.

8. CLEARING LIMITS WILL VARY WITH GROUND CONDITIONS. CLEAR AS NECESSARY TO MEET ROAD TYPICAL CROSS SECTIONS AND SAFE SIGHT DISTANCE AS DIRECTED BY THE PROJECT ENGINEER AND SUBJECT TO THE CONDITIONS IN THE CONTRACT DOCUMENTS.

9. DURING ROAD CLEARING OPERATIONS, ALL MERCHANTABLE TIMBER WITHIN THE CLEARING LIMITS SHALL BE FELLED, LIMBED AND DECKED. MERCHANTABLE TIMBER SHALL BE DECKED ALONG THE ROAD IN A MANNER THAT DOES NOT CREATE A HAZARD TO THE PUBLIC. LOGS SHALL BE DECKED IN AN ORDERLY MANNER AND NOT OBSTRUCT SURFACE WATERS. LOG DECKS SHALL BE CONFIGURED TO EFFICIENTLY AND SAFELY LOAD LOG TRUCKS; LOG DECKS GENERALLY SHALL BE CONSOLIDATED IN A MANNER THAT FACILITATES THE LOADING OF FULL LOADS WITHOUT LOG TRUCK MOVEMENT. UNMERCHANTABLE TIMBER AND DEBRIS SHALL BE TREATED AS APPROVED IN THE OPERATING PLAN UNLESS DIRECTED OTHERWISE IN WRITING BY THE PROJECT ENGINEER.

10. PRIOR TO BURNING CONSTRUCTION DEBRIS, CONTACT DOF AND THE LOCAL WILDLAND FIRE JURISDICTIONAL AGENCY FOR WRITTEN APPROVAL.

11. DITCHES SHALL BE 2’ WIDE MINIMUM OR AS REQUIRED FOR ADEQUATE DRAINAGE AND SNOW STORAGE AS DETERMINED BY THE PROJECT ENGINEER.

12. PRELIMINARY LOCATION OF DRAINAGE STRUCTURES ARE IDENTIFIED IN THE BID DOCUMENTS. ADDITIONAL DRAINAGE STRUCTURES MAY BE REQUIRED.

A. FORDING OF ANY STREAM BY ROADS SHALL BE IN ACCORDANCE WITH 11 AAC 95.295 (C) AND 95.305.

B. MINIMUM CULVERT DIAMETER IS 18".

C. CULVERTS MUST EXTEND A MINIMUM OF 36" BEYOND THE TOE OF FILL ON BOTH SIDES OF THE ROAD.

D. CULVERT ENDS SHALL BE CONSTRUCTED TO PREVENT SCOUR OF THE ROAD BED.

13. FISH PASSAGE LOCATIONS ARE IDENTIFIED IN THE BID DOCUMENTS.

A. FISH PASSAGE DESIGN AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH ALASKA DEPARTMENT OF FISH AND GAME PERMIT AND GUIDELINES.

B. CHANGES TO THE COURSE OF AN ANADROMOUS FISH BEARING WATERWAY MUST BE APPROVED, IN WRITING, BY THE ALASKA DEPARTMENT OF FISH AND GAME.

C. OBTAIN WRITTEN PERMISSION FROM ALASKA DEPARTMENT OF FISH AND GAME PRIOR TO FORDING ANADROMOUS FISH WATERS.

D. THE INLET AND OUTLET OF FISH PASSAGES SHALL MATCH THE NATURAL COURSE OF THE STREAM CHANNEL.

E. DO NOT PERCH CULVERT ENDS.
14. CONTROL OR PREVENT EROSION, SILTATION, WATER DEGRADATION AND POLLUTION PER AS 41.17 AND 11 AAC95 (FRPA) AND AS SPECIFIED IN THE DRAWINGS FOR SITE SPECIFIC CONCERNS or AS DIRECTED BY THE ENGINEER. AT A MINIMUM, FRPA BMP'S SHALL BE USED FOR EROSION CONTROL AND MAINTENANCE AND ARE A REQUIREMENT OF ALL CONTRACTS.
15. TURNOUTS SHALL BE PLACED ON PRIMARY ROADS AT INTER-VISIBLE LOCATIONS OR AS DETERMINED BY THE PROJECT ENGINEER. TURNAROUNDS SHALL BE PLACED ON SECONDARY AND SPUR ROADS AT LOCATIONS DETERMINED BY THE PROJECT ENGINEER. SEE SHEET E–02.00 FOR TURNOUT AND TURNAROUND DETAIL.
16. INSTALL SIGNAGE AS DIRECTED BY THE PROJECT ENGINEER.

A. AT A MINIMUM, SIGNS WILL BE INSTALLED AT THE FOLLOWING LOCATIONS:

I. R1–1 SIGNS AT ALL STOP CONTROLLED INTERSECTIONS;

II. D–10 SERIES SIGNS AT FULL MILE INTERVALS ALONG PRIMARY AND SECONDARY ROADS;

III. OM–3 SERIES OBJECT MARKERS AT ALL OBSTACLES AND HAZARDS E.G. BRIDGE ENDS; AND

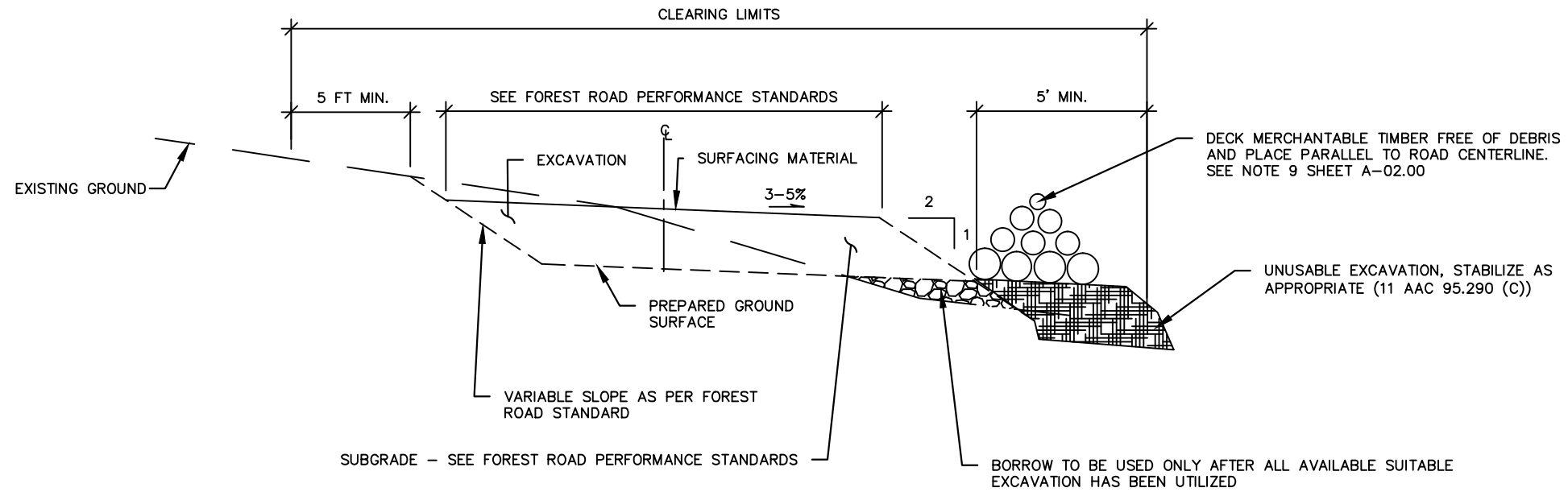
IV. "ACTIVE LOGGING ROAD..." SIGN AT ENTRANCE TO THE ROAD.
17. YEAR ROUND ROADS ARE NOT TO BE USED FOR HAULING OPERATIONS WHEN ROADS ARE NOT SAFE, SUSCEPTIBLE TO EXCESSIVE DAMAGE OR UNREASONABLE WEAR, AS DETERMINED BY THE PROJECT ENGINEER. LAYER IS TOO THIN TO PREVENT SURFACE DEFORMATION.

GEOMETRIC STANDARDS		
ROAD CLASSIFICATION	DESIGN SPEED (MPH)	MIN. HORIZONTAL CURVE RADIUS
PRIMARY OR MAIN HAUL ROADS	35	360’
SECONDARY ROAD	20	140’
SPUR ROAD	10	50’
WINTER ROAD	15 OR BY CLASSIFICATION	75’

MINIMUM HORIZONTAL CURVE RADIUS TAKEN FROM EXHIBIT 16 OF THE AASHTO *GUIDELINES FOR GEOMETRIC DESIGN OF VERY LOW VOLUME LOCAL ROADS (ADT<400)* _
USING A TRACTION COEFFICIENT OF 0.5 FOR NON-WINTER ROADS AND 0.4 FOR WINTER ROADS.

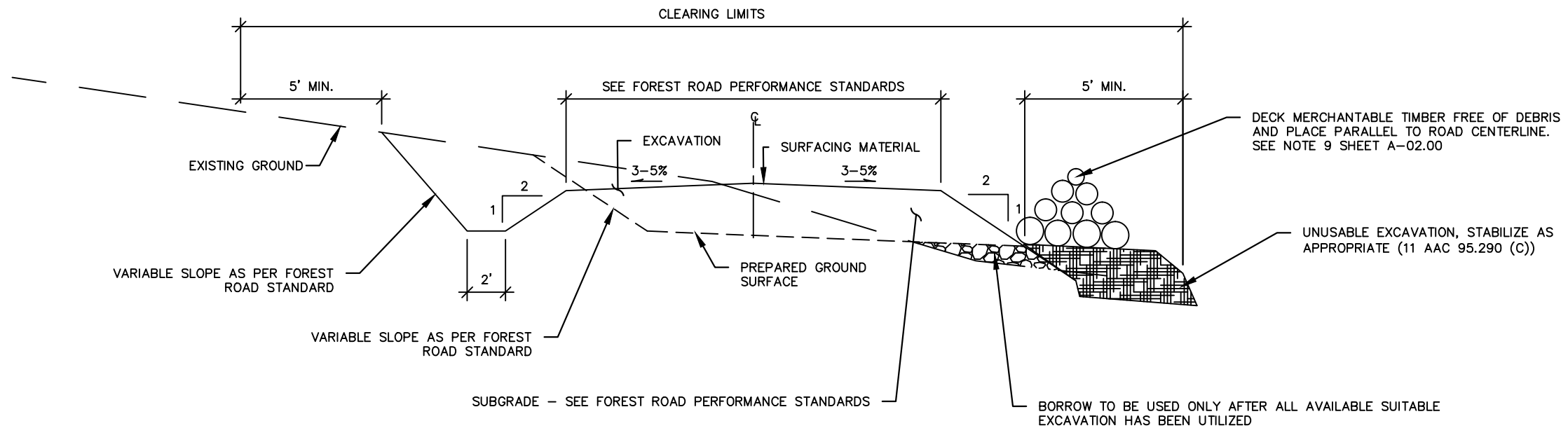
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1	11/5/2015		GS





