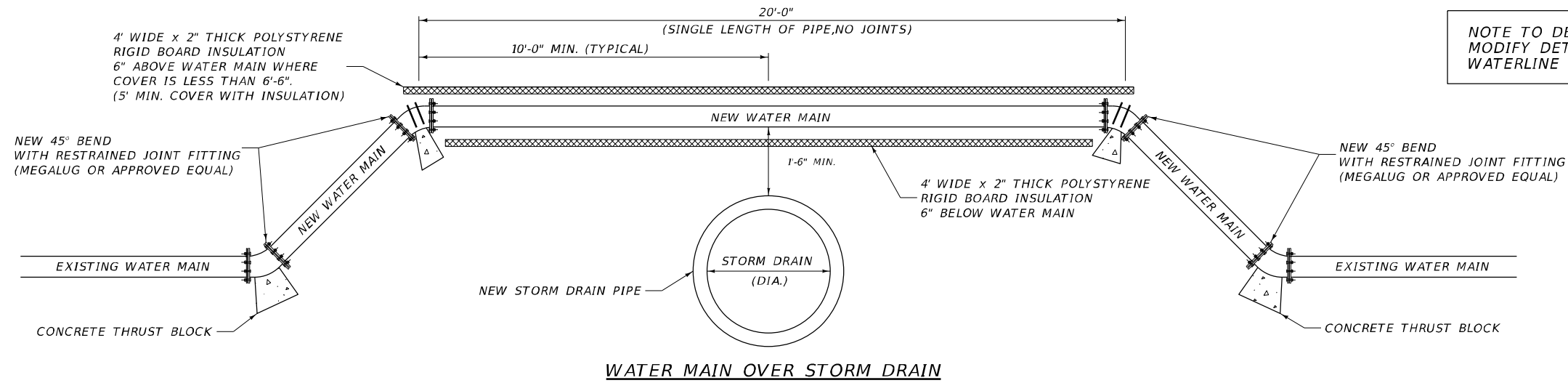
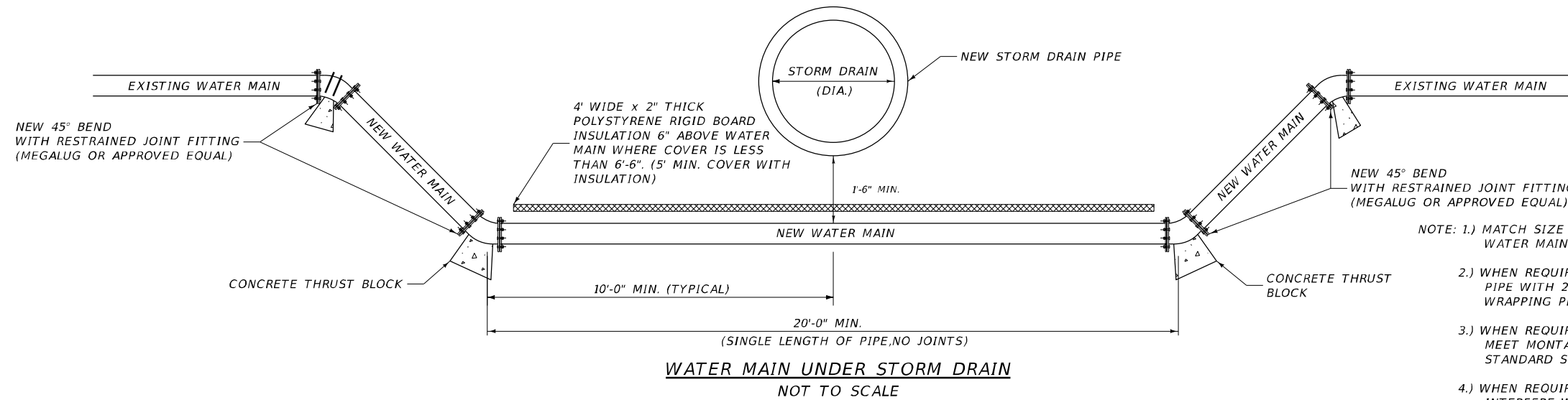


# DETAIL



NOTE TO DESIGNER:  
MODIFY DETAIL AS NEEDED TO MEET WATERLINE OWNERS REQUIREMENTS.



- NOTE: 1.) MATCH SIZE AND TYPE OF NEW WATER MAIN TO EXISTING.
- 2.) WHEN REQUIRED, ENCASE NEW D.I. PIPE WITH 2-PLY POLYETHYLENE PIPE WRAPPING PER AWWA C105.
- 3.) WHEN REQUIRED, THRUST BLOCKS TO MEET MONTANA PUBLIC WORKS OR THE CITY STANDARD SPECIFICATION.
- 4.) WHEN REQUIRED, THRUST BLOCKS WILL NOT INTERFERE WITH ACCESS TO CONNECTION JOINT BOLTS.
- 5.) WHEN REQUIRED, POLYSTYRENE RIGID BOARD INSULATION TO MEET ASTM C578, TYPE VI, WITH 40 P.S.I. COMPRESSION STRENGTH.
- 6.) CLEAN, TEST, AND DISINFECT PER MONTANA PUBLIC WORKS.

NOTE:  
# WHEN REQUIRED FIELD INVESTIGATE TO DETERMINE IF EXISTING WATER MAIN MEETS DEQ CLEARANCE ON NEW STORM DRAIN LINE. WHEN CLEARANCE IS NOT MET, DETERMINE EXISTING LINE SIZE AND ADJUST PER DETAIL.

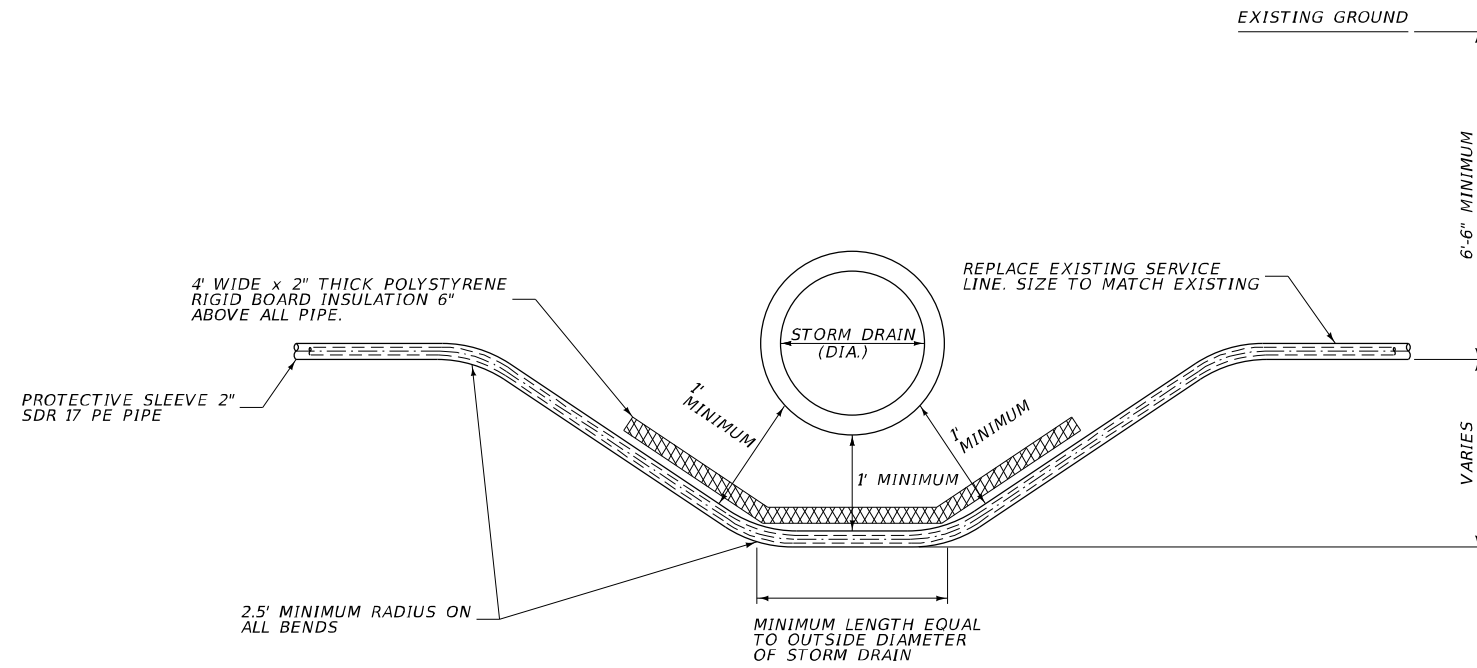
ADJUST WATER MAIN						
STATION	OFFSET	# FIELD INVESTIGATION	PIPE TYPE\SIZE (in)	PIPE LENGTH (ft)	* GRANULAR BEDDING MATERIAL (yd <sup>3</sup> )	* TRENCH EXCAVATION (yd <sup>3</sup> )

\* FOR INFORMATIONAL PURPOSES ONLY. COST INCLUDED IN LENGTH OF PIPE.

ADJUST WATER MAIN DETAIL  
NO SCALE

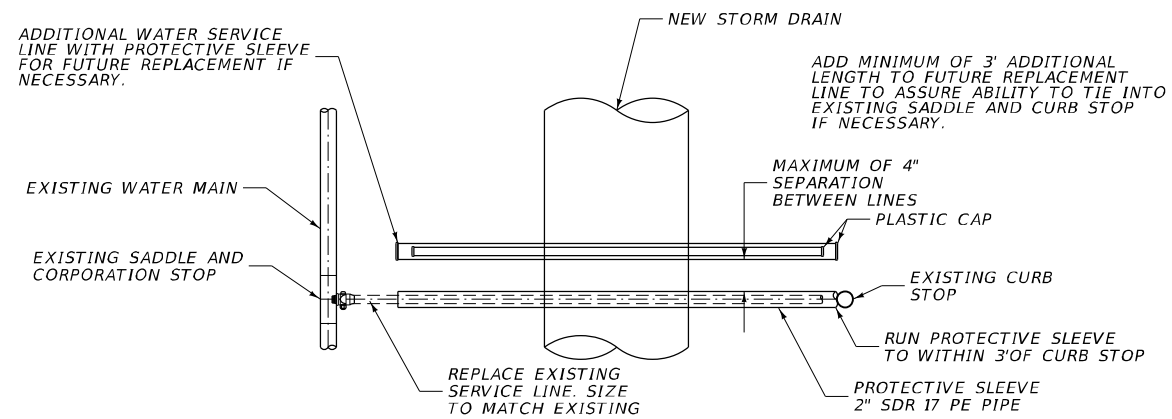
# DETAIL

NOTE TO DESIGNER:  
MODIFY DETAIL AS NEEDED TO MEET  
WATERLINE OWNERS REQUIREMENTS.

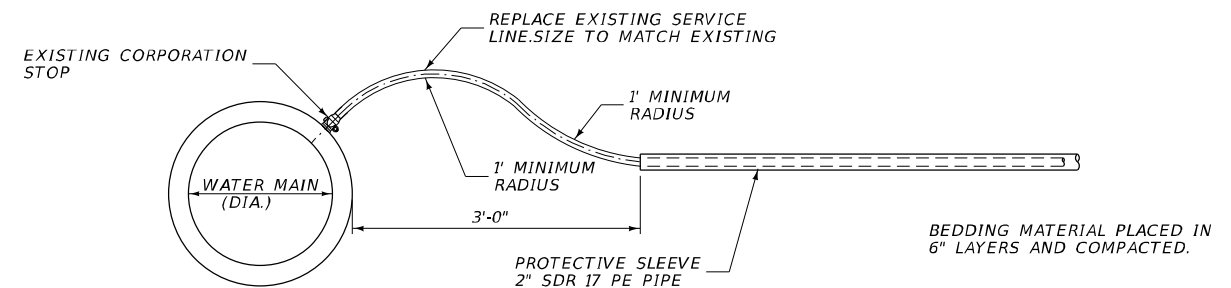


- NOTE: 1.) MATCH SIZE AND TYPE OF NEW WATER LINE TO EXISTING.  
2.) CLEAN, TEST, AND DISINFECT WATER SERVICE AND FITTING PER MONTANA PUBLIC WORKS.  
3.) WHEN REQUIRED, POLYSTYRENE RIGID BOARD INSULATION TO MEET ASTM C578, TYPE VI, WITH 40 P.S.I. COMPRESSION STRENGTH.