TYPICAL SIDEHILL SECTION - NO DITCH

NOT TO SCALE

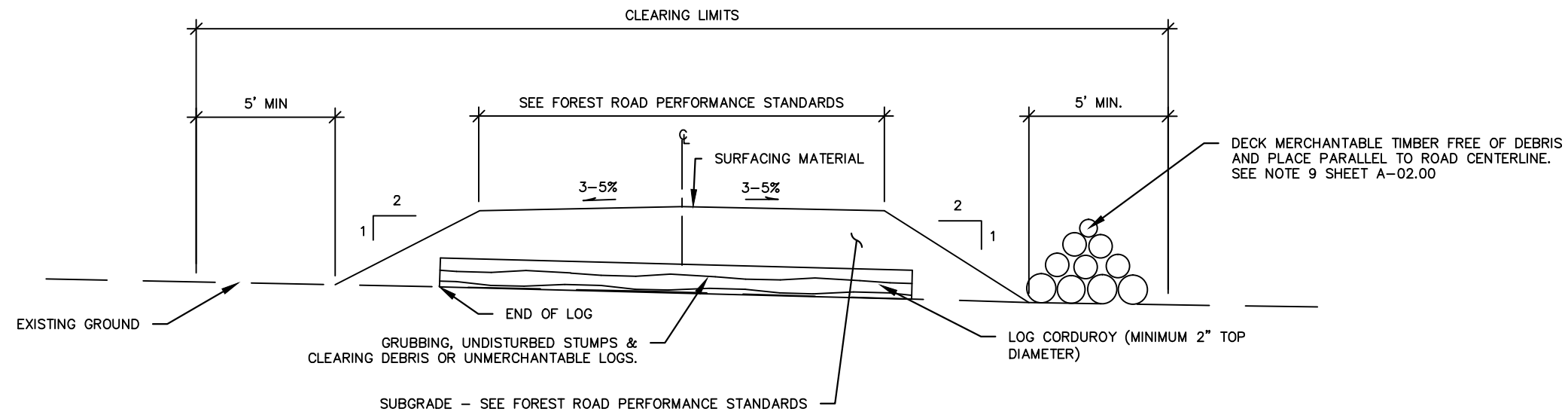


TYPICAL SIDEHILL SECTION - WITH DITCH

NOT TO SCALE

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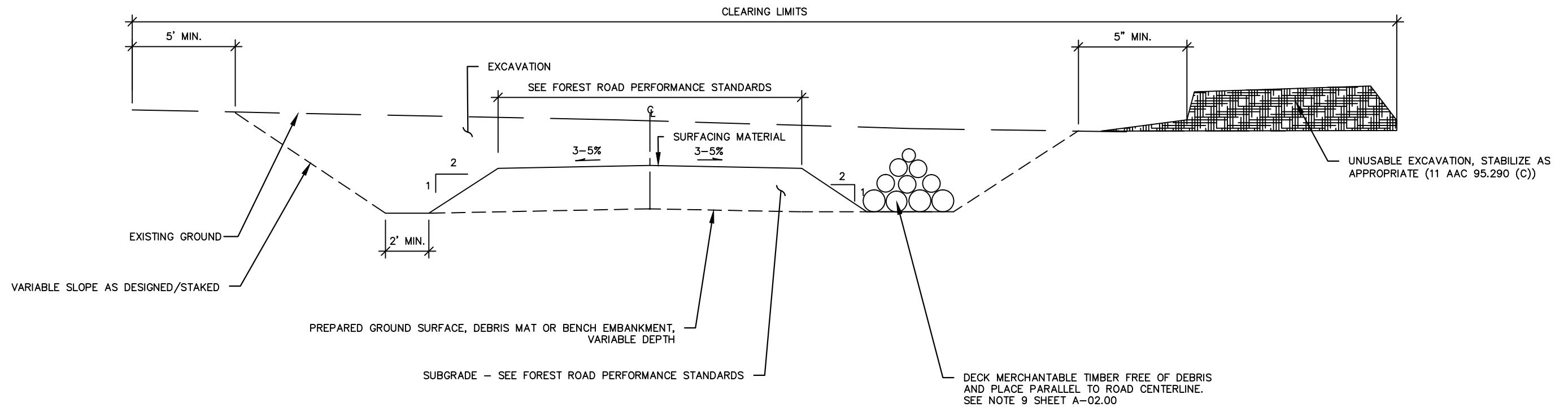


NOTES:

1. IF CROSS DRAINAGE IS A CONCERN PLACE A LAYER OF GEOTEXTILE FABRIC ON TOP OF LOGS.

TYPICAL OVERLAY SECTION

NOT TO SCALE

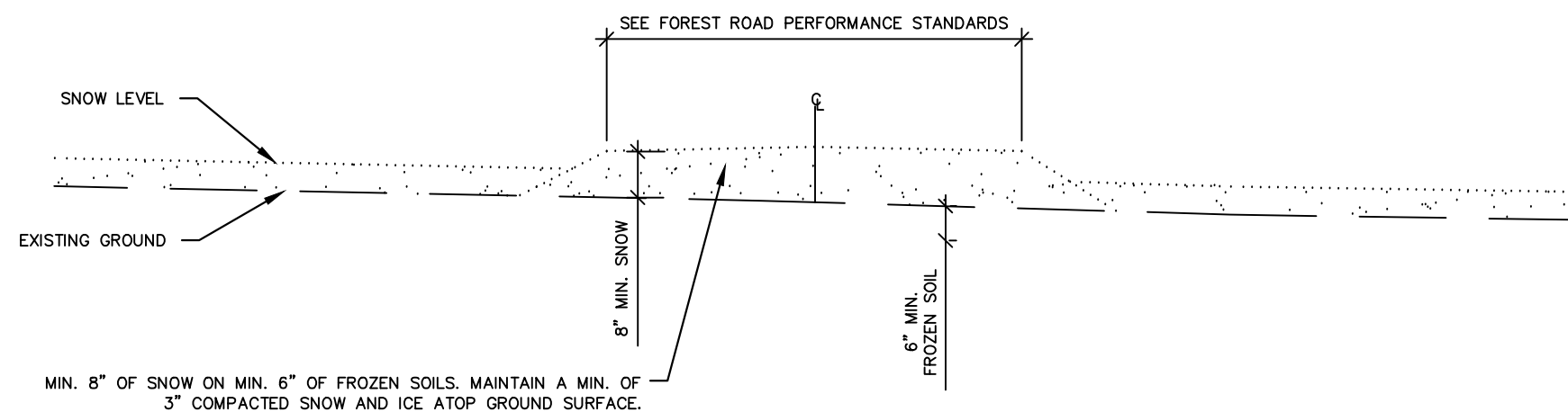


TYPICAL THRU-CUT SECTION

NOT TO SCALE

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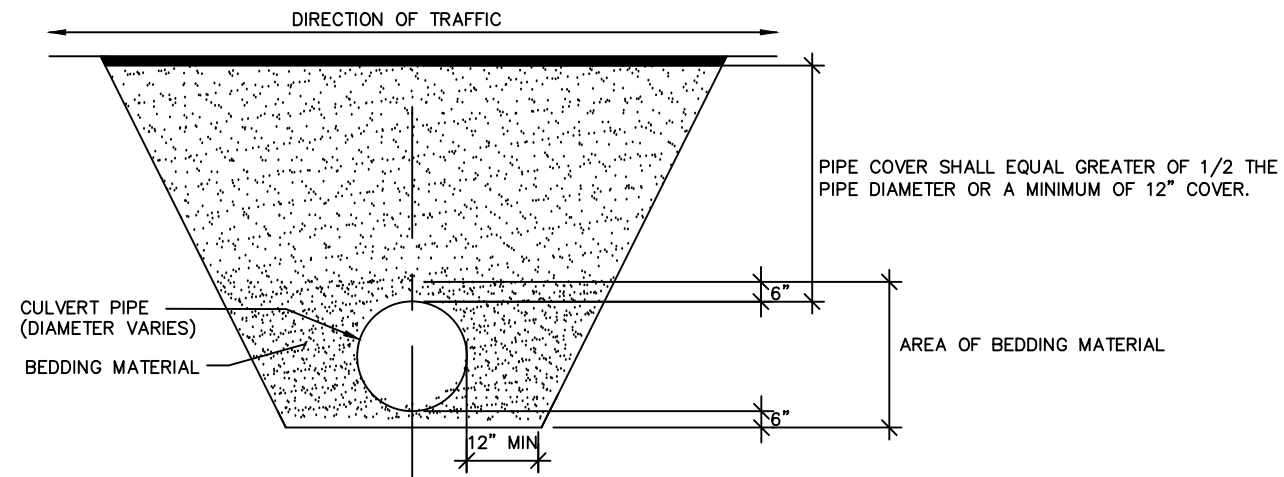




WINTER ROAD
NOT TO SCALE

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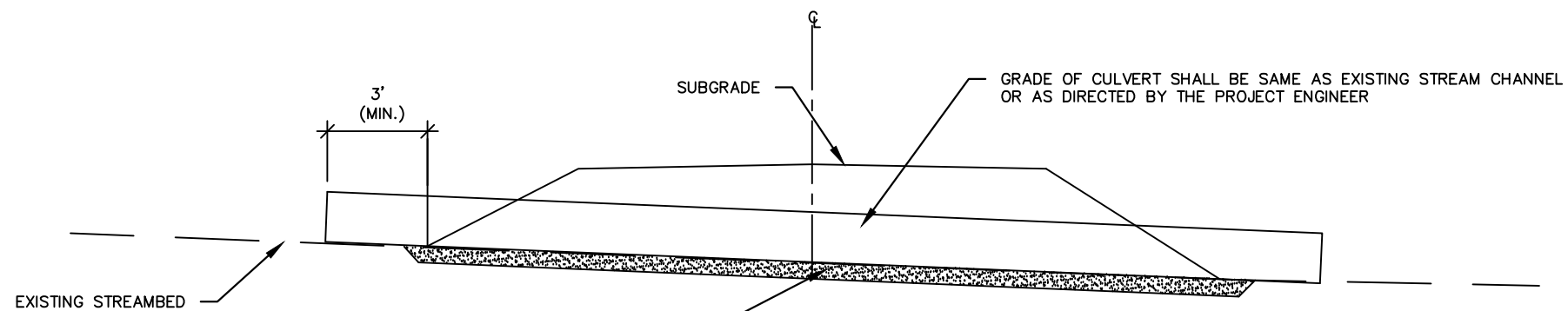


TYPICAL CULVERT TRENCH SECTION

NOT TO SCALE

NOTES:

1. CULVERT JOINTS SHALL HAVE WATERTIGHT GASKETS AND SHALL NOT LEAK.
2. CULVERT PLACEMENT SHALL BE APPROVED BY THE PROJECT ENGINEER BEFORE BACKFILLING.
3. ALL USABLE MATERIAL (COMMON EXCAVATION) SHALL BE USED AS BACKFILL FOR EMBANKMENT CONSTRUCTION.
4. SIDE SLOPES SHALL BE EXCAVATED AT 0.5H:1V OR FLATTER IN ACCORDANCE WITH ALL APPLICABLE SAFETY REQUIREMENTS.
5. BEDDING MATERIAL SHALL AT A MINIMUM MEET THE SAME REQUIREMENTS AS THE SUBGRADE MATERIAL. DO NOT PLACE ROCKS LARGER THAN 6 INCHES IN DIAMETER AGAINST CULVERT. PLACE AND COMPACT BEDDING IN LIFTS TO ADEQUATELY SUPPORT THE PIPE.
6. FOLLOW MANUFACTURE'S REQUIREMENTS FOR INSTALLATION UNLESS DIRECTED OTHERWISE BY THE PROJECT ENGINEER.
7. WHEN JOINING TWO PIPES TOGETHER, THE MINIMUM LENGTH OF PIPE TO BE JOINED SHALL BE SIX FEET.



NOTES:

1. DO NOT PERCH CULVERTS.
2. PLACE CULVERT IN ALIGNMENT WITH THE NATURAL STREAM CHANNEL. WHERE NO CHANNEL IS APPARENT, INSTALL CULVERTS AT SKEW AND SLOPE TO DRAIN OR AS DIRECTED BY THE PROJECT ENGINEER.
3. MINIMUM CULVERT GRADES SHALL BE 5% OR 1/2 OF THE TRIBUTARY DITCH GRADE.
4. CAMBER WILL DEPEND ON SITE CONDITIONS. MAXIMUM CAMBER IS 2% (STEEL OR ALUMINUM CULVERTS) OR 1% (POLYETHYLENE CULVERTS) OF CULVERT LENGTH BY NO MORE THAN 2.5 INCHES AT CENTER.
5. MINIMUM CULVERT DIAMETER IS 18".
6. CULVERT INLETS AND OUTLETS SHALL EXTEND 36 INCHES BEYOND THE TOE OF THE FILL UNLESS OTHERWISE AGREED TO BY THE PROJECT ENGINEER.
7. CULVERTS MUST BE SPACED TO PREVENT POOLING OF WATER CAUSED BY THE PRESENCE OF THE ROADBED.
8. PROVIDE ENERGY DISSIPATORS AT OUTLETS OF STORM DRAIN CULVERTS (FRPA 11 AAC 95.305 (C)).
9. RELIEF CULVERT SPACING WILL DEPEND ON SITE CONDITIONS. PROJECT ENGINEER TO ADVISE.

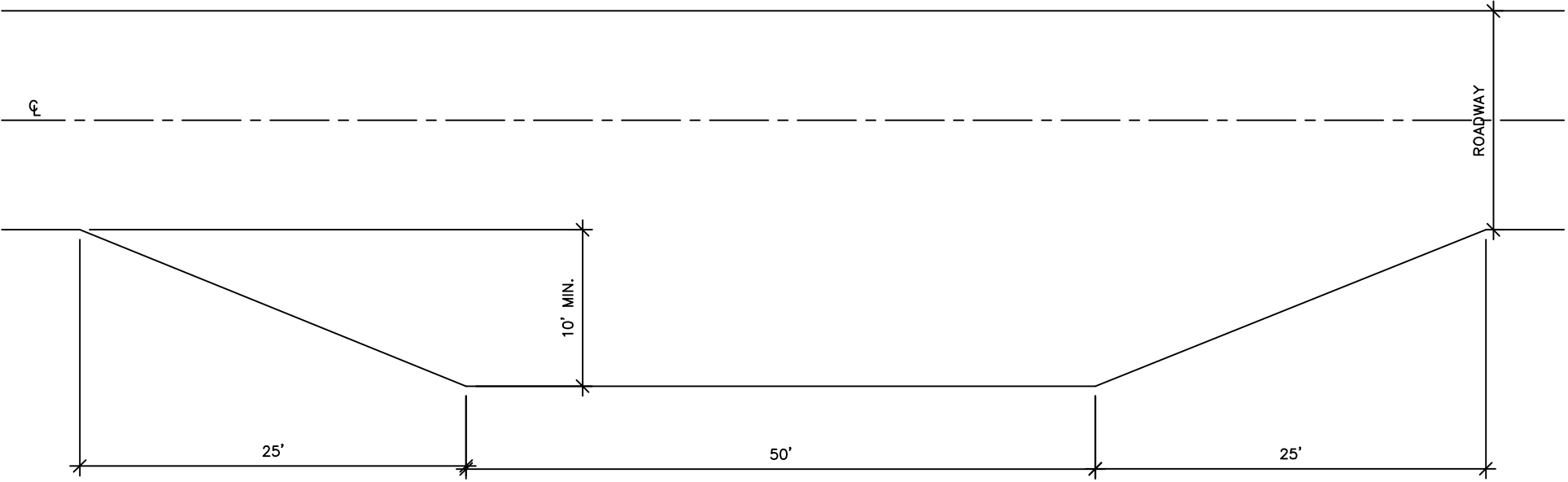
MINIMUM CULVERT SPACING 11 AAC 95.295 (B)		
PERCENT OF LONGITUDINAL GRADE	REGION I	REGION II & REGION III
0 TO 2	SEE NOTE #7	SEE NOTE #7
2 TO 7	1,000	1,500
8 TO 15	800	1,000
OVER 15	600	800

TYPICAL CULVERT INSTALLATION

NOT TO SCALE

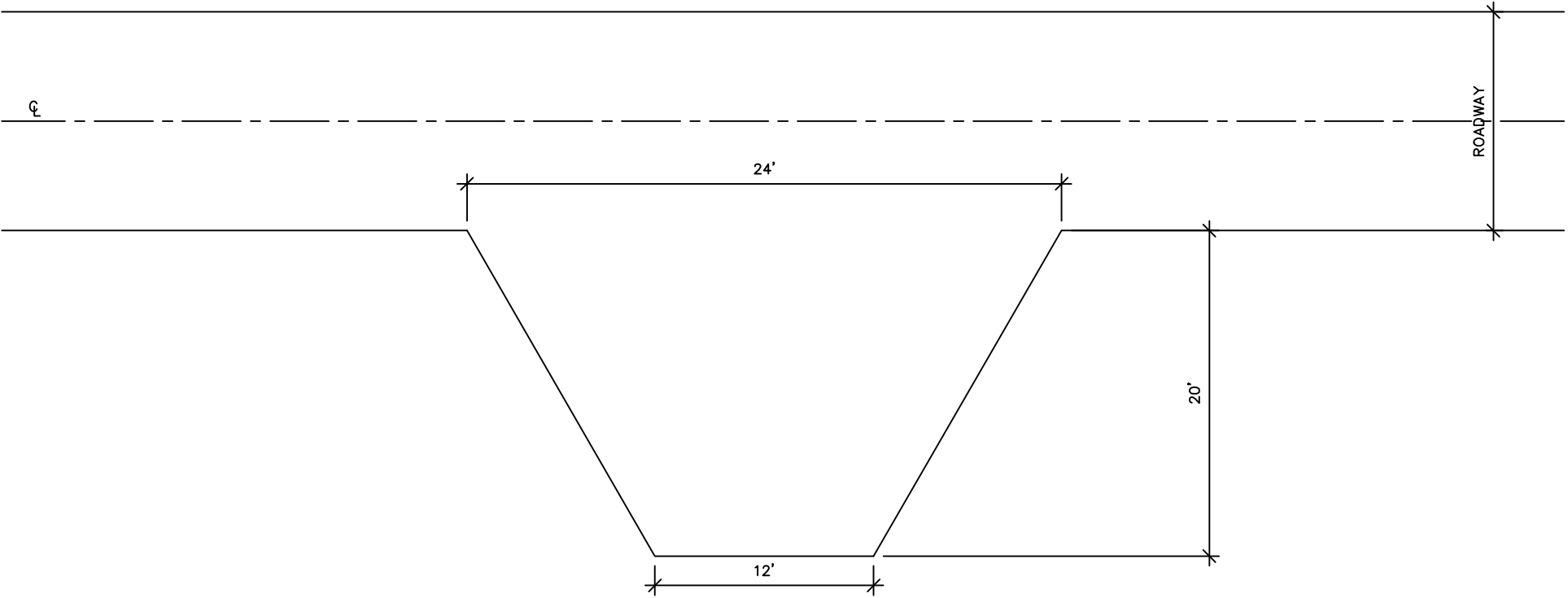
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TURNOUT DETAIL

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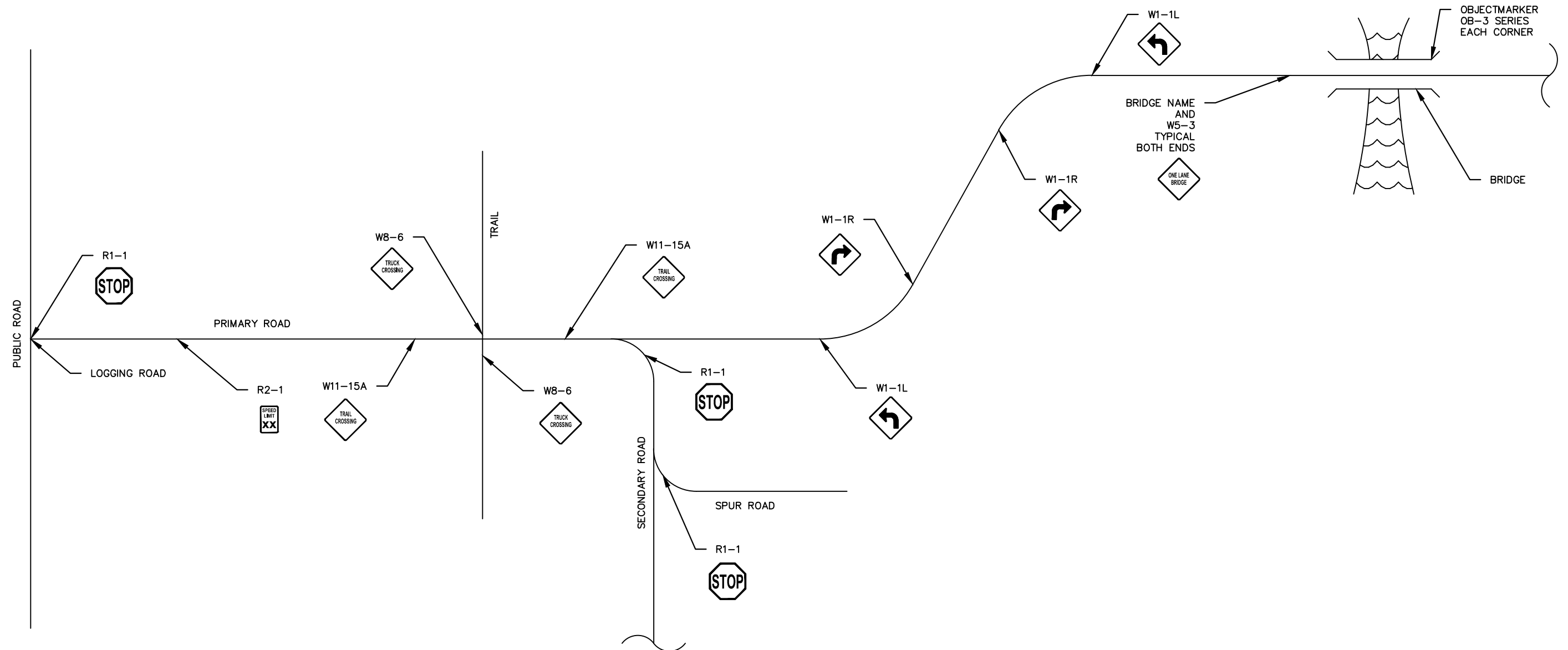