**WATER SERVICE ADJUSTMENT DETAIL - PROFILE VIEW**

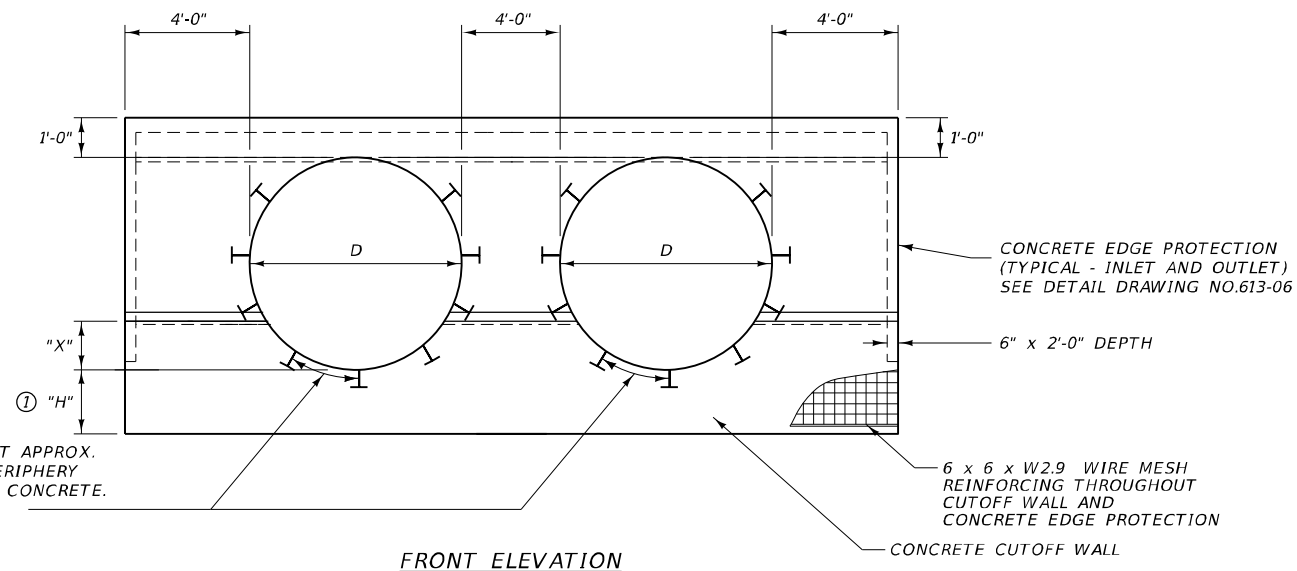


**WATER SERVICE ADJUSTMENT DETAIL - PLAN VIEW**



**WATER SERVICE CONNECTION DETAIL**

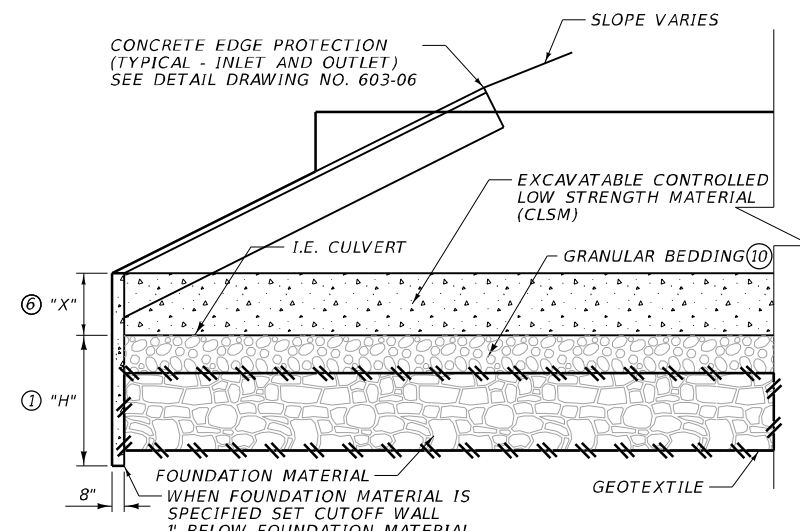
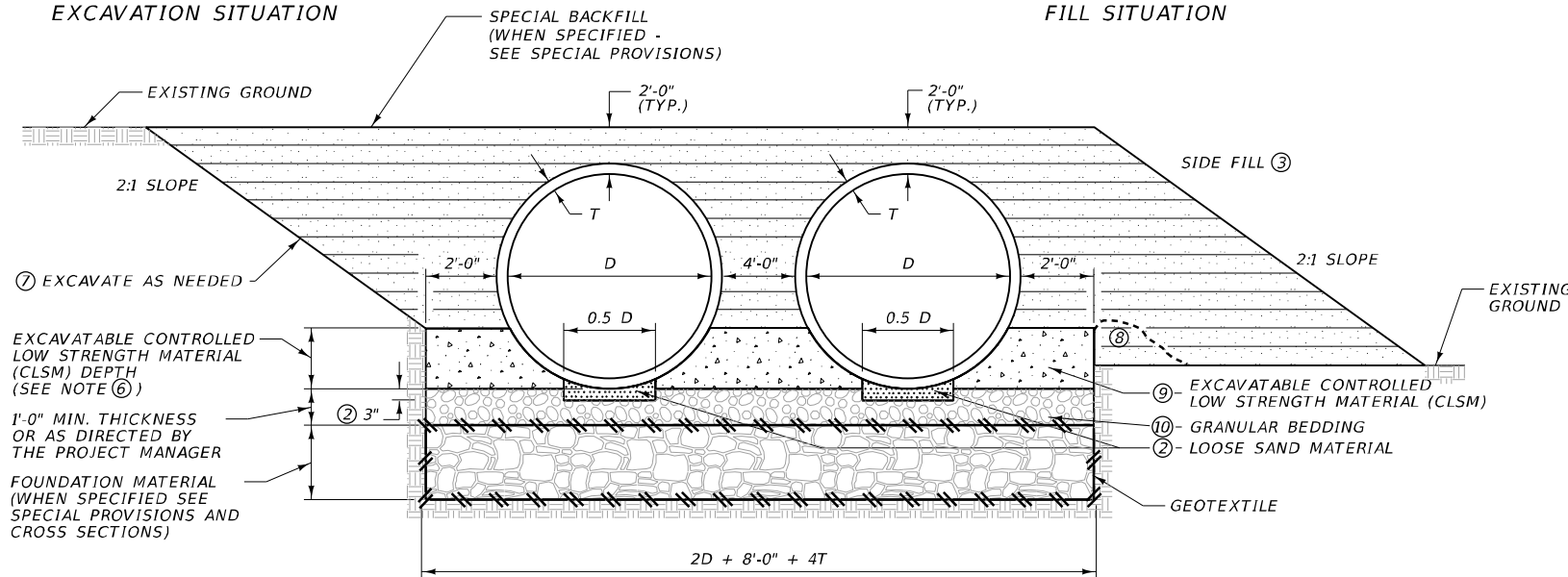
WATER SERVICE  
ADJUSTMENT DETAIL  
NO SCALE



3/4" DIA. ANCHOR BOLTS AT APPROX. 18" O.C. AROUND ENTIRE PERIPHERY OF CULVERT EMBEDDED IN CONCRETE. SEE DTL. DWG. NO. 552-00

TYPICAL EXCAVATION SITUATION

TYPICAL FILL SITUATION



NOTES:

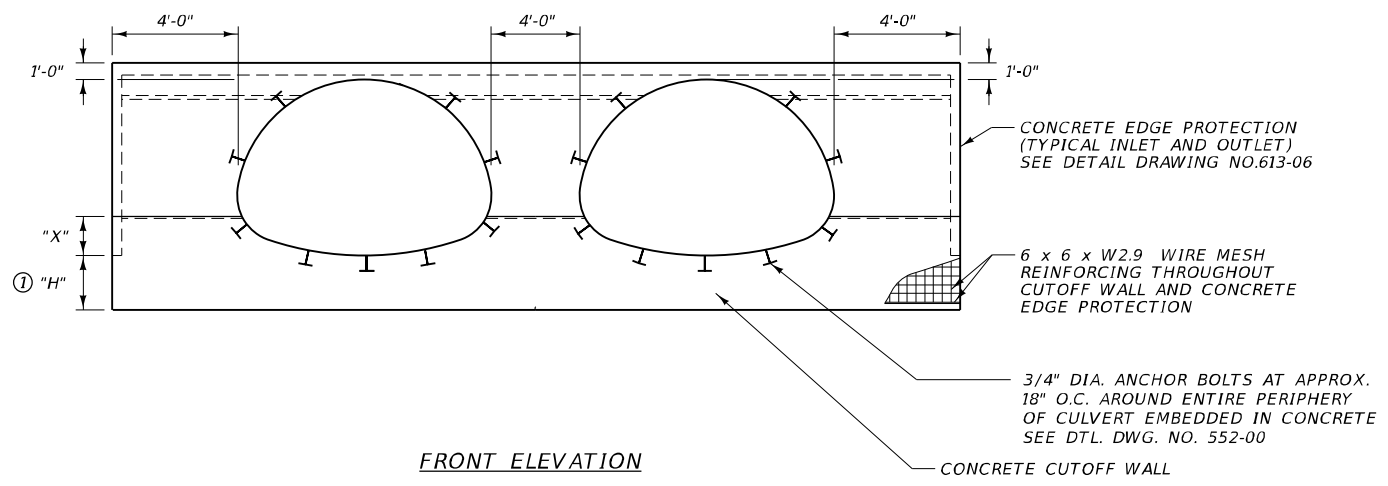
- ① 3'-0" MIN. OR 1'-0" BELOW BOTTOM OF FOUNDATION MATERIAL IF SPECIFIED.
- ② THE CONTRACTOR HAS THE OPTION OF USING A SAND CUSHION AS APPROVED BY THE PROJECT MANAGER TO FACILITATE CULVERT INSTALLATION. IF A SAND CUSHION IS USED, THAT MATERIAL WILL BE MEASURED AND PAID FOR AS GRANULAR BEDDING.
- ③ COMPACT AND PLACE SIDE FILL PER SECTION 603 AND 203.
- ④ FURNISH GRANULAR BEDDING AND FOUNDATION MATERIAL PER SECTION 701.
- ⑤ DIMENSION D THE INSIDE PIPE DIAMETER. DIMENSION T IS THE CORRUGATION DEPTH.
- ⑥ THE EXCAVATABLE CONTROLLED LOW STRENGTH MATERIAL (CLSM) DEPTH FOR METAL PIPE IS "X" + T. SEE DETAIL DRAWING NO. 603-32 FOR "X" DIMENSIONS OF CIRCULAR METAL PIPES.
- ⑦ EXCAVATE A SUFFICIENT AMOUNT TO PROVIDE A SAFE WORKING ENVIRONMENT AND TO ALLOW ACHIEVEMENT OF ALL CULVERT INSTALLATION AND COMPACTION REQUIREMENTS. SLOPE, BENCH OR PROVIDE SHORING FOR ALL EXCAVATIONS IN ACCORDANCE WITH THE U.S. DEPARTMENT OF LABOR, OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION.
- ⑧ BUILD BERM WITH FILL MATERIAL AS NEEDED TO CONTAIN THE EXCAVATABLE CONTROLLED LOW STRENGTH MATERIAL (CLSM) BEDDING TO THE PROPER DEPTH.
- ⑨ PLACE EXCAVATABLE CONTROLLED LOW STRENGTH MATERIAL (CLSM) MEETING THE REQUIREMENTS OF SECTION 551 OF THE STANDARD SPECIFICATIONS.
- ⑩ COMPACT GRANULAR BEDDING BY PROOF ROLLING WITH A VIBRATORY COMPACTOR IN 12" LIFTS OR BY USING A METHOD APPROVED BY THE PROJECT MANAGER

DIMENSIONS

STATION	D (FT.)	LENGTH (FT.)	"T" (IN.)	"X" (FT.)	"H" (FT.)

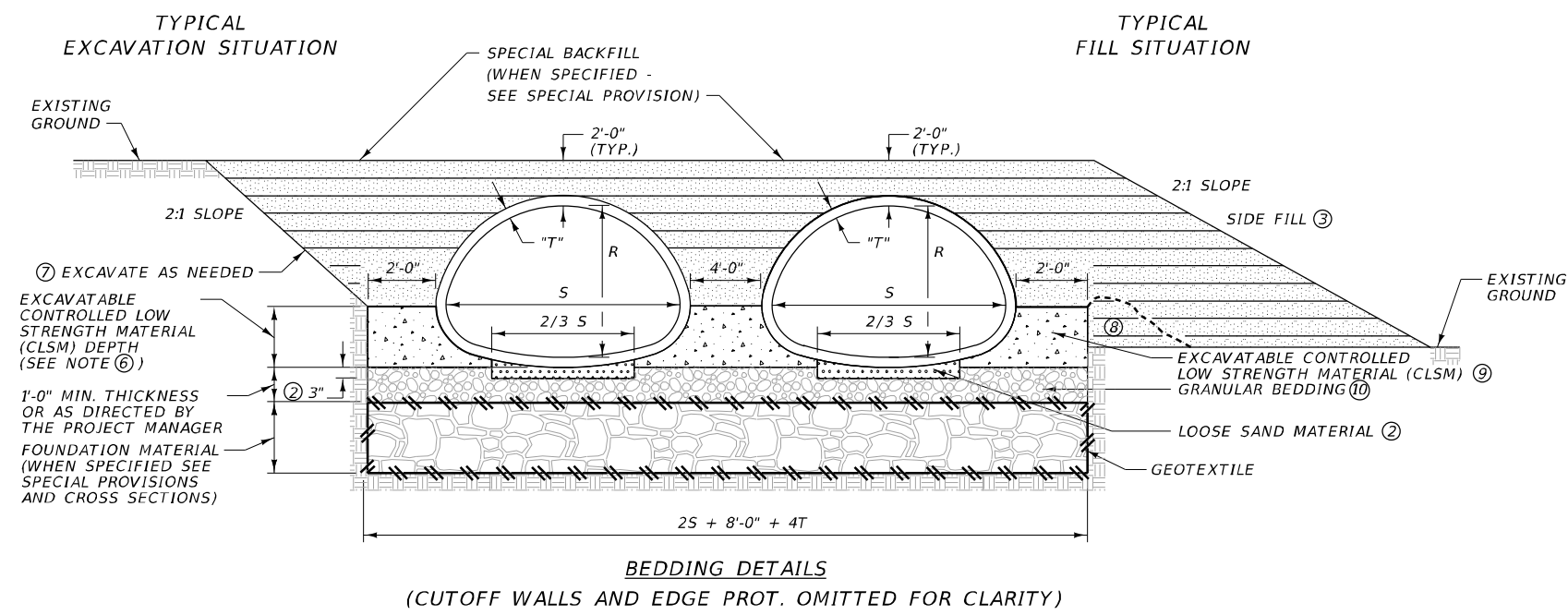
NOTE: INCLUDE REINFORCING MATERIAL IN THE UNIT PRICE BID PER CUBIC YARD OF CLASS GENERAL CONCRETE. INCLUDE ANCHOR BOLTS IN THE UNIT PRICE BID PER LINEAR FOOT OF CULVERT. QUANTITIES ARE BASED ON THE DIMENSIONS IN THE TABLE.