TURNAROUND DETAIL

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NOTES:

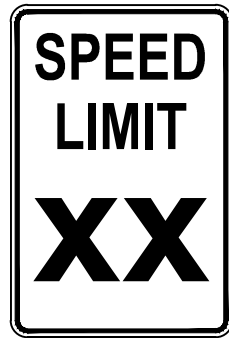
1. PLACE D10-1 MILE MARKERS EVERY MILE.
2. DIAGRAM ABOVE SHOWS APPROXIMATE PLACEMENT OF SIGNS. PROJECT ENGINEER TO DETERMINE FINAL PLACEMENT BASED ON SITE CONDITIONS.
3. SEE SHEET S-01.00 FOR ADDITIONAL BRIDGE SIGNS.

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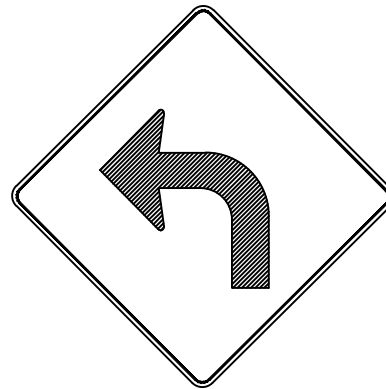
R1-1 (MUTCD)
24" X 24"
18"X18"



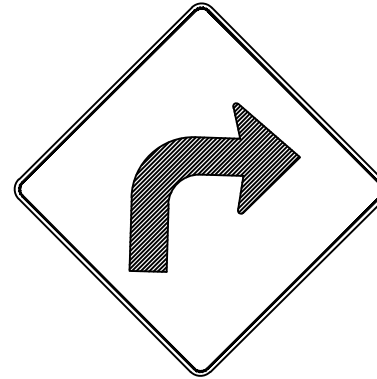
R2-1 (MUTCD)
18"W X 24"H



D10-1 (MUTCD)
10" X 18"



W1-1L (MUTCD)
24" X 24"
18"X18"



W1-1R (MUTCD)
24" X 24"
18"X18"



W5-3 (MUTCD)
24" X 24"



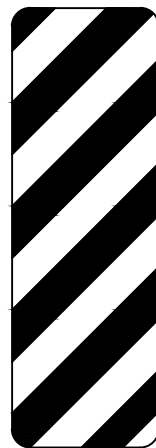
W16-9P (MUTCD)
24" X 18"



W11-15A (MUTCD)
24" X 24"



W8-6 (MUTCD)
24" X 24"



OM-3L (MUTCD)
12" X 36"



OM-3L (MUTCD)
12" X 36"



72"X54" BLACK MESSAGE AND BORDER ON WHITE BACKGROUND (CUSTOM)

NOTE: FOR SIGN FRAMING AND POST SPACING SEE ALASKA DEPARTMENT OF TRANSPORTATION STANDARD DETAIL S-00.11

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BRIDGE PROJECT NOTES

DESIGN OF PREFABRICATED STEEL BRIDGE

THE DESIGN OF THE PREFABRICATED STEEL BRIDGE SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE "AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS". WHEN USING THE "AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS", ALL OCCURRENCES OF THE WORD "SHOULD" SHALL BE REPLACED WITH THE WORD "SHALL". ALL DRAWINGS, SPECIFICATIONS, AND PROJECT SPECIFIC CALCULATIONS SHALL BE SIGNED AND SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF ALASKA.

DO NOT PROVIDE A FRACATURE CRITICAL OR NON-REDUNDANT BRIDGE SUCH AS A TRUSS OR TWO-GIRDER BRIDGE SYSTEM.

THE BRIDGE SHALL BE CONFIGURED TO BE TRANSPORTED TO A SITE BY STANDARD HIGHWAY LOG TRUCK OR LOW BOY IN MULTIPLE SECTIONS. APPROPRIATE LIFTING POINTS SHALL BE INTEGRATED INTO THE DESIGN TO ALLOW TYPICAL SLINGING AND HANDLING METHODS FOR INSTALLATION AND TRANSPORTATION TO THE SITE.

BRIDGE RAILING POSTS SHALL TIE TO THE DECK STRUCTURE (DECK OR DECK BEAMS) OF THE BRIDGE, NOT THE BRIDGE GIRDERS. CRASH WORTHY RAIL SYSTEMS DESIGNED TO THE LRFD TEST LEVEL 2 STANDARD IS ACCEPTABLE FOR THIS SUBMITTAL. BRIDGE RAILING SHALL BE HOT DIPPED GALVANIZED THREE BEAM GUARDRAIL MEETING AASHTO HIGHWAY AND BRIDGE SPECIFICATIONS. GUARDRAIL SHALL BE COMPATIBLE WITH DOT & PF STANDARD THREE BEAM CONFIGURATIONS.

CLEARLY SPECIFY RELEVANT INFORMATION SUCH AS MEMBER SIZES, GEOMETRY, BEARING REACTIONS, DESIGN LOADS, MATERIAL PROPERTIES AND OTHER DESIGN INFORMATION ON THE DRAWINGS.

DESIGN LOADINGS FOR THE BRIDGE WILL CONFORM TO THE FOLLOWING.

- A. DEAD LOAD- USE UNIT WEIGHTS AS DEFINED IN THE "AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS" MOST RECENT EDITION WITH INTERIM REVISIONS.
- B. VEHICULAR LIVE LOAD - USE THE OPERATING STRESS LEVEL OF THE AASHTO BRIDGE MAINTENANCE MANUAL FOR HL-93, AND UFS LOADS FOR UBO, UO2 AND L90 LOADING.
- C. WIND LOAD - 100 MPH PER AASHTO REQUIREMENTS.
- D. FATIGUE - USE A SINGLE LANE AVERAGE DAILY TRUCK TRAFFIC (ADTT) OF 20 FOR DESIGN.
- E. SEISMIC - AS DEFINED IN THE "AASHTO GUIDE SPECIFICATIONS FOR LRFD SEISMIC BRIDGE DESIGN".
- F. ERECTION - USE A CONSTRUCTION LOAD FACTOR OF NOT LESS THAN 1.25 FOR ALL LOADS THAT ARE ESSENTIALLY STATIC AND NOT LESS THAN 1.50 FOR ALL OTHER LOADS.
- G. THERE IS NO DEFLECTION CRITERIA.

MATERIALS

STEEL.

CONSTRUCT PREFABRICATED STEEL BRIDGE FROM ASTM A709 GRADE 50T3 OR ASTM A709 GRADE 50T3 PLATE AND STRUCTURAL SHAPES. ASTM A572 STEEL MAY BE SUBSTITUTED FOR A709 IF:

IT MEETS THE CHARPY V-NOTCH, ZONE 3 TEST REQUIREMENTS AS SPECIFIED IN ASTM A709.

FABRICATION CONFORMS TO THE MOST RECENT EDITION OF THE ANSI/AASHTO/AWS BRIDGE WELDING CODE D1.5 WHEN WELDING NEW STEEL BRIDGE GIRDERS, BEAMS AND STRINGERS.

HOT DIP GALVANIZE ALL STRUCTURAL STEEL SHAPES, PLATES, AND BARS IN ACCORDANCE WITH AASHTO M 111. REPAIR DAMAGE TO GALVANIZED COATINGS ACCORDING TO ASTM A180 OR AASHTO M 36.

EASTERSERS. ASTM A325. GALVANIZED PER AASHTO M 232.

DECKING.

IF TIMBER DECKING IS USED, BRIDGE SHALL HAVE A PRESSURE TREATED DECK OF AT LEAST 4X12 TIMBERS WITH AN ADDITIONAL UNTREATED RUNNING/WEAR SURFACE OF 3X12 UNTREATED DOUG-FIR. USE GRADE 1 OR BETTER FOR DECKING AND GRADE #2 FOR RUNNING PLANKS.

UNLESS OTHERWISE APPROVED BY THE STATE, ALL TREATED WOOD SHALL BE NEW PRESURE TREATED PACIFIC DOUG-FIR TIMBERS OR EQUIVALENT MEETING THE DOT & PF STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION (SSHC) AND THE AMERICAN WOOD PRESERVERS ASSOCIATION (AWPA) USE CATEGORY OF UC4B. PENTA BASED PRODUCTS WILL NOT BE ACCEPTED. FABRICATE TIMBER (INCLUDING ALL CUTTING, SHAPING, AND BORING) BEFORE TREATMENT. CAREFULLY TRIM ALL ABRASIONS AND TREAT ALL CUTS IN TREATED MEMBERS ACCORDING TO AWPA STANDARD M 4. BEFORE DRIVING BOLTS, TREAT ALL HOLES BORED AFTER TREATMENT ACCORDING TO THE APPLICABLE AWPA STANDARDS. FILL REMAINING HOLES WITH TREATED PILES.

MATERIALS (CONT.)

CONCRETE.

USE NON-SKINK, NON-CORROSIVE, NON-METALLIC, CEMENT BASED GROUT MEETING ASTM C-1107, GRADE C. MEET THE REQUIREMENTS OF ASTM 520. DEVELOP A COMPRESSIVE STRENGTH OF 4,000 PSI.

ALL CONCRETE SHALL CONFORM TO DOT & PF CLASS A CONCRETE WITH A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI AT 28 DAYS.

ALL REINFORCING SHALL BE ASTM A 616, GRADE 60.

STRUCTURAL TIMBERS.

APPLY PRESERVATIVE TO ALL STRUCTURAL TIMBER THAT IS EXPOSED TO WEATHER, WATER, OR SOIL. USE THE PRESERVATIVE AND TREATMENT PROCESS OF AASHTO M193 AND "BEST MANAGEMENT PRACTICES FOR THE USE OF TREATED WOOD IN AQUATIC ENVIRONMENTS (BMPs)", PUBLISHED BY THE WESTERN WOOD PRESERVERS INSTITUTE. USE COPPER NAPHTHATE WITH A RETENTION OF PRESERVATION CONFORMING TO AWPA USE CATEGORY 4B FOR HIGHWAYS AND BRIDGES.

WELDING.

PERFORM ALL WELDING AND NONDESTRUCTIVE EXAMINATION (NDE) AS SPECIFIED OR SHOWN ON THE PLANS. CONFORM TO THE MOST RECENT EDITION OF THE ANSI/AASHTO/AWS BRIDGE WELDING CODE D1.5 WHEN WELDING NEW STEEL BRIDGE GIRDERS, BEAM AND STRINGERS. CONFORM TO THE MOST RECENT EDITION OF THE STRUCTURAL WELDING CODE AWS D1.1 WHEN WELDING ALL OTHER STEEL STRUCTURES.

AT LEAST 30 DAYS PRIOR TO WELDING, SUBMIT FOR APPROVAL A WELDING PLAN STAMPED AND SIGNED BY THE CERTIFIED WELDING INSPECTOR (CWI) RESPONSIBLE FOR THE QUALITY CONTROL (QC) AND CONSISTING OF THE FOLLOWING DOCUMENTS.

- A. QUALITY CONTROL PERSONNEL QUALIFICATIONS INCLUDING CWI NUMBER.
- B. WELDING PROCEDURE SPECIFICATIONS (WPS) USING FORMS IN AWS D11, SAMPLE WELDING FORMS.
- C. PROCEDURE QUALIFICATION RECORDS (PQR), WHEN APPLICABLE, USING FORMS IN AWS D11, SAMPLE WELDING FORMS.
- D. WELDER PERFORMANCE QUALIFICATION RECORDS (WPQR) USING FORMS IN AWS D11, SAMPLE WELDING FORMS WITH DOCUMENTATION OF CURRENT WELDER CERTIFICATION.
- E. SAMPLE DAILY INSPECTION SHEET, AND
- F. TTE AND EXTENT OF NDE TO BE CONDUCTED, AS REQUIRED IN THE SSHC SECTION 504. USING A CWI, PERFORM ALL QUALITY CONTROL INSPECTION NECESSARY TO ENSURE THAT THE MATERIALS AND WORKMANSHIP MEET THE REQUIREMENTS OF THE CONTRACT DOCUMENTS. CORRECT ALL DEFICIENCIES IN MATERIALS AND WORKMANSHIP REVEALED BY QUALITY CONTROL AND QUALITY ASSURANCE REPRESENTATIVES DESIGNATED BY THE STATE. FURNISH ALL COMPLETED QUALITY CONTROL INSPECTION DOCUMENTS TO THE ENGINEER OR WHEN SPECIFIED, THE QUALITY ASSURANCE REPRESENTATIVE DESIGNATED BY THE STATE. DO NOT WELD OR TACK BRACKETS, CLIPS, SHIPPING DEVICES OR OTHER MATERIAL NOT REQUIRED BY THE CONTRACT DOCUMENTS TO THE PERMANENT STRUCTURE, UNLESS SHOWN ON THE WORKING DRAWINGS AND APPROVED BY THE ENGINEER.

SITE SPECIFIC NOTES

EACH END OF THE BRIDGE MUST BE SECURED TO THE ABUTMENT STRUCTURE.

AN EARTH EMBANKMENT CONSTRUCTED FOR USE AS A BRIDGE APPROACH MUST BE PROTECTED FROM EROSION BY USING PLANTED OR SEEDED GROUND COVER, BULKHEADS, ROCK RIPRAP, RETAINING WALLS, OR OTHER EQUALLY EFFECTIVE MEANS.

A BRIDGE MUST BE INSTALLED IN SUCH A WAY AS TO MINIMIZE DISTURBANCE TO THE BED AND BANKS OF A STREAM. NO PART OF THE SUPERSTRUCTURE MAY BE BELOW THE HIGH WATER MARK OF THE STREAM OR OBSTRUCTING THE STREAM'S FLOW BETWEEN ORDINARY HIGH WATER.

EQUIPMENT STREAM CROSSINGS ARE NOT AUTHORIZED WITHOUT PRIOR SPECIFIC STATE APPROVAL. THE PURCHASER/CONTRACTOR MUST SUBMIT WRITTEN PLANS IF CROSSING OF OPEN (UNFROZEN WATERS) IS REQUIRED FOR ROAD CONSTRUCTION.

GENERAL NOTES:

THE BIDDER WILL HAVE THE STRUCTURE DESIGNED BY A PROFESSIONAL ENGINEER, REGISTERED IN THE STATE OF ALASKA. PLANS OF THE PROPOSED STRUCTURE WILL BE SUBMITTED AND BE SUBJECT TO APPROVAL OF THE DOT CONTRACTING OFFICER OR HIS DESIGNEE BEFORE FINAL ACCEPTANCE.

PROVIDE AND SECURE A WAIVER/LATE TO THE STRUCTURE INDICATING THE BRIDGE MANUFACTURER'S NAME, MAXIMUM LOAD LIMITS, AND YEAR OF FABRICATION.

PROVIDE AN INVENTORY AND OPERATING LOAD RATINGS OF THE BRIDGE IN THE PLAN SUBMITTALS ACCORDING TO THE MOST RECENT VERSION, INCLUDING INTERIM VERSION, OF THE AASHTO MANUAL FOR BRIDGE EVALUATION (MBE). LOAD RATE STEEL AND CONCRETE ELEMENTS USING THE LOAD AND RESISTANCE FACTOR RATING (LRFR) METHOD. LOAD RATE TIMBER ELEMENTS USING THE ALLOWABLE STRESS RATING (ASR) METHOD AND LOAD AND RESISTANCE FACTOR RATING (LRFR) METHODS.

THE BRIDGE SHALL BE DELIVERED WITH ADEQUATE BLOCKING TO KEEP THE STRUCTURE 6 INCHES OFF THE GROUND, LEVEL AND WELL SUPPORTED UNTIL IT IS INSTALLED.

FOUNDATION NOTES

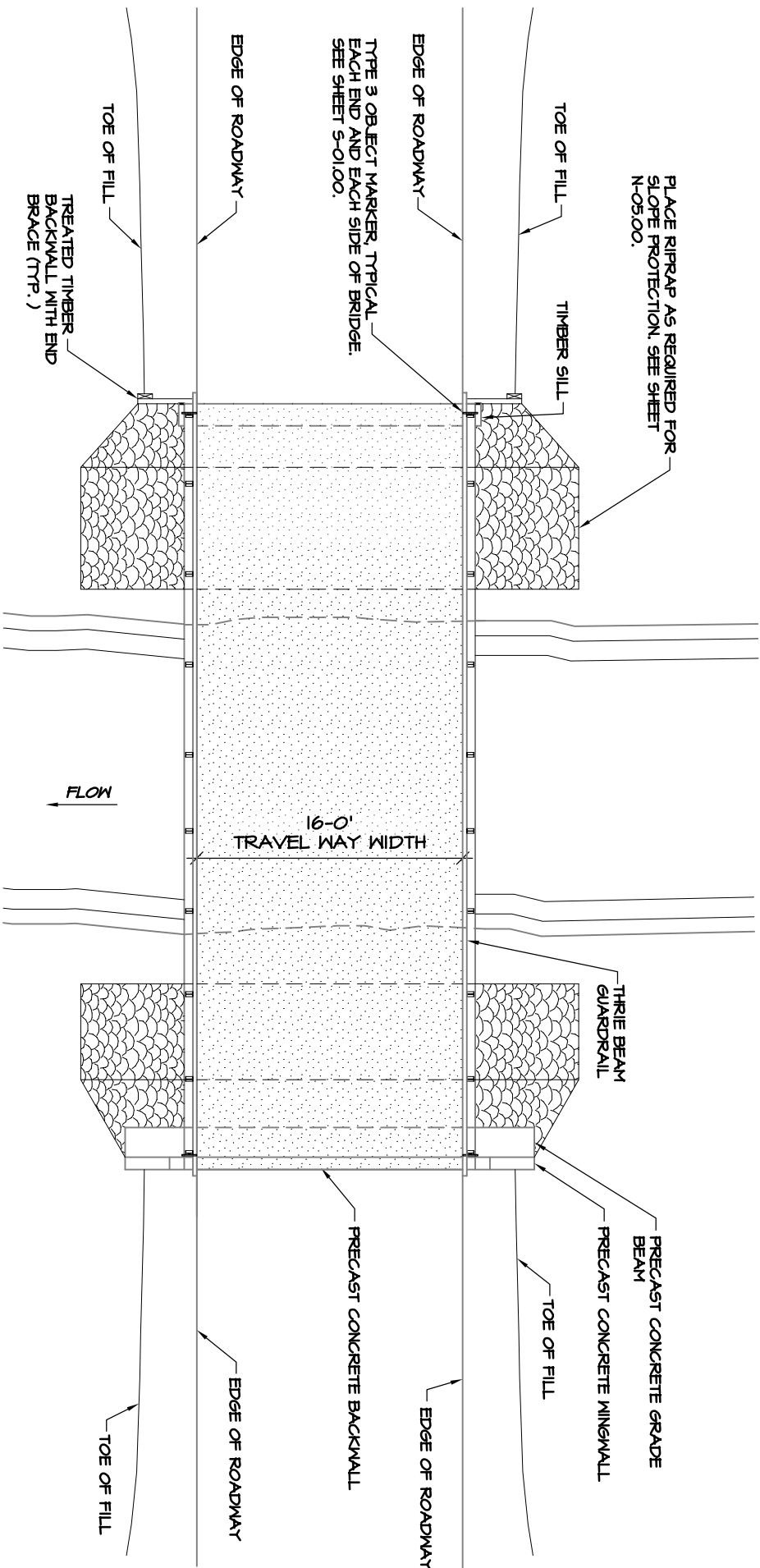
FOUNDATION DESIGN AND DETAILS ASSUME SUBSTRUCTURE UNITS WILL BE PLACED ON COMPETENT SOIL OR BEDROCK CAPABLE OF ACHIEVING A MINIMUM BEARING PRESSURE OF 1500 PSF. IF THIS CRITERIA CANNOT BE MET, CONSULT WITH A LICENSED PROFESSIONAL ENGINEER FOR FURTHER GUIDANCE.

FABRICATION AND INSTALLATION OF GEOTELL FOUNDATION STABILIZATION UNITS SHALL BE IN ACCORDANCE WITH SPECIAL PROVISION 671.

FABRICATION AND INSTALLATION OF WELDED WIRE RETAINING WALL SYSTEMS SHALL BE IN ACCORDANCE WITH SPECIAL PROVISION 516.