DETAIL BEDDING FOR DOUBLE STRUCTURAL STEEL PLATE PIPE CULVERTS  
NO SCALE

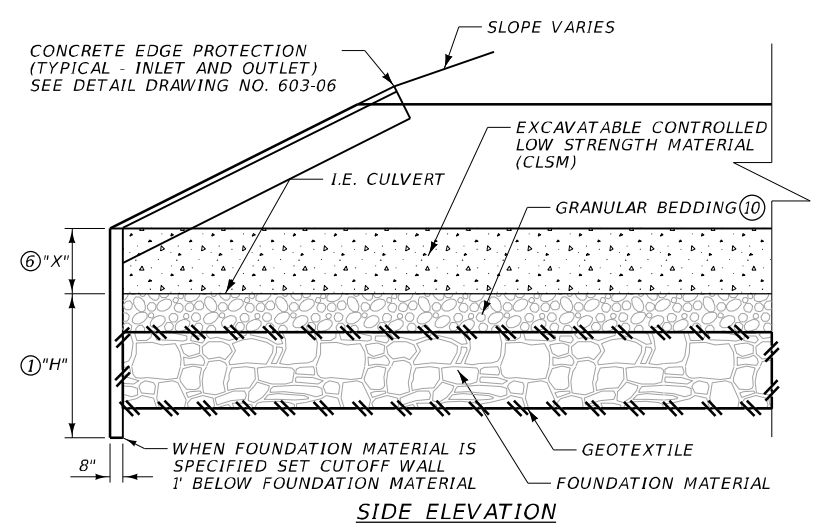


FRONT ELEVATION

- NOTES:
- ① 3'-0" MIN. OR 1'-0" BELOW BOTTOM OF FOUNDATION MATERIAL IF SPECIFIED.
  - ② THE CONTRACTOR HAS THE OPTION OF USING A SAND CUSHION AS APPROVED BY THE PROJECT MANAGER TO FACILITATE CULVERT INSTALLATION. IF A SAND CUSHION IS USED, THAT MATERIAL WILL BE MEASURED AND PAID FOR AS GRANULAR BEDDING.
  - ③ COMPACT AND PLACE SIDE FILL PER SECTION 603 AND 203.
  - ④ FURNISH GRANULAR BEDDING AND FOUNDATION MATERIAL PER SECTION 701.
  - ⑤ DIMENSION D THE INSIDE PIPE DIAMETER. DIMENSION T IS THE CORRUGATION DEPTH.
  - ⑥ THE EXCAVATABLE CONTROLLED LOW STRENGTH MATERIAL (CLSM) DEPTH FOR METAL PIPE IS "X" + T. SEE DETAIL DRAWING NO. 603-34 FOR "X" DIMENSIONS OF METAL ARCH CULVERTS.
  - ⑦ EXCAVATE A SUFFICIENT AMOUNT TO PROVIDE A SAFE WORKING ENVIRONMENT AND TO ALLOW ACIEVEMENT OF ALL CULVERT INSTALLATION AND COMPACTION REQUIREMENTS. SLOPE, BENCH OR PROVIDE SHORING FOR ALL EXCAVATIONS IN ACCORDANCE WITH THE U.S. DEPARTMENT OF LABOR, OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION.
  - ⑧ BUILD BERM WITH FILL MATERIAL AS NEEDED TO CONTAIN THE EXCAVATABLE CONTROLLED LOW STRENGTH MATERIAL (CLSM) BEDDING TO THE PROPER DEPTH.
  - ⑨ PLACE EXCAVATABLE CONTROLLED LOW STRENGTH MATERIAL (CLSM) MEETING THE REQUIREMENTS OF SECTION 551 OF THE STANDARD SPECIFICATIONS.
  - ⑩ COMPACT GRANULAR BEDDING BY PROOF ROLLING WITH A VIBRATORY COMPACTOR IN 12" LIFTS OR BY USING A METHOD APPROVED BY THE PROJECT MANAGER



BEDDING DETAILS  
(CUTOFF WALLS AND EDGE PROT. OMITTED FOR CLARITY)

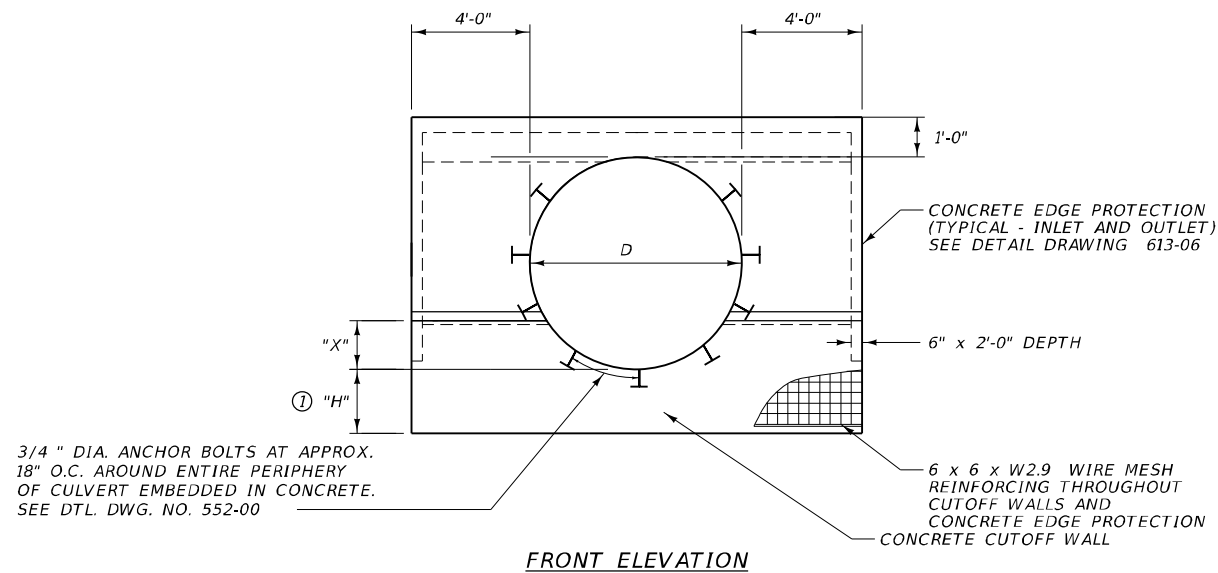


SIDE ELEVATION

DIMENSIONS						
STATION	SPAN (FT.)	RISE (FT.)	LENGTH (FT.)	"T" (IN.)	"X" (FT.)	"H" (FT.)

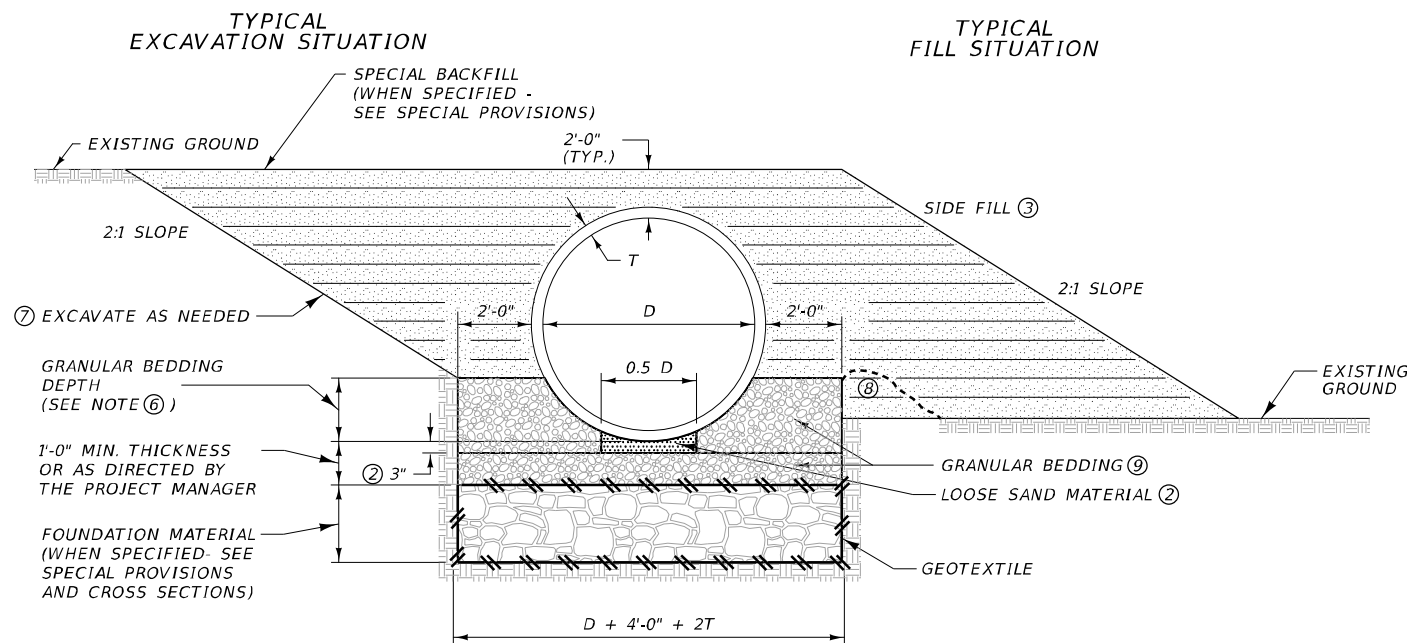
NOTE: INCLUDE REINFORCING MATERIAL IN THE UNIT PRICE BID PER CUBIC YARD OF CLASS GENERAL CONCRETE. INCLUDE ANCHOR BOLTS IN THE UNIT PRICE BID PER LINEAR FOOT OF CULVERT. QUANTITIES ARE BASED ON THE DIMENSIONS IN THE TABLE.

DETAIL  
BEDDING FOR DOUBLE  
STRUCTURAL STEEL PLATE  
PIPE ARCH CULVERTS  
NO SCALE



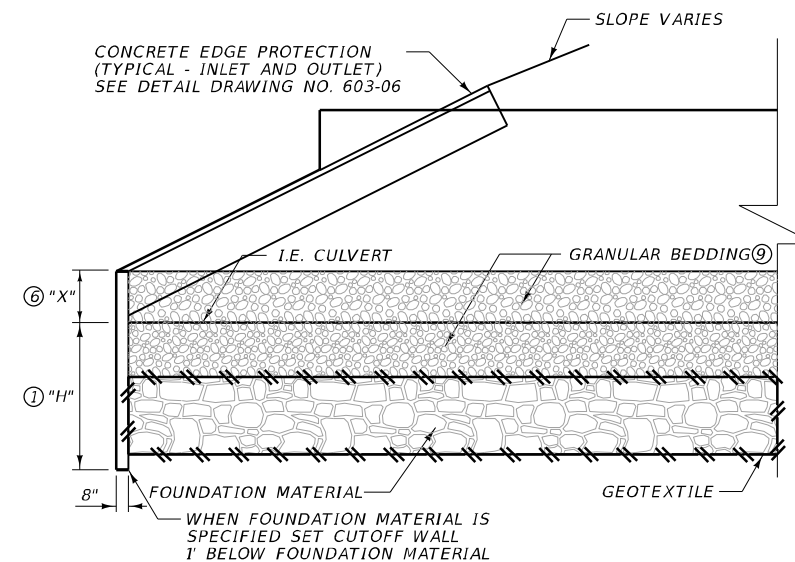
NOTES:

- ① 3'-0" MIN. OR 1'-0" BELOW BOTTOM OF FOUNDATION MATERIAL IF SPECIFIED.
- ② THE CONTRACTOR HAS THE OPTION OF USING A SAND CUSHION AS APPROVED BY THE PROJECT MANAGER TO FACILITATE CULVERT INSTALLATION. IF A SAND CUSHION IS USED, THAT MATERIAL WILL BE MEASURED AND PAID FOR AS GRANULAR BEDDING.
- ③ COMPACT AND PLACE SIDE FILL PER SECTION 603 AND 203.
- ④ FURNISH GRANULAR BEDDING AND FOUNDATION MATERIAL PER SECTION 701.
- ⑤ DIMENSION D THE INSIDE PIPE DIAMETER. DIMENSION T IS THE CORRUGATION DEPTH.
- ⑥ THE GRANULAR BEDDING DEPTH IS "X" + T. SEE DTL. DWG. NO. 603-32 FOR "X" DIMENSIONS OF CIRCULAR METAL CULVERTS. AFTER LAYING CULVERT, COMPACT GRANULAR BEDDING AT HAUNCHES AND SIDES.
- ⑦ EXCAVATE A SUFFICIENT AMOUNT TO PROVIDE A SAFE WORKING ENVIRONMENT AND TO ALLOW ACIEVEMENT OF ALL CULVERT INSTALLATION AND COMPACTION REQUIREMENTS. SLOPE, BENCH OR PROVIDE SHORING FOR ALL EXCAVATIONS IN ACCORDANCE WITH THE U.S. DEPARTMENT OF LABOR, OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION.
- ⑧ BUILD BERM WITH FILL MATERIAL AS NEEDED TO CONTAIN THE GRANULAR BEDDING TO THE PROPER DEPTH.
- ⑨ COMPACT GRANULAR BEDDING BY PROOF ROLLING WITH A VIBRATORY COMPACTOR IN 12 INCH LIFTS OR BY USING A METHOD APPROVED BY THE PROJECT MANAGER.



BEDDING DETAILS

(CUTOFF WALLS AND EDGE PROT. OMITTED FOR CLARITY)



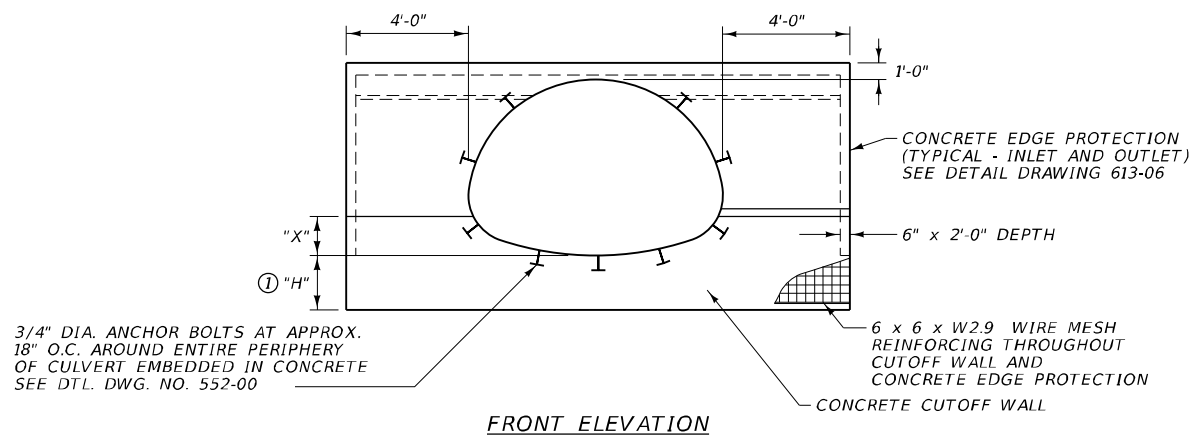
SIDE ELEVATION

DIMENSIONS

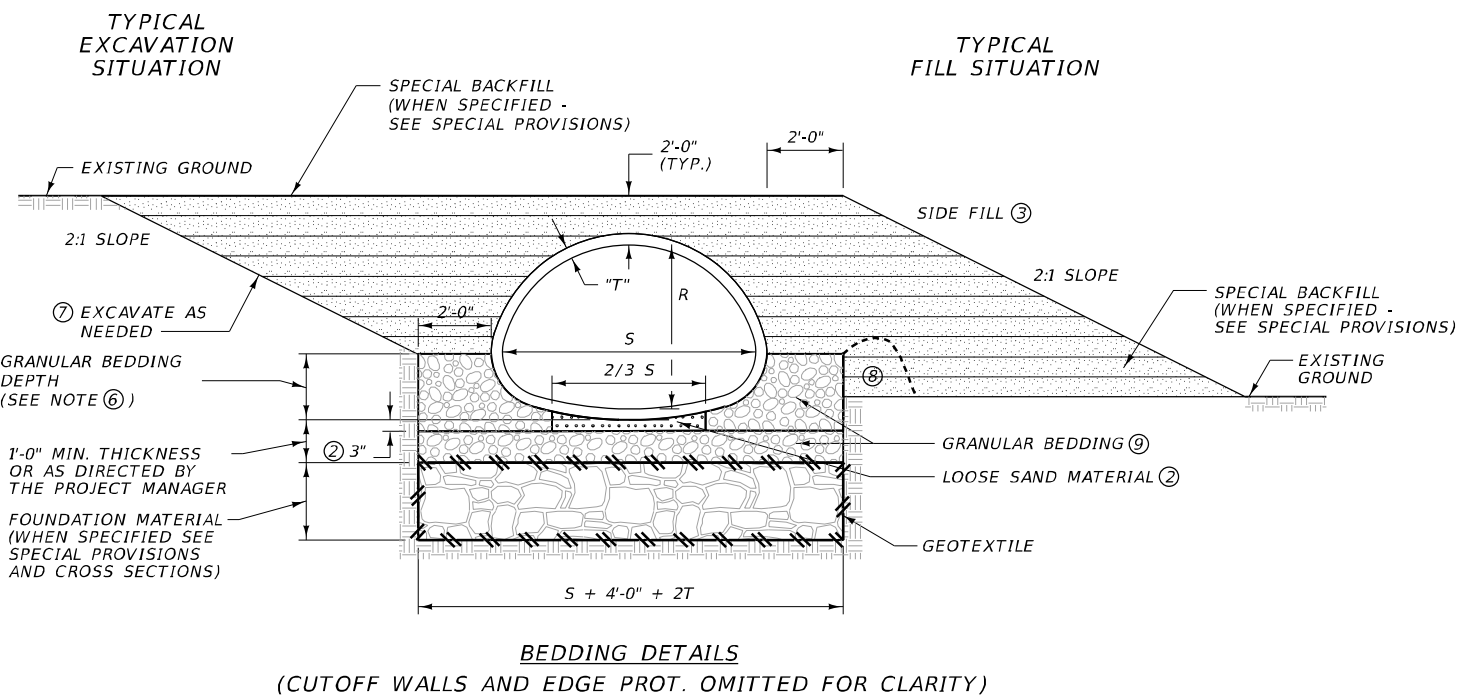
STATION	D (FT.)	LENGTH (FT.)	"T" (IN.)	"X" (FT.)	"H" (FT.)

NOTE: INCLUDE REINFORCING MATERIAL IN THE UNIT PRICE BID PER CUBIC YARD OF CLASS GENERAL CONCRETE. INCLUDE ANCHOR BOLTS IN THE UNIT PRICE BID PER LINEAR FOOT OF CULVERT. QUANTITIES ARE BASED ON THE DIMENSIONS IN THE TABLE.

DETAIL BEDDING FOR STRUCTURAL STEEL PLATE PIPE CULVERT NO SCALE

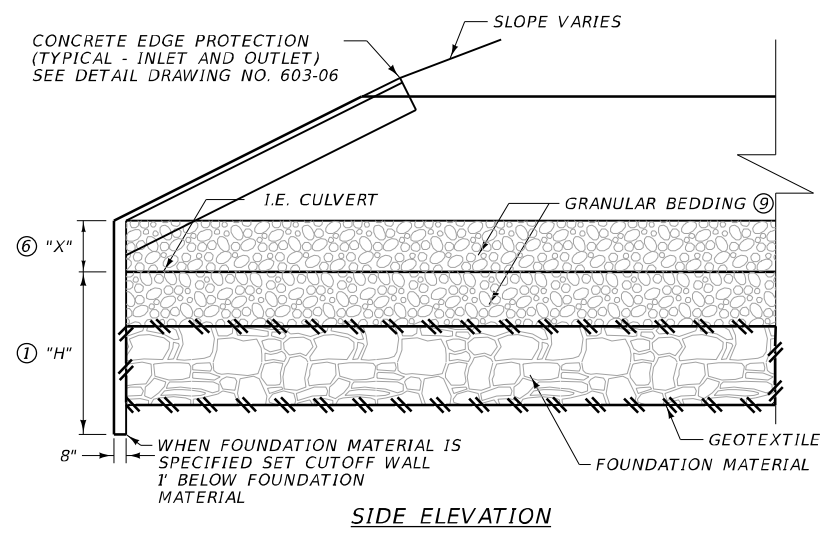


3/4" DIA. ANCHOR BOLTS AT APPROX. 18" O.C. AROUND ENTIRE PERIPHERY OF CULVERT EMBEDDED IN CONCRETE SEE DTL. DWG. NO. 552-00



NOTES:

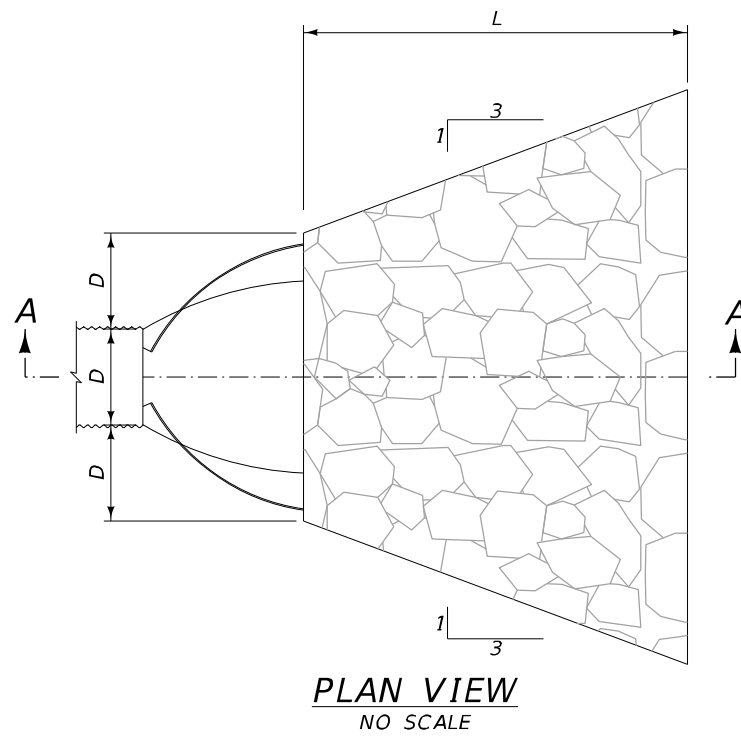
- ① WHEN FOUNDATION MATERIAL IS SPECIFIED, SET CUTOFF WALL 1 FOOT BELOW BOTTOM OF FOUNDATION MATERIAL.
- ② PLACE LOOSE SAND MATERIAL UNIFORMLY IN THE BOTTOM OF THE TRENCH AND SHAPE TO FIT BOTTOM OF PIPE. THE MINIMUM THICKNESS BEFORE PLACING PIPE IS 3". AFTER LAYING CULVERT, COMPACT GRANULAR BEDDING AT HAUNCHES AND SIDES OF PIPE. COMPACT GRANULAR BEDDING BY PROOF ROLLING WITH A VIBRATORY COMPACTOR IN 12 INCH LIFTS OR BY USING A METHOD APPROVED BY THE PROJECT MANAGER.
- ③ COMPACT AND PLACE SIDE FILL PER SECTION 603 AND 203.
- ④ SEE SECTION 701.04 OF THE STANDARD SPECIFICATIONS FOR BEDDING MATERIAL REQUIREMENTS.
- ⑤ DIMENSIONS S AND R ARE THE SPAN AND RISE. DIMENSION T IS THE CORRUGATION DEPTH.
- ⑥ THE GRANULAR BEDDING DEPTH IS "X" + T. SEE DTL. DWG. NO. 603-34 FOR "X" DIMENSIONS OF METAL ARCH CULVERTS. AFTER LAYING CULVERT, COMPACT GRANULAR BEDDING AT HAUNCHES AND SIDES.
- ⑦ EXCAVATE A SUFFICIENT AMOUNT TO PROVIDE A SAFE WORKING ENVIRONMENT AND TO ALLOW ACIEVEMENT OF ALL CULVERT INSTALLATION AND COMPACTION REQUIREMENTS. SLOPE, BENCH OR PROVIDE SHORING FOR ALL EXCAVATIONS IN ACCORDANCE WITH THE U.S. DEPARTMENT OF LABOR, OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION.
- ⑧ BUILD BERM WITH FILL MATERIAL AS NEEDED TO CONTAIN THE GRANULAR BEDDING TO THE PROPER DEPTH.



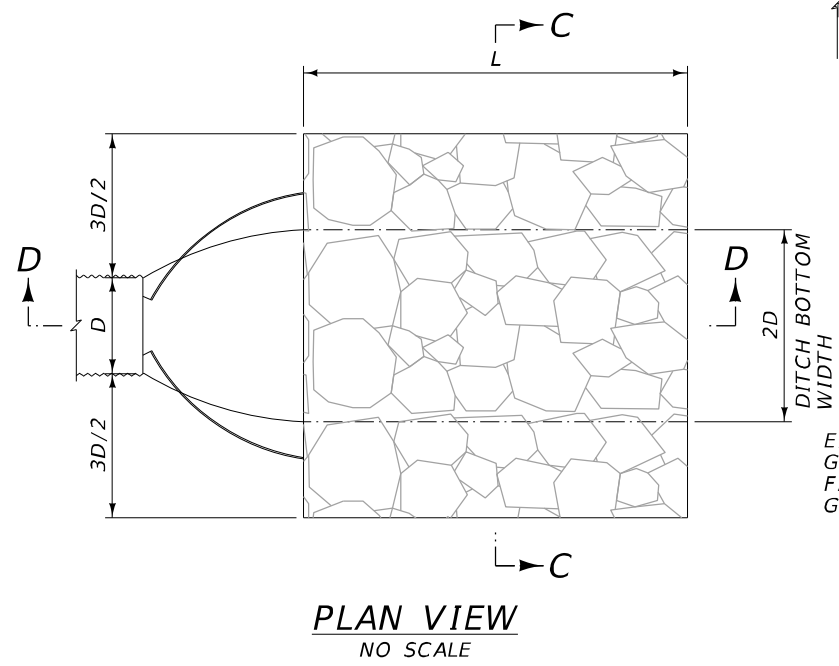
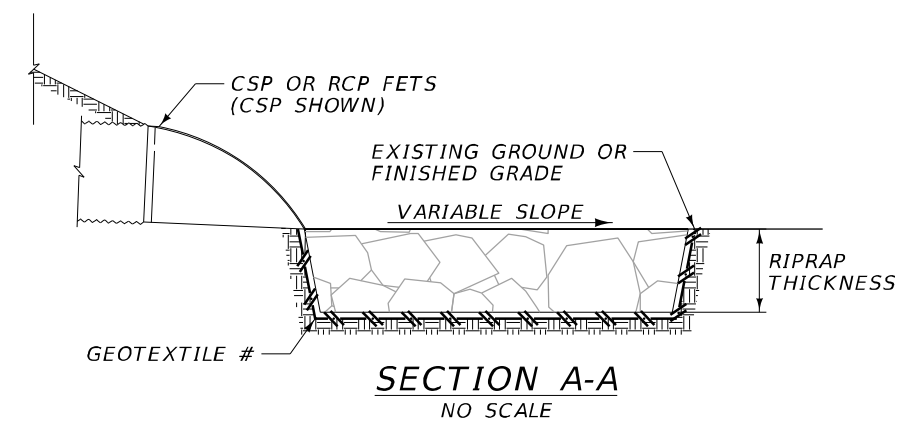
DIMENSIONS						
STATION	SPAN (FT.-IN.)	RISE (FT.-IN.)	LENGTH (FT.)	"T" (IN.)	"X" (FT.)	"H" (FT.)

NOTE: INCLUDE REINFORCING MATERIAL IN THE UNIT PRICE BID PER CUBIC YARD OF CLASS GENERAL CONCRETE. INCLUDE ANCHOR BOLTS IN THE UNIT PRICE BID PER LINEAR FOOT OF CULVERT. QUANTITIES ARE BASED ON THE DIMENSIONS IN THE TABLE.