FABRICATION AND INSTALLATION OF BIN WALL ABUTMENT SYSTEMS SHALL BE IN ACCORDANCE WITH SPECIAL PROVISION 517.



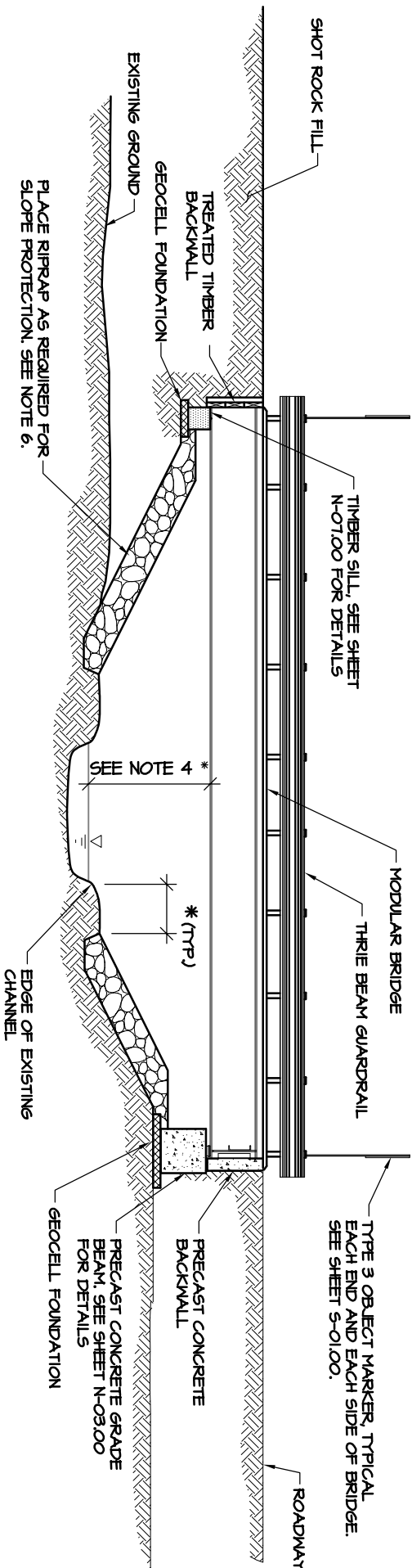


NOTE:
THIS DRAWING SHOWS A TYPICAL INSTALLATION.

PLAN VIEW

GENERAL NOTES.

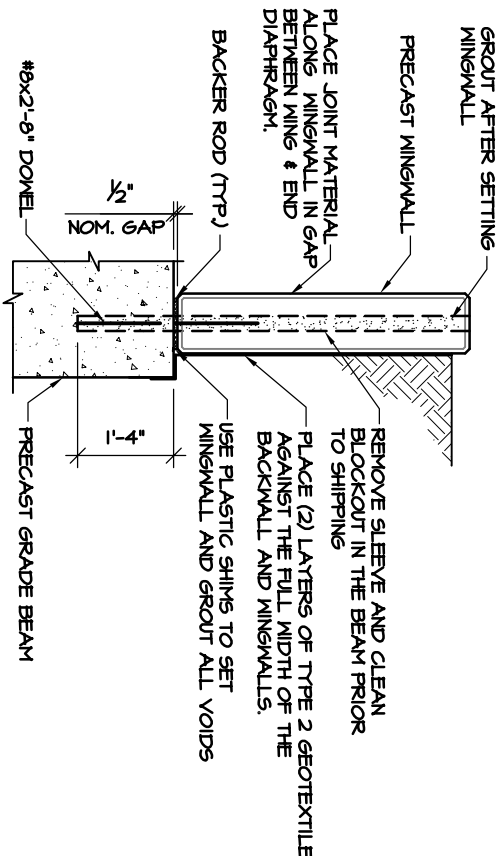
1. DRAWING IS APPLICABLE FOR SINGLE LANE BRIDGE ONLY, UNLESS OTHERWISE NOTED.
2. SEE SHEET N-01.00 FOR FOUNDATION PARAMETERS.
3. SEE SHEET N-06.00 FOR SILL MATERIAL NOTES.
4. PROVIDE 5 FT. MIN CLEARANCE FROM AVERAGE HIGH WATER MARK FOR ICE AND DEBRIS PASSAGE.
5. WHERE STRUCTURAL EXCAVATION IS REQUIRED, REFER TO DOT & PF SPECIFICATION 205.
6. SEE SHEET N-05.00 FOR RIPRAP DETAILS AND NOTES.



ELEVATION

* 3'-0" FEET MIN. (UNLESS OTHERWISE SPECIFIED BY ENGINEER)

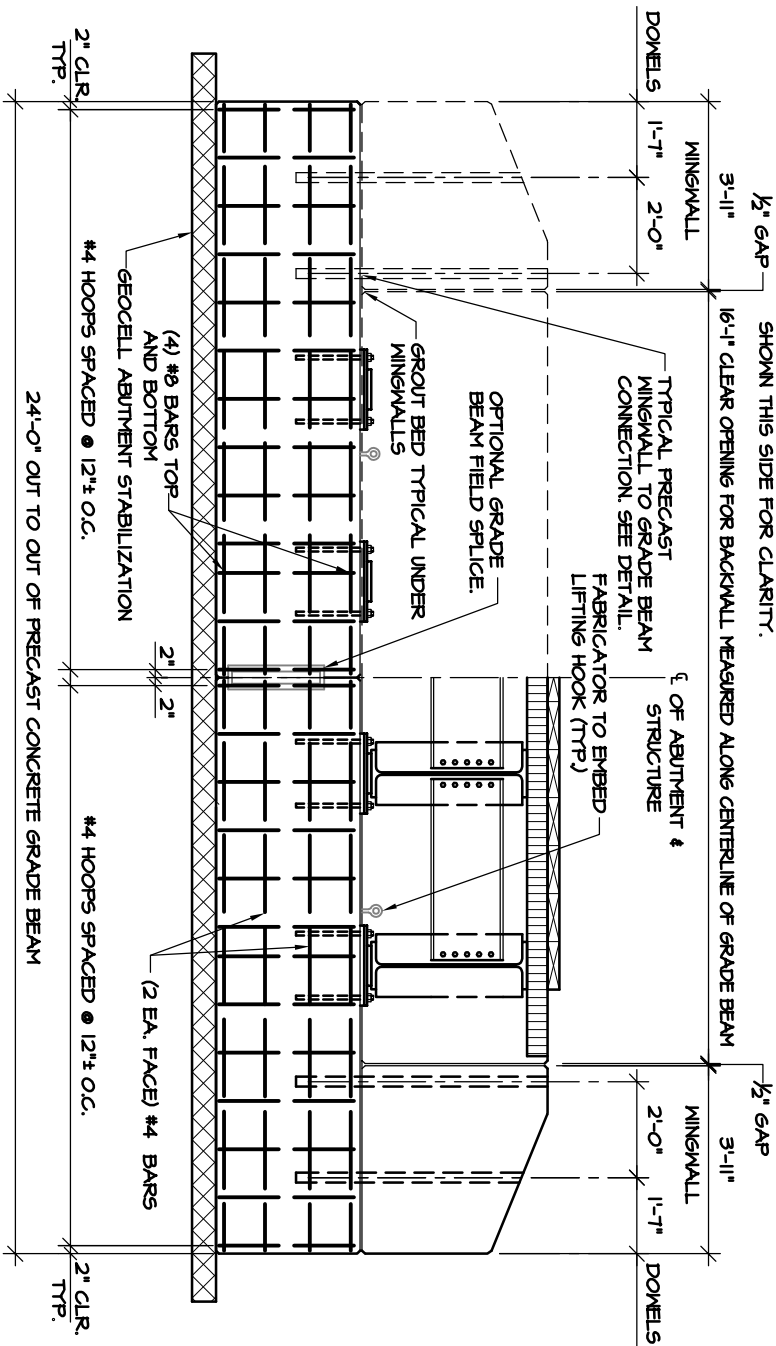




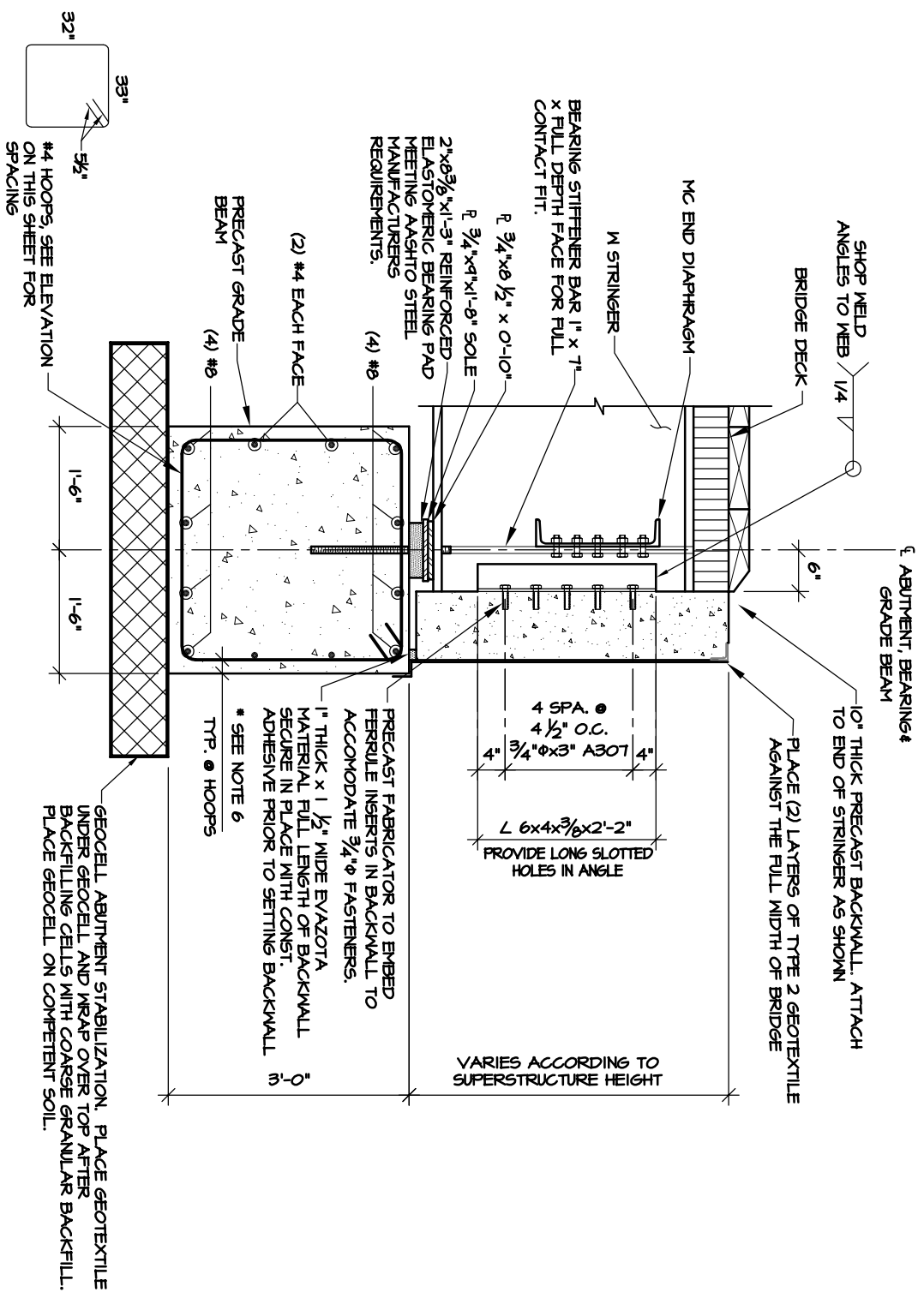
MINGWALL CONNECTION DETAIL



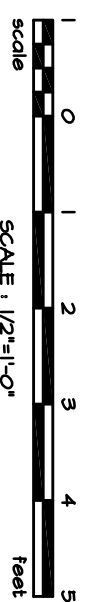
NOTE:
BRIDGE SUPERSTRUCTURE NOT SHOWN THIS SIDE FOR CLARITY.