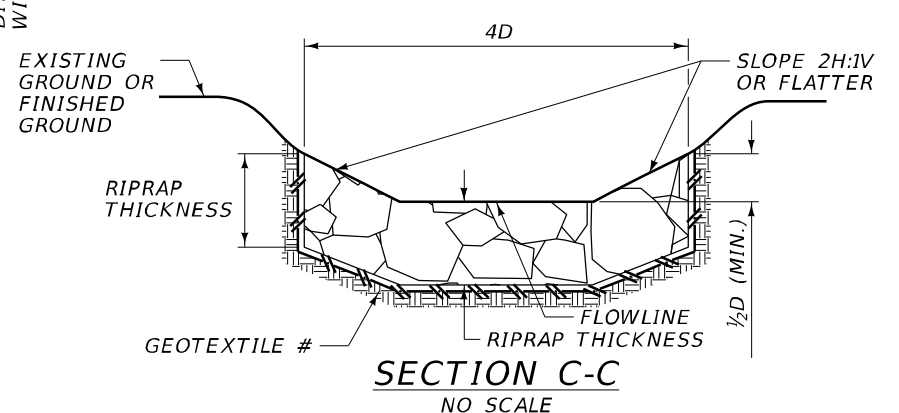
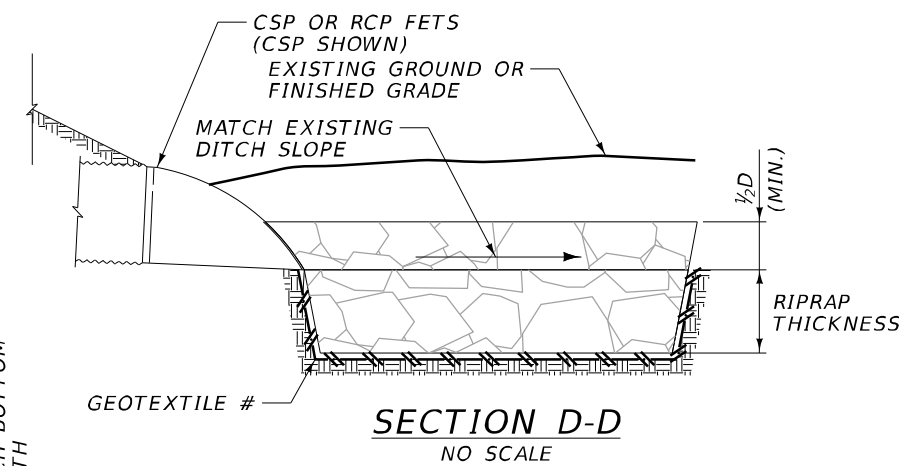
DETAIL BEDDING FOR STRUCTURAL STEEL PLATE PIPE ARCH CULVERT NO SCALE



**CULVERT OUTLET RIPRAP WITHOUT DITCH**



**CULVERT OUTLET RIPRAP WITH DITCH**



**CULVERT OUTLET RIPRAP WITHOUT DITCH - DIMENSIONS AND ESTIMATED QUANTITIES**

CULVERT DIA. OR SPAN D (in.)	CLASS I RIPRAP (2' THICK)			CLASS II RIPRAP (2.5' THICK)		
	LENGTH OF APRON L (ft.)	Class I Riprap (yd)	Geotextile # (yd)	LENGTH OF APRON L (ft.)	Class II Riprap (yd)	Geotextile # (yd)
12	4	1.3	2	6	2.8	3
18	6	2.9	4	9	6.3	8
21	7	3.9	6	11	9.1	11
22	8	4.8	7	11	9.3	11
24	8	5.1	8	12	11.1	13
26	9	6.3	10	13	13.0	16
28	10	7.7	11	14	15.1	18
28½	10	7.7	12	15	16.8	20
30	10	8.0	12	15	17.4	21
35	12	11.3	17	18	24.6	30
36	12	11.6	17	18	25.0	30
36¼	13	12.9	19	19	27.1	33
42	14	15.7	24	21	34.0	41
43¾	15	17.7	27	22	37.2	45
48	16	20.5	31	24	44.4	53
49	17	22.6	34	25	47.6	57
51½	18	25.0	38	26	51.6	62
53	18	25.7	39	27	55.6	67
57	19	29.0	43	29	64.2	77
58½	20	31.5	47	30	68.4	82

# PERMANENT EROSION CONTROL GEOTEXTILE - HIGH SURVIVABILITY

**CULVERT OUTLET RIPRAP WITH DITCH - DIMENSIONS AND ESTIMATED QUANTITIES**

CULVERT DIA. OR SPAN D (in.)	CLASS I RIPRAP (2' THICK)			CLASS II RIPRAP (2.5' THICK)		
	LENGTH OF APRON L (ft.)	Class I Riprap (yd)	Geotextile # (yd)	LENGTH OF APRON L (ft.)	Class II Riprap (yd)	Geotextile # (yd)
12	4	1.2	2	6	2.2	3
18	6	2.7	4	9	5.0	6
21	7	3.6	6	11	7.1	9
22	8	4.3	7	11	7.5	9
24	8	4.7	8	12	8.9	11
26	9	5.8	9	13	10.4	13
28	10	6.9	11	14	12.1	15
28½	10	7.0	11	15	13.2	17
30	10	7.4	12	15	13.9	18
35	12	10.4	16	18	19.4	25
36	12	10.7	17	18	20.0	25
36¼	13	11.6	18	19	21.3	27
42	14	14.5	23	21	27.2	35
43¾	15	16.2	26	22	29.7	38
48	16	19.0	30	24	35.6	45
49	17	20.6	33	25	37.8	48
51½	18	22.7	36	26	41.0	52
53	18	23.6	37	27	44.2	56
57	19	26.7	42	29	51.0	65
58½	20	28.9	46	30	54.2	69

# PERMANENT EROSION CONTROL GEOTEXTILE - HIGH SURVIVABILITY

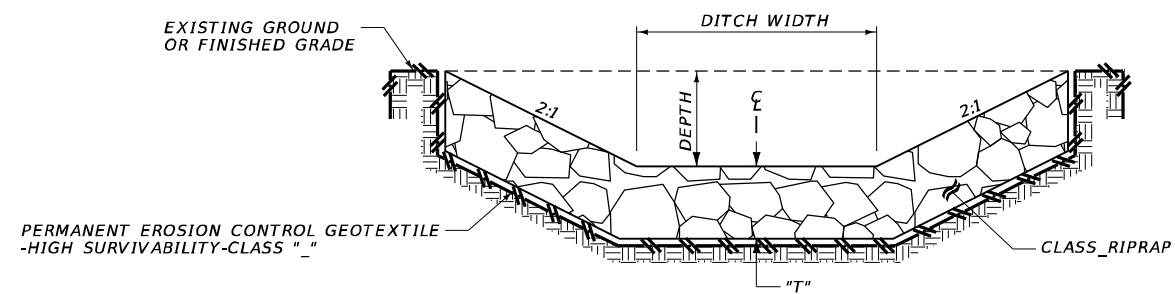
CULVERT STATION	CULVERT DIA. OR SPAN D (in.)	OUTLET RIPRAP LOCATION (lt. or rt.)	WITH DITCH	WITHOUT DITCH

CULVERT OUTLET RIPRAP FOR CULVERTS WITH FETS (48" EQUIVALENT AND SMALLER)  
NOT TO SCALE

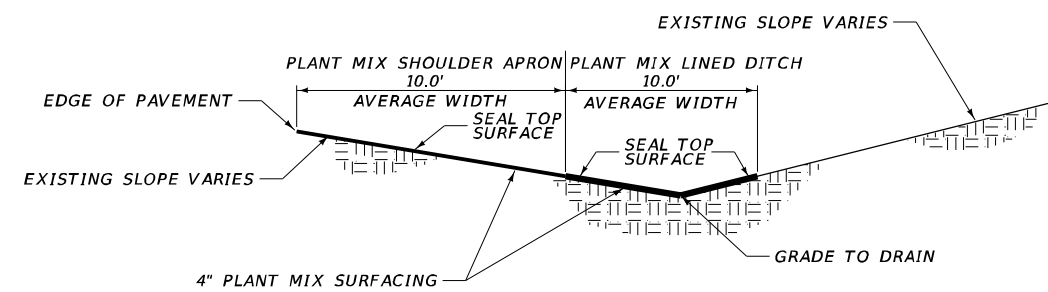






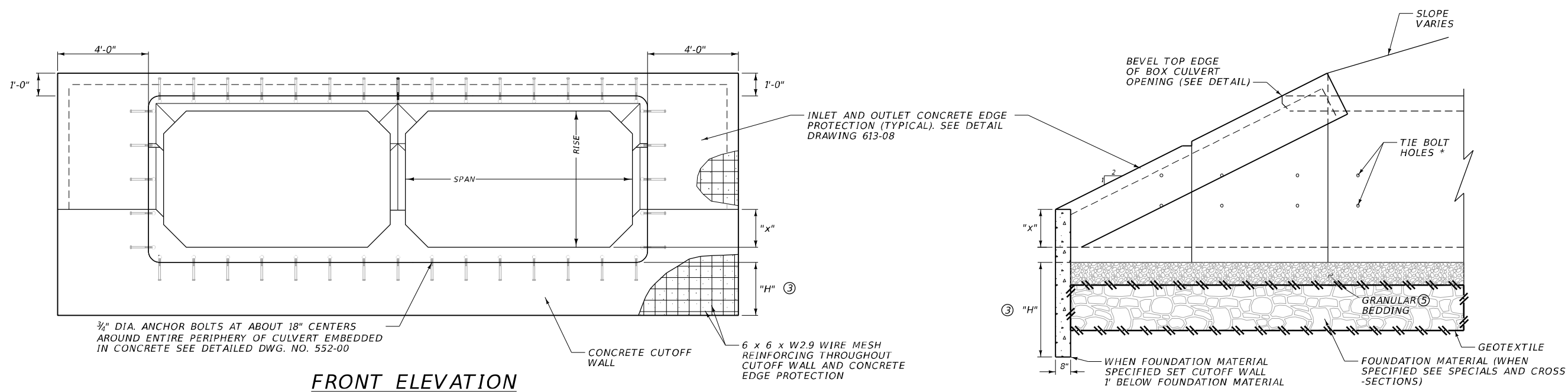


**RIPRAP LINED DITCH**



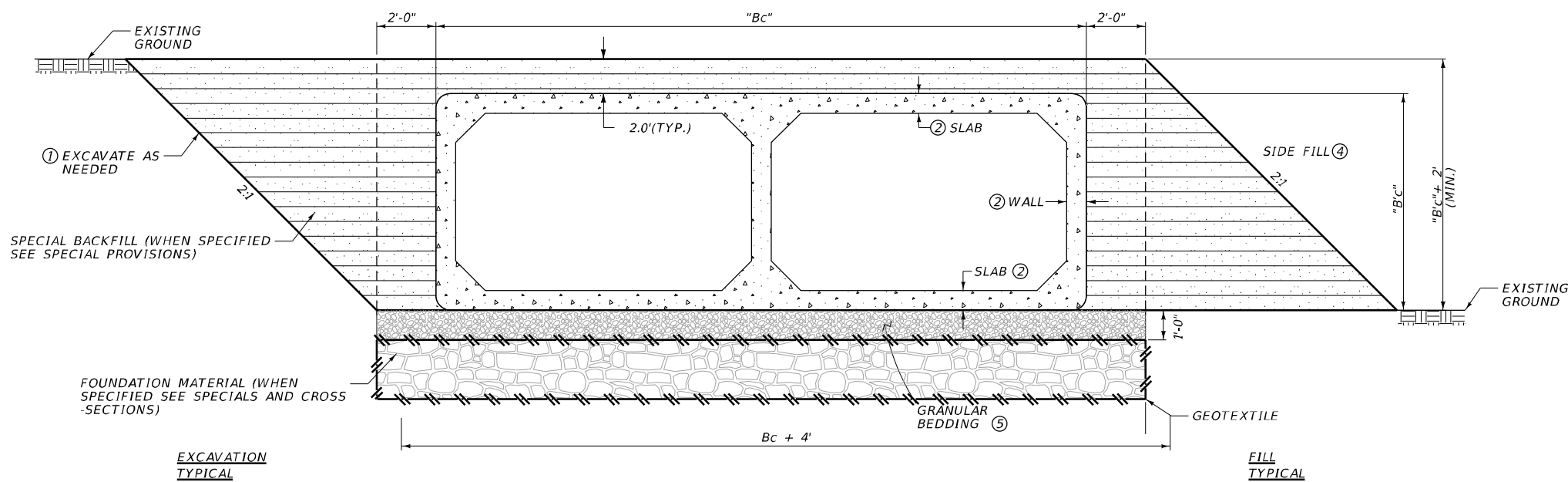
**PLANT MIX LINED DITCH**

RESHAPE AND COMPACT EXISTING SLOPES AS NECESSARY TO PROVIDE SUITABLE PAVING SURFACE. COMPACTION REQUIREMENTS FOR PLANT MIX AND GROUND ARE WAIVED BUT SUBJECT TO ENGINEER'S APPROVAL. RESHAPING PAID FOR WITH GRADER HOURS. COMPACTION TO BE INCLUDED IN COST OF OTHER ITEMS.

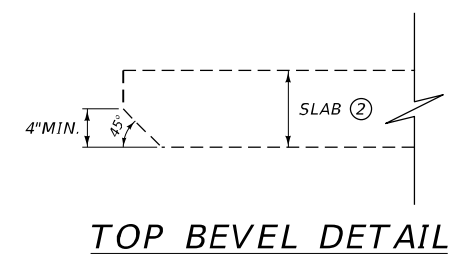


**FRONT ELEVATION**

**SIDE ELEVATION**



**BEDDING DETAIL**



**TOP BEVEL DETAIL**

- NOTES:
- ① EXCAVATE A SUFFICIENT AMOUNT TO PROVIDE A SAFE WORKING ENVIRONMENT AND TO ALLOW ACHIEVEMENT OF ALL CULVERT INSTALLATION AND COMPACTION REQUIREMENTS. SLOPE, BENCH OR PROVIDE SHORING FOR ALL EXCAVATIONS IN ACCORDANCE WITH THE U.S. DEPARTMENT OF LABOR, OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION.
  - ② FOR ESTIMATING QUANTITIES ONLY. ACTUAL DIMENSION TO BE DETERMINED BY PRECAST MANUFACTURER.
  - ③ 3'-0" MIN. OR 1'-0" BELOW BOTTOM OF FOUNDATION MATERIAL IF SPECIFIED.
  - ④ COMPACT AND PLACE SIDE FILL PER SECTION 603 AND 203.
  - ⑤ SEE SECTION 701 OF THE STANDARD SPECIFICATIONS FOR GRANULAR BEDDING REQUIREMENTS. THE CONTRACTOR HAS THE OPTION OF USING A SAND CUSHION ABOVE THE GRANULAR BEDDING TO FACILITATE JOINING OF THE BOX CULVERT SECTIONS.

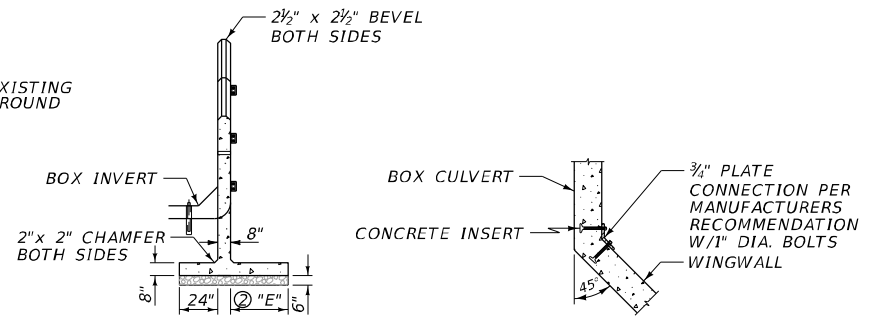
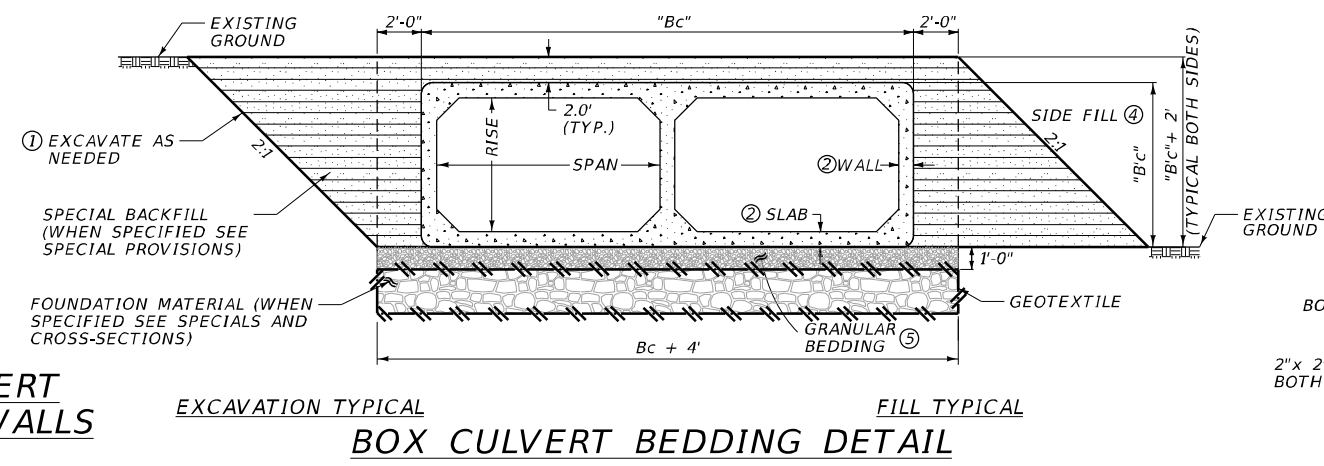
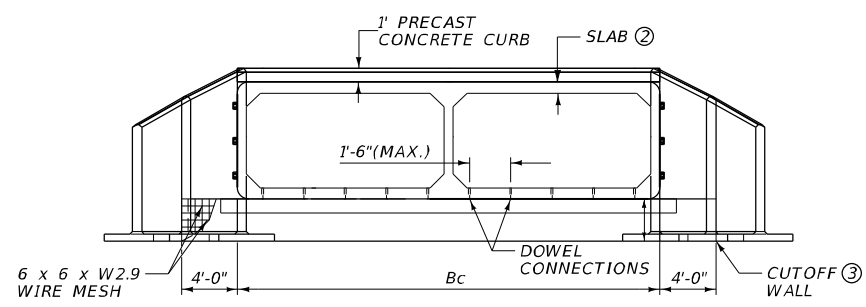
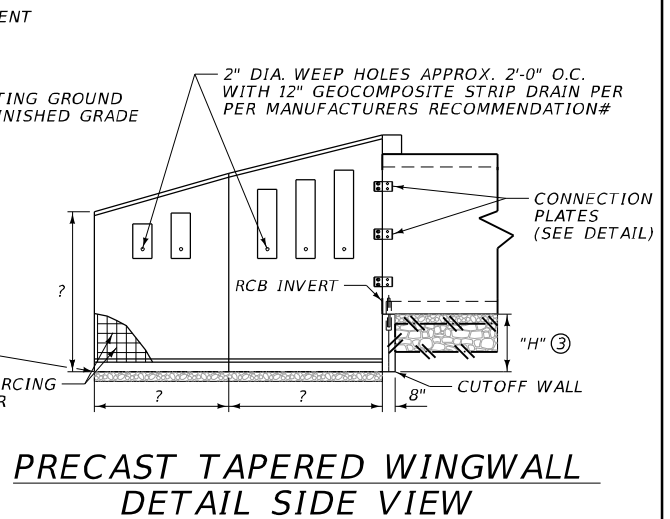
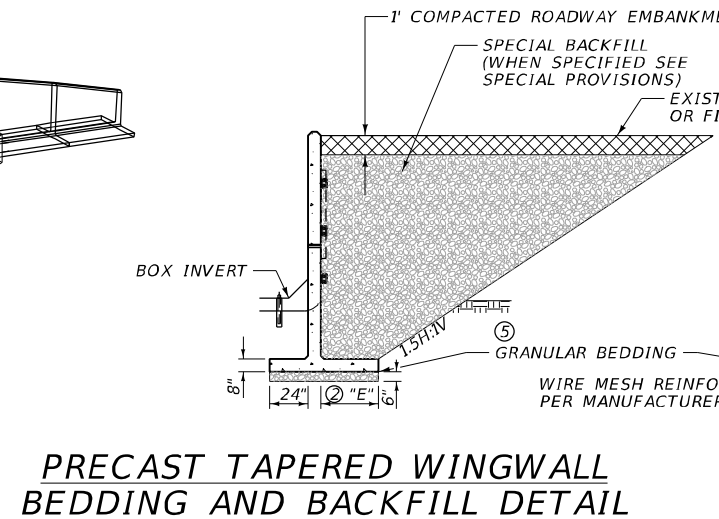
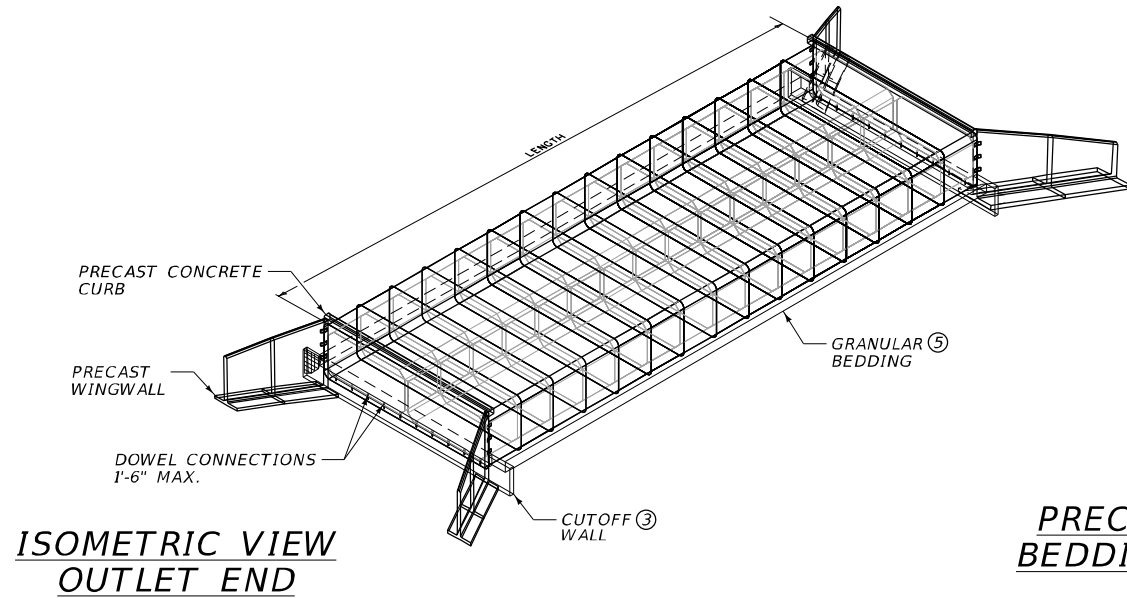
DIMENSIONS										
STATION	SPAN (ft.)	RISE (ft.)	LENGTH (ft.)	WALL (in.)	SLAB (in.)	"Bc" (ft.)	"x" (ft.)	"Bc" (ft.)	"H" (ft.)	COVER (ft.)

NOTE: INCLUDE REINFORCING, CUTOFF WALL, AND CONCRETE EDGE PROTECTION IN THE UNIT PRICE BID PER CUBIC YARD OF CLASS GENERAL CONCRETE. INCLUDE ANCHOR BOLTS IN THE UNIT PRICE BID PER LINEAR FOOT OF CULVERT. PROVIDE BOX CULVERTS MEETING ASTM C1577. QUANTITIES ARE BASED ON THE DIMENSIONS IN THE TABLE.

**SLOPED END  
DOUBLE RCB DETAIL  
NO SCALE**

**NOTES TO DESIGNER:**

- ① ADDITIONAL SHEETS MAY BE REQUIRED IF WINGWALLS ARE DIFFERENT DIMENSIONS AND/OR FLARE.
- ② ADD TOP BEVEL IF RCB IS EXPECTED TO FLOW FULL AT INLET.



**NOTES:**

- ① EXCAVATE A SUFFICIENT AMOUNT TO PROVIDE A SAFE WORKING ENVIRONMENT AND TO ALLOW ACHIEVEMENT OF ALL CULVERT INSTALLATION AND COMPACTION REQUIREMENTS. SLOPE, BENCH OR PROVIDE SHORING FOR ALL EXCAVATIONS IN ACCORDANCE WITH THE U.S. DEPARTMENT OF LABOR, OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION.
- ② FOR ESTIMATING QUANTITIES ONLY, ACTUAL DIMENSION TO BE DETERMINED BY PRECAST MANUFACTURER.
- ③ 3'-0" MIN OR 1'-0" BELOW BOTTOM OF FOUNDATION MATERIAL IF SPECIFIED.
- ④ COMPACT AND PLACE SIDE FILL PER SECTION 603 AND 203.
- ⑤ SEE SECTION 701 OF THE STANDARD SPECIFICATIONS FOR GRANULAR BEDDING REQUIREMENTS. THE CONTRACTOR HAS THE OPTION OF USING A SAND CUSHION ABOVE THE GRANULAR BEDDING TO FACILITATE JOINING OF THE BOX CULVERT SECTIONS.

DIMENSIONS										
STATION	SPAN (ft.)	RISE (ft.)	LENGTH (ft.)	WALL (in.)	SLAB (in.)	"E" (in.)	"Bc" (ft.)	"B'c" (ft.)	"H" (ft.)	COVER (ft.)

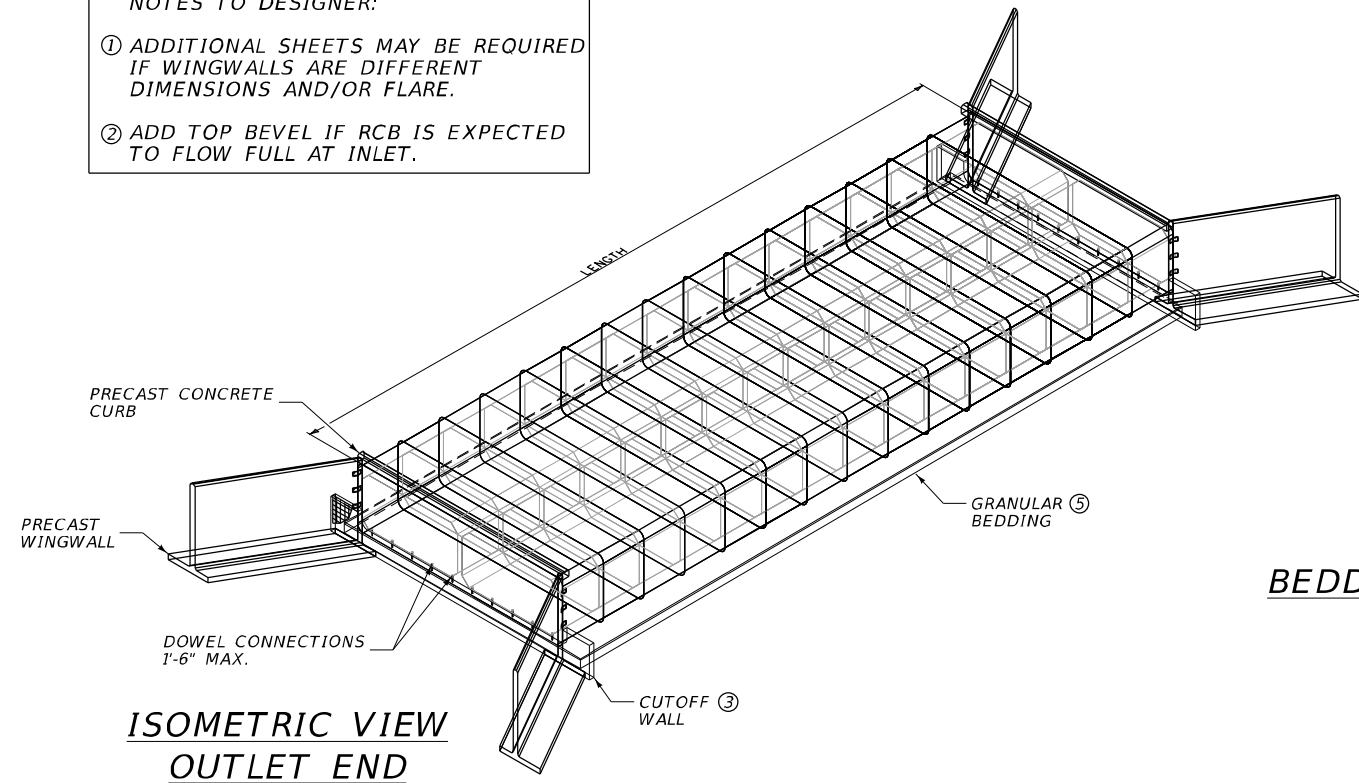
NOTE: QUANTITIES ARE BASED ON THE DIMENSIONS IN THE TABLE. PROVIDE BOX CULVERTS MEETING ASTM C1577. INCLUDE PRECAST TAPERED WINGWALLS, PRECAST CONCRETE CURBS, CUTOFF WALLS, SPECIAL BACKFILL BEHIND PRECAST TAPERED WINGWALLS, GEOCOMPOSITE STRIP DRAINS, AND GRANULAR BEDDING BENEATH THE PRECAST TAPERED WINGWALLS IN THE UNIT PRICE BID PER LINEAR FOOT OF RCB. #PROVIDE A GEOCOMPOSITE STRIP DRAIN CONSTRUCTED OF A POLYMERIC DRAINAGE CORE WITH A MINIMUM COMPRESSIVE STRENGTH OF 9000 PSF PER ASTM D 1621 AND A MINIMUM FLOW CAPACITY OF 20 GPM PER ASTM D 4716. THE STRIP DRAIN MUST BE WRAPPED IN A SUBSURFACE DRAINAGE GEOTEXTILE FILTER MEETING THE REQUIREMENTS OF HIGH SURVIVABILITY, CLASS B OF SECTION 716.