ABUTMENT ELEVATION



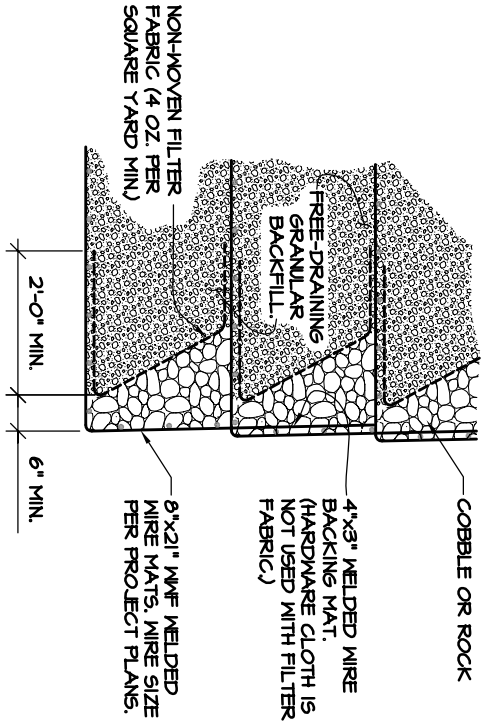
ABUTMENT SECTION



GENERAL NOTES:

- ALL PRECAST CONCRETE SHALL BE CLASS A CONCRETE MEETING DOT & PF STANDARD SPECIFICATION 501 WITH A MINIMUM FC = 4000 PSI AT 28 DAYS.
- ALL REINFORCING STEEL SHALL BE THE DEFORMED TYPE MEETING AASHTO M31 (ASTM A615), GRADE 60. BENDING AND SPLICING OF REINFORCEMENT SHALL BE IN ACCORDANCE WITH ACI 318.
- ALL BOLTS SHALL TO BE ASTM A325, GALVANIZED IN ACCORDANCE WITH AASHTO M232.
- ALL METAL COMPONENTS SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M111.
- GRADE BEAM AND MINIWALL LENGTH SHALL BE EXTENDED TO MEET SITE CONDITIONS AND RETAIN ROADWAY APPROACH FILL.
- PROVIDE A MINIMUM OF 2" OF CONCRETE COVER OVER REINFORCING STEEL.



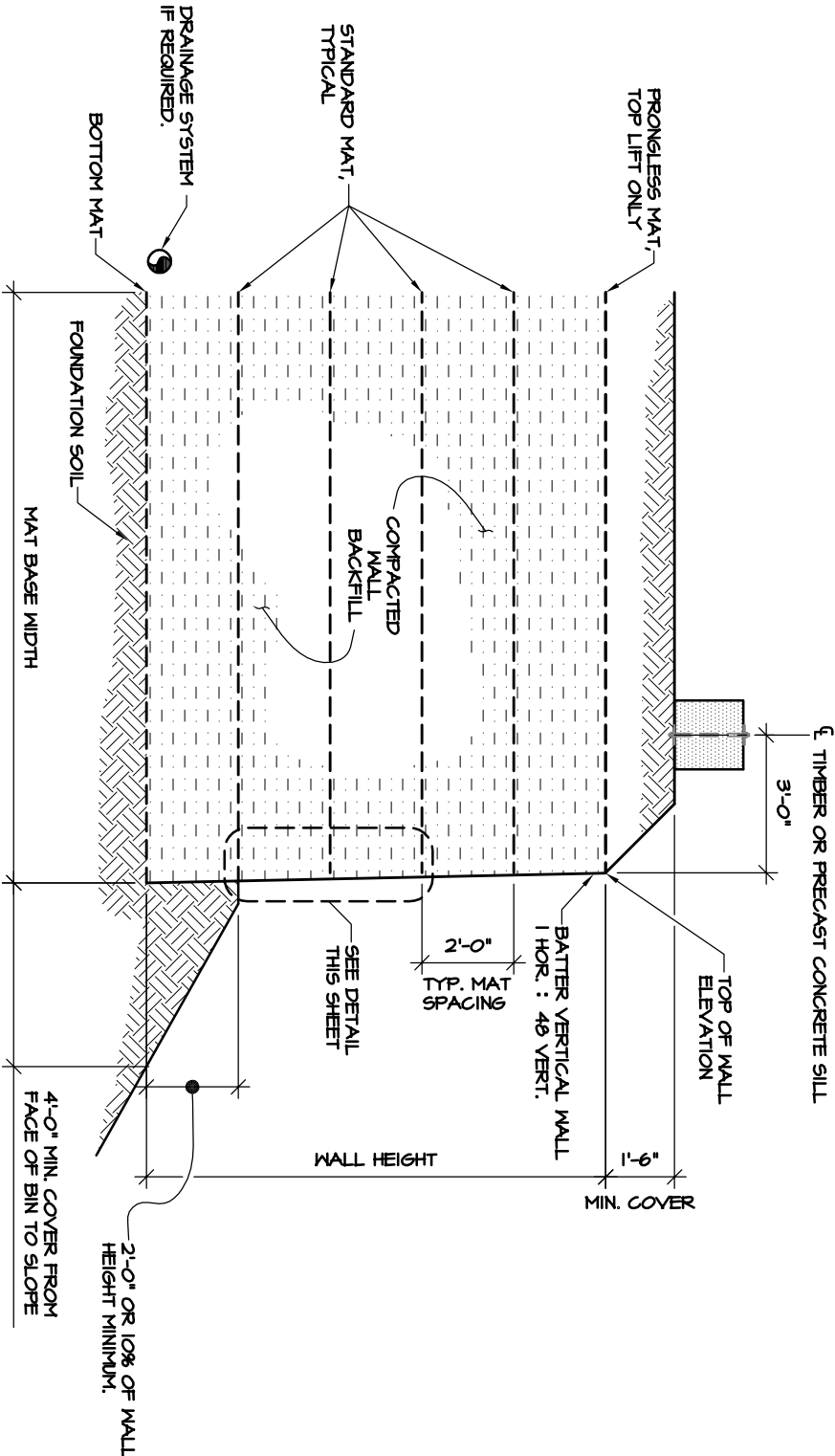


- GENERAL NOTES:**
1. WELDED WIRE RETAINING WALL SYSTEMS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE MANUFACTURER'S GUIDELINES.
 2. WELDED WIRE RETAINING WALL DETAILS SHALL BE USED THAT MINIMIZE IMPACTS ON WATERWAYS BY UTILIZING FILTER FABRIC OR HARDWARE CLOTH TO PROTECT FROM INFILTRATION OF FINES AND BY PROVIDING ADEQUATE DRAINAGE BEHIND THE STRUCTURE.
 3. ALL METAL COMPONENTS SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M311.
 4. INSTALL BIN WALL RETAINING ABUTMENT SYSTEM PER MANUFACTURER'S TYPICAL INSTALLATION. FILL INTERIOR OF BIN WITH SELECT GRANULAR BACKFILL MATERIAL 103-222 COMPACTED TO 95% DENSITY OR ENGINEER'S APPROVAL. BACKFILL AND COMPACT ADJACENT TO BIN WITH BACKFILL MATERIAL 103-215.
 5. EROSION CONTROL PLAN IS REQUIRED.

WELDED WIRE ROCK FACING DETAIL



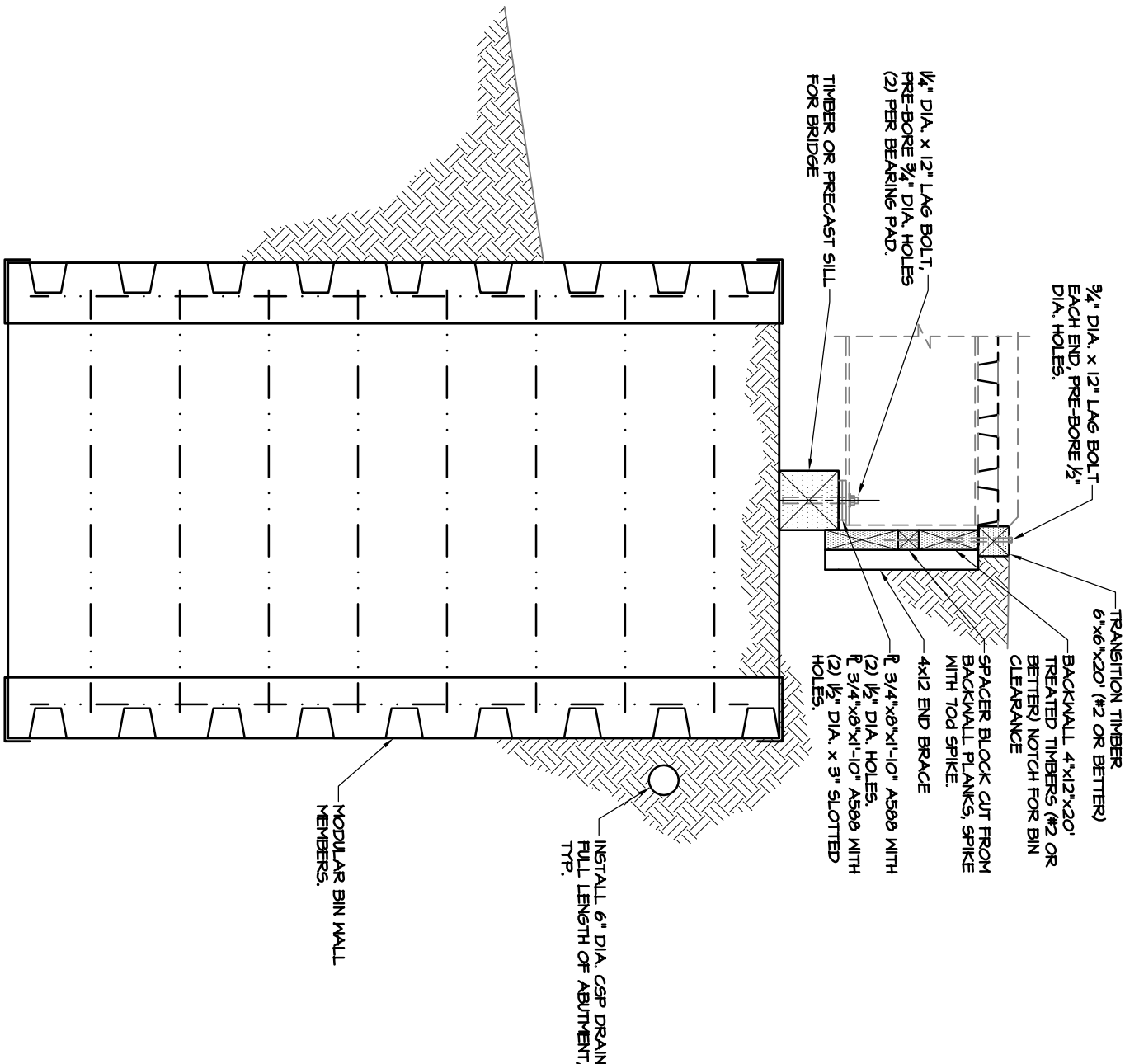
SCALE : 3/8"=1'-0"