DOUBLE RCB WITH TAPERED WINGWALLS DETAIL NOT TO SCALE

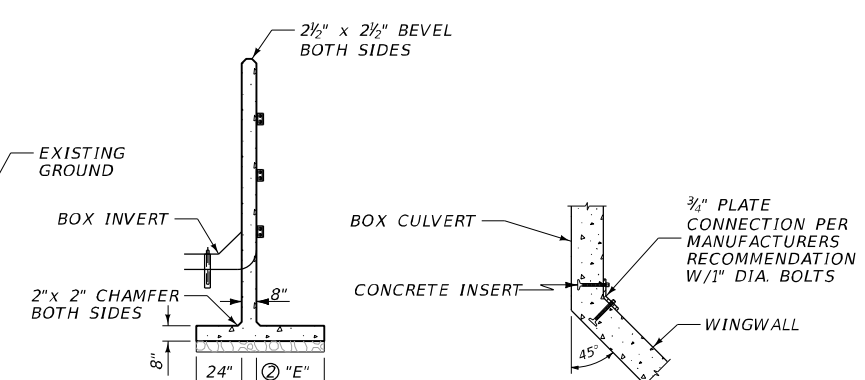
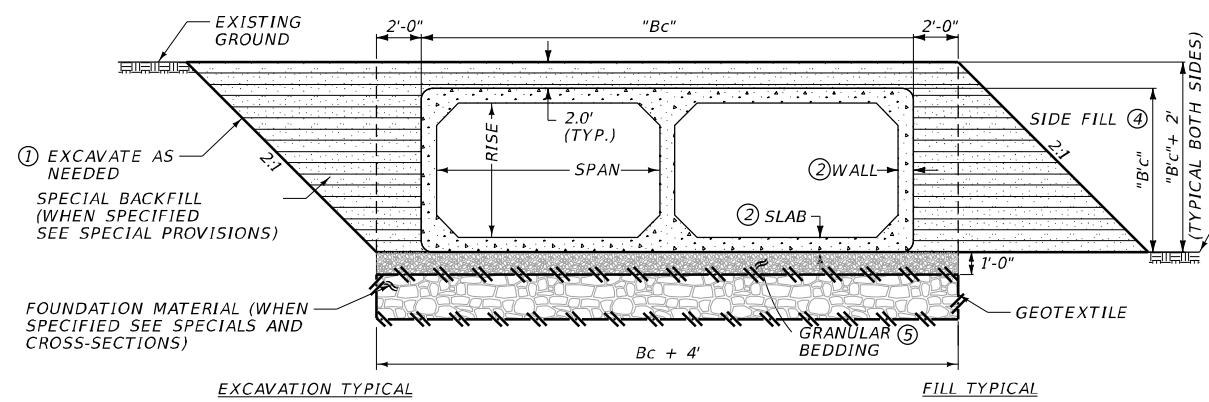
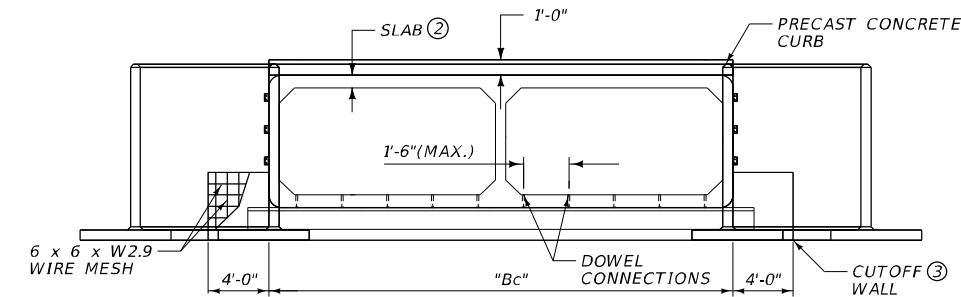
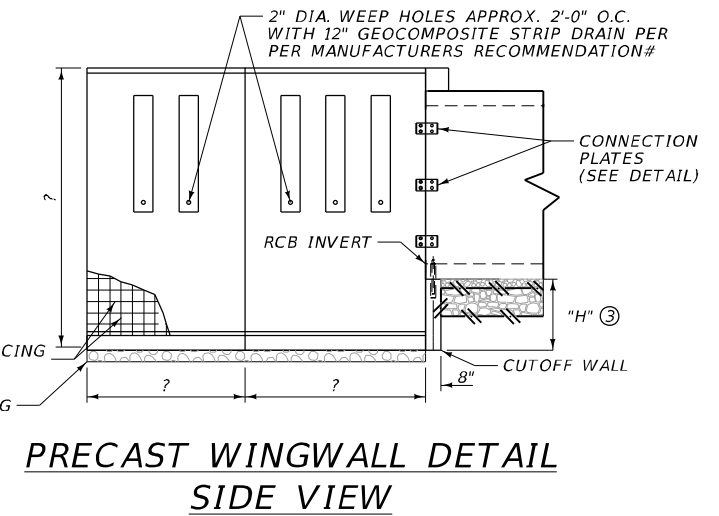
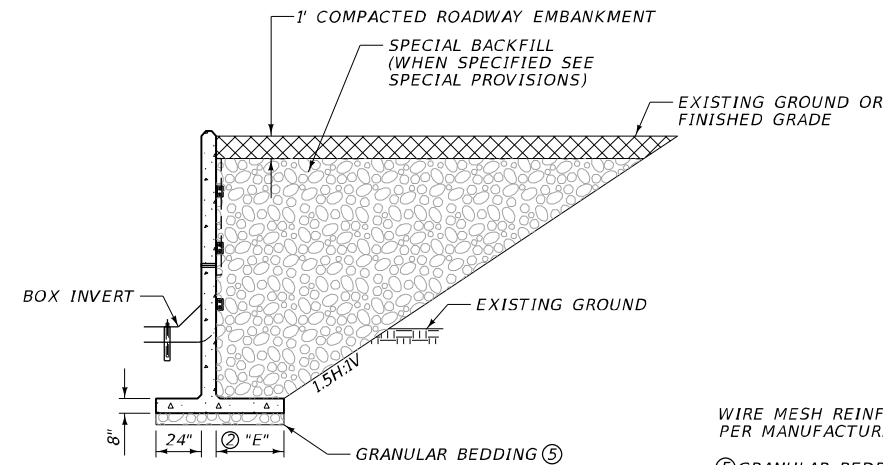
# DETAIL

**NOTES TO DESIGNER:**

- ① ADDITIONAL SHEETS MAY BE REQUIRED IF WINGWALLS ARE DIFFERENT DIMENSIONS AND/OR FLARE.
- ② ADD TOP BEVEL IF RCB IS EXPECTED TO FLOW FULL AT INLET.



**PRECAST WINGWALL  
BEDDING AND BACKFILL DETAIL**



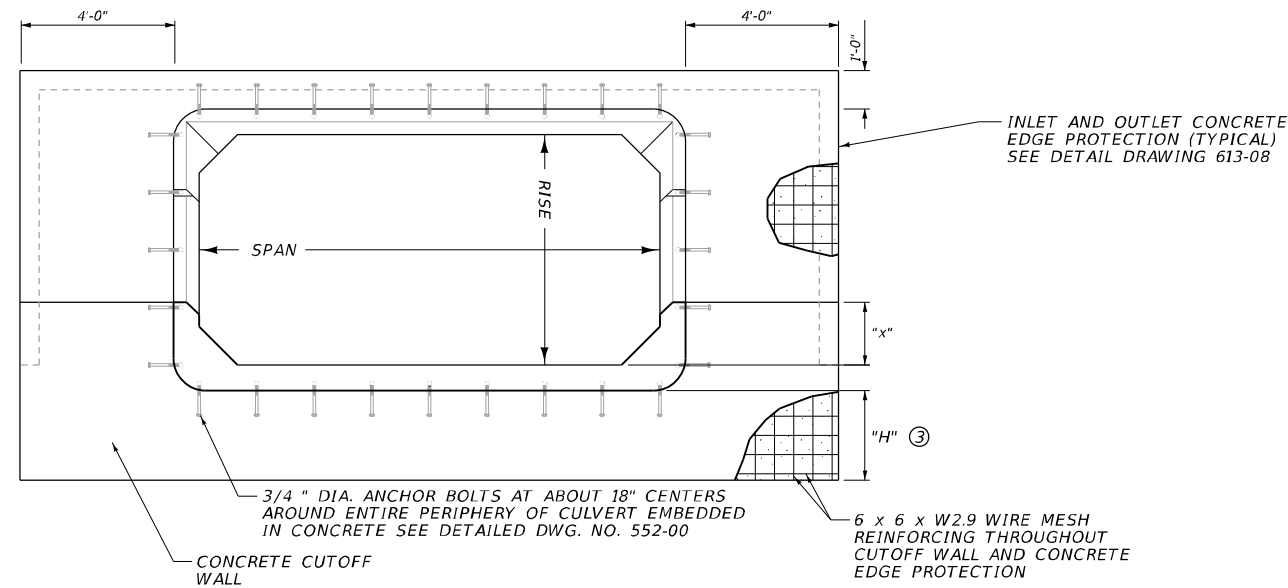
**NOTES:**

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- ⑤ SEE SECTION 701 OF THE STANDARD SPECIFICATIONS FOR GRANULAR BEDDING REQUIREMENTS. THE CONTRACTOR HAS THE OPTION OF USING A SAND CUSHION ABOVE THE GRANULAR BEDDING TO FACILITATE JOINING OF THE BOX CULVERT SECTIONS.

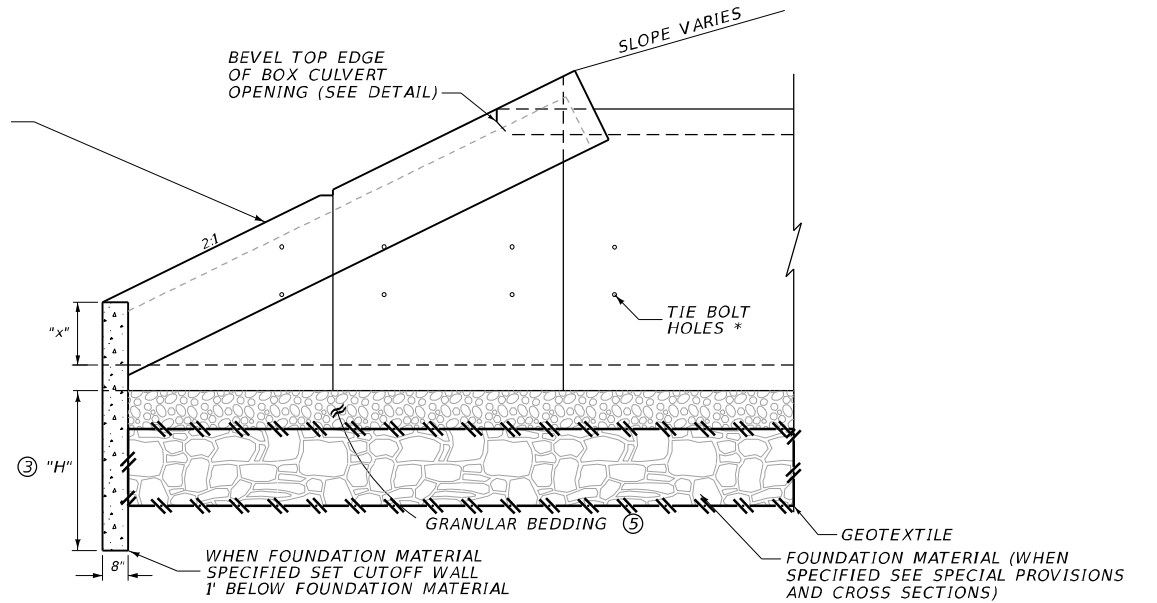
DIMENSIONS										
STATION	SPAN (ft.)	RISE (ft.)	LENGTH (ft.)	WALL (in.)	SLAB (in.)	"E" (in.)	"Bc" (ft.)	"B'c" (ft.)	"H" (ft.)	COVER (ft.)

NOTE: QUANTITIES ARE BASED ON THE DIMENSIONS IN THE TABLE. PROVIDE BOX CULVERTS MEETING ASTM C1577. INCLUDE PRECAST TAPERED WINGWALLS, PRECAST CONCRETE CURBS, CUTOFF WALLS, SPECIAL BACKFILL BEHIND PRECAST TAPERED WINGWALLS, GEOCOMPOSITE STRIP DRAINS, AND GRANULAR BEDDING BENEATH THE PRECAST TAPERED WINGWALLS IN THE UNIT PRICE BID PER LINEAR FOOT OF RCB. #PROVIDE A GEOCOMPOSITE STRIP DRAIN CONSTRUCTED OF A POLYMERIC DRAINAGE CORE WITH A MINIMUM COMPRESSIVE STRENGTH OF 9000 PSF PER ASTM D 1621 AND A MINIMUM FLOW CAPACITY OF 20 GPM PER ASTM D 4716. THE STRIP DRAIN MUST BE WRAPPED IN A SUBSURFACE DRAINAGE GEOTEXTILE FILTER MEETING THE REQUIREMENTS OF HIGH SURVIVABILITY, CLASS B OF SECTION 716.