ELEVATION - WELDED WIRE RETAINING WALL FOUNDATION



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

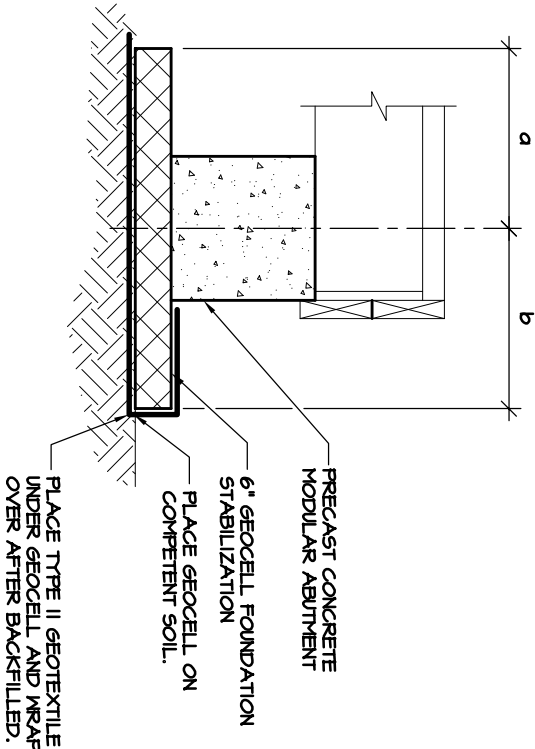


SECTION MODULAR BIN WALL ABUTMENT



SCALE : 3/8"=1'-0"

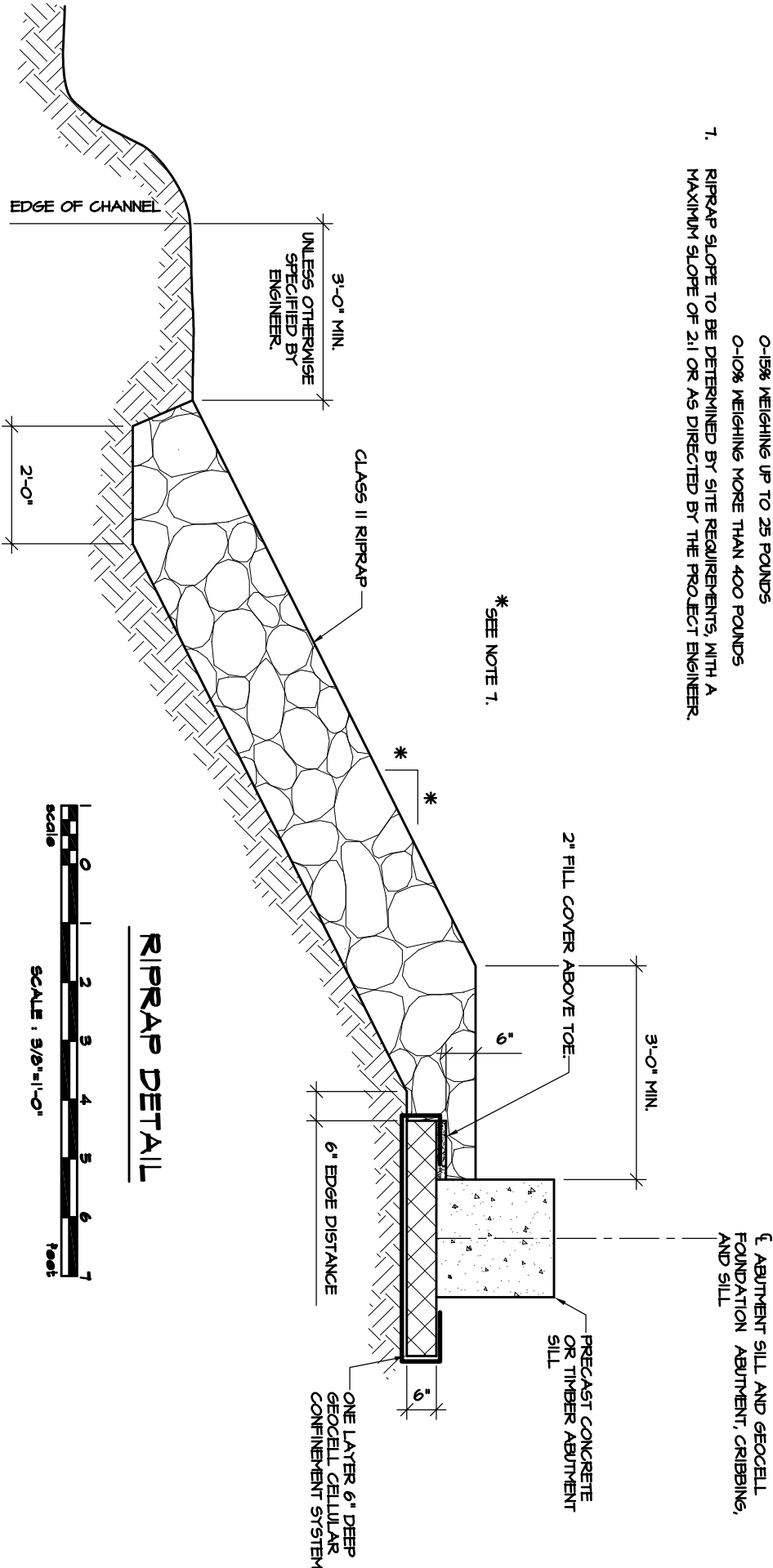




GEOCELL SCHEDULE			
STRUCTURE	SPAN	a	b
CONCRETE ABUTMENT	UP TO 50 FT.	4'-3"	2'-6"
	UP TO 90 FT.	5'-6"	4'-6"

GEOCELL DETAIL

- GENERAL NOTES:**
- SEE SHEET N-01.00 FOR FOUNDATION PARAMETERS.
 - ALL GEOTEXTILE SHALL BE TYPE II UNLESS OTHERWISE SPECIFIED BY THE ENGINEER.
 - GEOTEXTILE SHALL BE JOINED BY OVERLAPPING A MINIMUM OF 18 INCHES (UNLESS OTHERWISE SPECIFIED) AND SECURED AGAINST UNDERLYING FOUNDATION MATERIAL USING PINS APPROVED AND PROVIDED BY THE GEOTEXTILE MANUFACTURER.
 - GEOTEXTILE BENEATH RIPRAP SHALL BE PLACED WITH A MINIMUM OVERLAP OF 24 INCHES.
 - SUBGRADE SURFACES ON WHICH FABRIC IS PLACED SHALL BE REASONABLY SMOOTH AND FREE OF ROCKS, CLODS, ROOTS OR OTHER OBJECTS WHICH COULD PUNCTURE THE FABRIC.
 - ALL RIPRAP SHALL BE CLASS II RIPRAP CONFORMING TO THE FOLLOWING CRITERIA, UNLESS OTHERWISE SPECIFIED BY THE ENGINEER.
 - CLASS II 50-100% WEIGHING 200 POUNDS OR MORE.
 - 0-15% WEIGHING UP TO 25 POUNDS
 - 0-10% WEIGHING MORE THAN 400 POUNDS
 - RIPRAP SLOPE TO BE DETERMINED BY SITE REQUIREMENTS, WITH A MAXIMUM SLOPE OF 2:1 OR AS DIRECTED BY THE PROJECT ENGINEER.



RIPRAP DETAIL



1. PROVIDE TYPE OM-3R OR OM-3L OBJECT MARKERS AT EACH CORNER OF THE BRIDGE, EITHER AT EACH ABUTMENT OR AT THE END OF APPROACH RAIL, AS SHOWN ON THE CONTRACT PLANS.
2. WHEN OBJECT MARKERS ARE TO BE PLACED ON TOP OF FINAL GUARDRAIL POST, USE SIMILAR MATERIAL TO SPLICE TO GUARDRAIL POST AS SHOWN ON DOT & PF STANDARD DRAWING S-20.10. OTHERWISE WOOD OR STEEL PERFORATED POSTS MAY BE USED.
3. PLYWOOD OR ALUMINUM AS SPECIFIED IN SECTION 730 OF THE DOT & PF STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION MAY BE USED FOR THE OBJECT MARKER SIGN BASE. IF ALUMINUM IS TO BE USED, PROVIDE A MINIMUM OF 0.060" THICK SHEET ALUMINUM.
4. ALWAYS PLACE INSIDE EDGE OF OBJECT MARKER IN LINE WITH EDGE OF OBSTRUCTION CLOSEST TO ROADWAY.
5. WHEN OBJECT MARKER IS AT THE EDGE OF PAVED APPROACH GUARDRAIL, ENSURE THAT BOTTOM OF OBJECT MARKER SIGN IS A MINIMUM OF 5 FOOT CLEAR ABOVE FINISHED ROADWAY EDGE.
6. IF APPROACH GUARDRAIL IS WARRANTED CONSULT "BARRIER GUIDE FOR LOW VOLUME AND LOW SPEED ROADS", PUBLICATION NO. FHWA-C/LTD-05-004, FOR DESIGN OF NECESSARY CLEAR ZONE.
7. FOR EMBEDMENT LENGTH SEE DOT & PF STANDARD SHEET S-30.03.
8. ATTACH ALL OBJECT MARKER POSTS IN ACCORDANCE WITH DOT & PF STANDARD SHEET S-30.03.