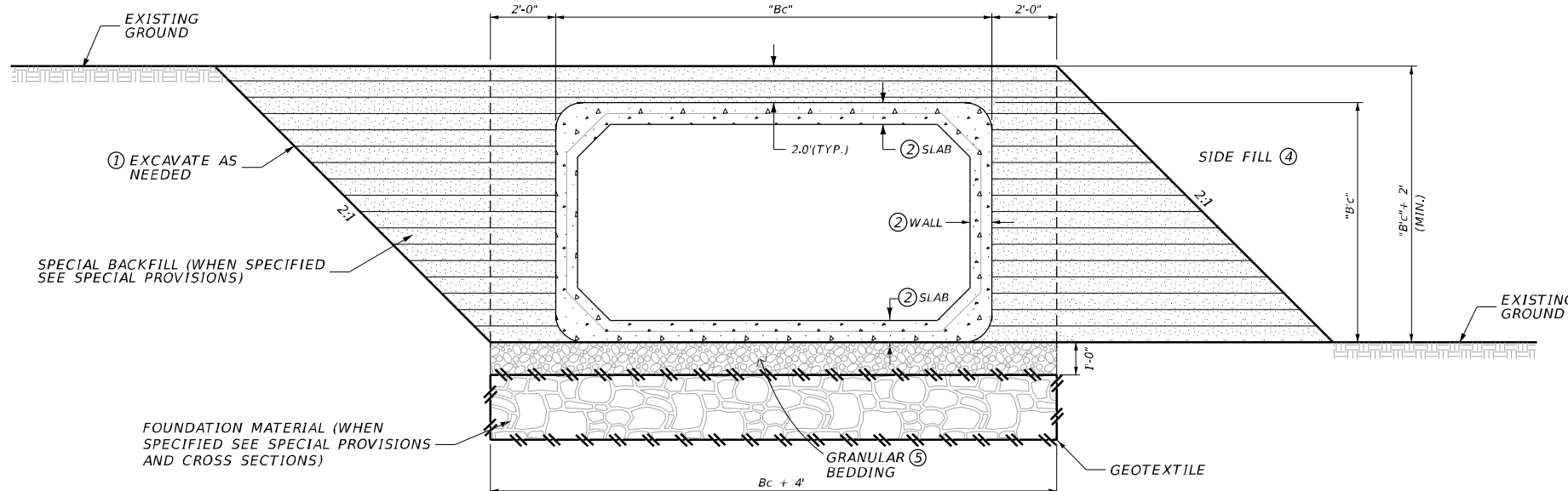
DOUBLE RCB WITH WINGWALLS DETAIL NOT TO SCALE



**FRONT ELEVATION**



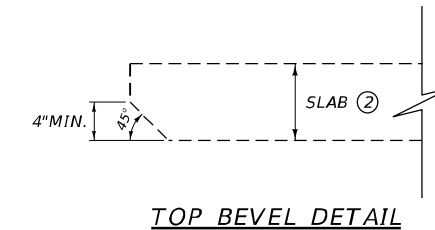
**SIDE ELEVATION**



**EXCAVATION TYPICAL**

**BEDDING DETAIL**

**FILL TYPICAL**



**TOP BEVEL DETAIL**

**NOTES:**

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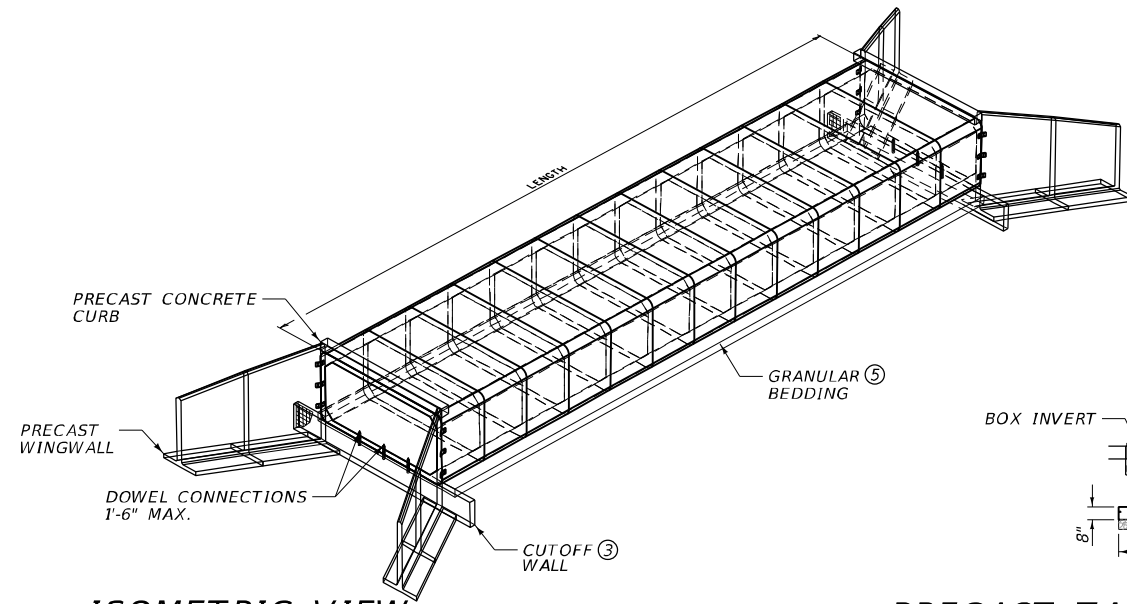
DIMENSIONS										
STATION	SPAN (ft.)	RISE (ft.)	LENGTH (ft.)	WALL (in.)	SLAB (in.)	"Bc" (ft.)	"x" (ft.)	"Bc" (ft.)	"H" (ft.)	COVER (ft.)

NOTE: INCLUDE REINFORCING MATERIAL, CUTOFF WALL, AND CONCRETE EDGE PROTECTION IN THE UNIT PRICE BID PER CUBIC YARD OF CLASS GENERAL CONCRETE. INCLUDE ANCHOR BOLTS IN THE UNIT PRICE BID PER LINEAR FOOT OF CULVERT. PROVIDE BOX CULVERTS MEETING ASTM C1577. QUANTITIES ARE BASED ON THE DIMENSIONS IN THE TABLE.

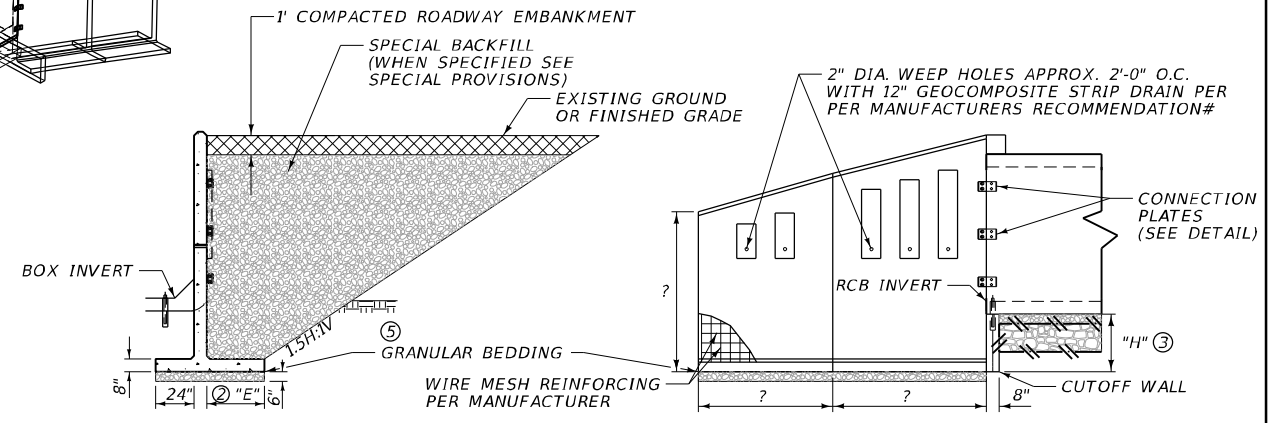
SLOPED END RCB DETAIL NO SCALE

**NOTES TO DESIGNER:**

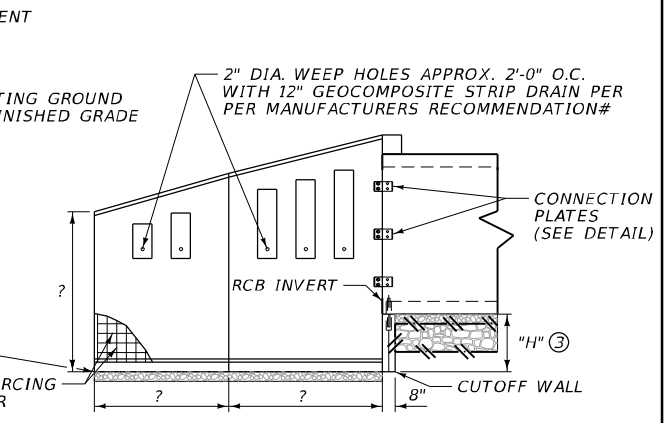
- ① ADDITIONAL SHEETS MAY BE REQUIRED IF WINGWALLS ARE DIFFERENT DIMENSIONS AND/OR FLARE.
- ② ADD TOP BEVEL IF RCB IS EXPECTED TO FLOW FULL AT INLET.



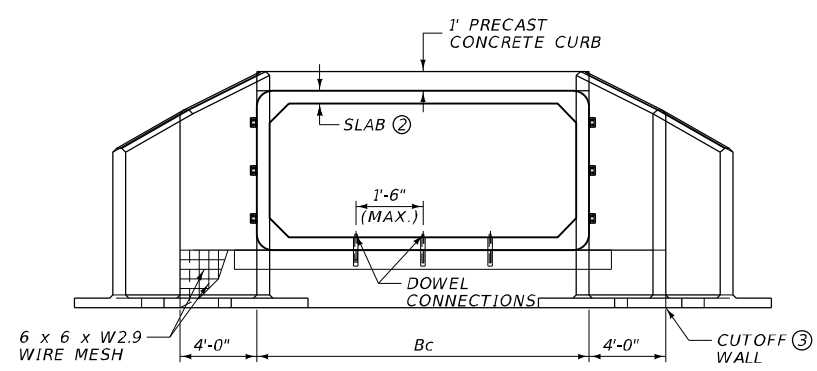
**ISOMETRIC VIEW  
OUTLET END**



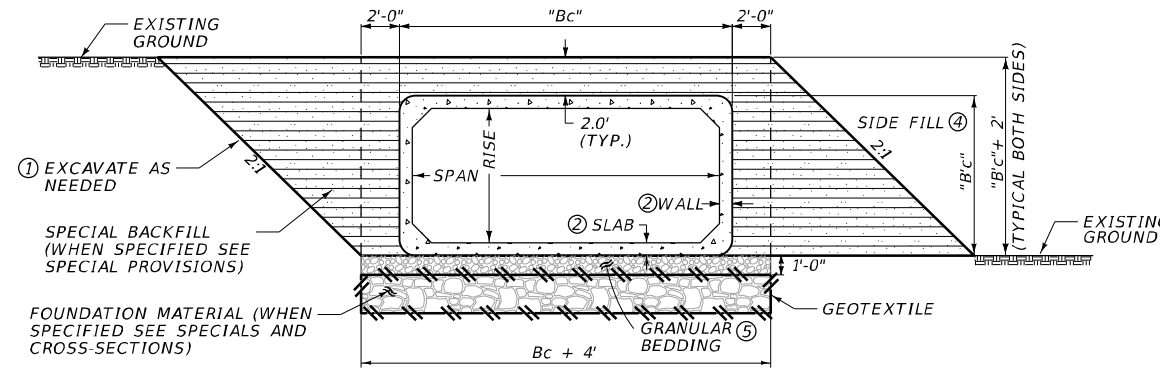
**PRECAST TAPERED WINGWALL  
BEDDING AND BACKFILL DETAIL**



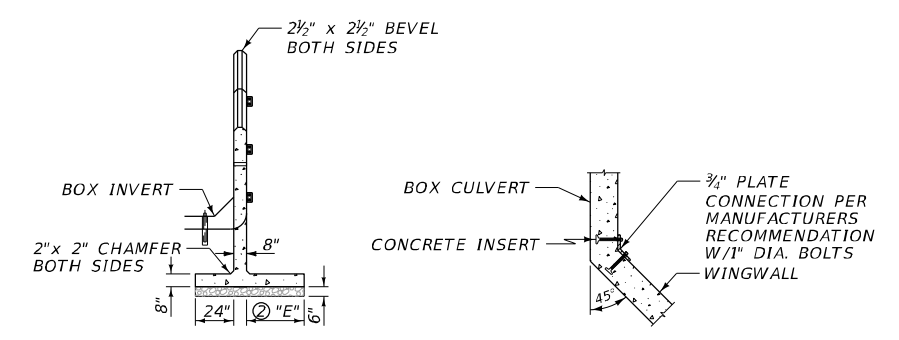
**PRECAST TAPERED WINGWALL  
DETAIL SIDE VIEW**



**PRECAST TAPERED SINGLE CELL BOX CULVERT  
WITH CUTOFF WALL AND 45° PRECAST WINGWALLS**



**EXCAVATION TYPICAL      FILL TYPICAL  
BOX CULVERT BEDDING DETAIL**



**PRECAST TAPERED WINGWALL  
DETAIL END VIEW      45° CONNECTION  
PLATE DETAIL**

**NOTES:**

- ① EXCAVATE A SUFFICIENT AMOUNT TO PROVIDE A SAFE WORKING ENVIRONMENT AND TO ALLOW ACHIEVEMENT OF ALL CULVERT INSTALLATION AND COMPACTION REQUIREMENTS. SLOPE, BENCH OR PROVIDE SHORING FOR ALL EXCAVATIONS IN ACCORDANCE WITH THE U.S. DEPARTMENT OF LABOR, OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION.
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DIMENSIONS										
STATION	SPAN (ft.)	RISE (ft.)	LENGTH (ft.)	WALL (in.)	SLAB (in.)	"E" (in.)	"Bc" (ft.)	"B'c" (ft.)	"H" (ft.)	COVER (ft.)

NOTE: QUANTITIES ARE BASED ON THE DIMENSIONS IN THE TABLE. PROVIDE BOX CULVERTS MEETING ASTM C1577. INCLUDE PRECAST TAPERED WINGWALLS, PRECAST CONCRETE CURBS, CUTOFF WALLS, SPECIAL BACKFILL BEHIND PRECAST TAPERED WINGWALLS, GEOCOMPOSITE STRIP DRAINS, AND GRANULAR BEDDING BENEATH THE PRECAST TAPERED WINGWALLS IN THE UNIT PRICE BID PER LINEAR FOOT OF RCB.

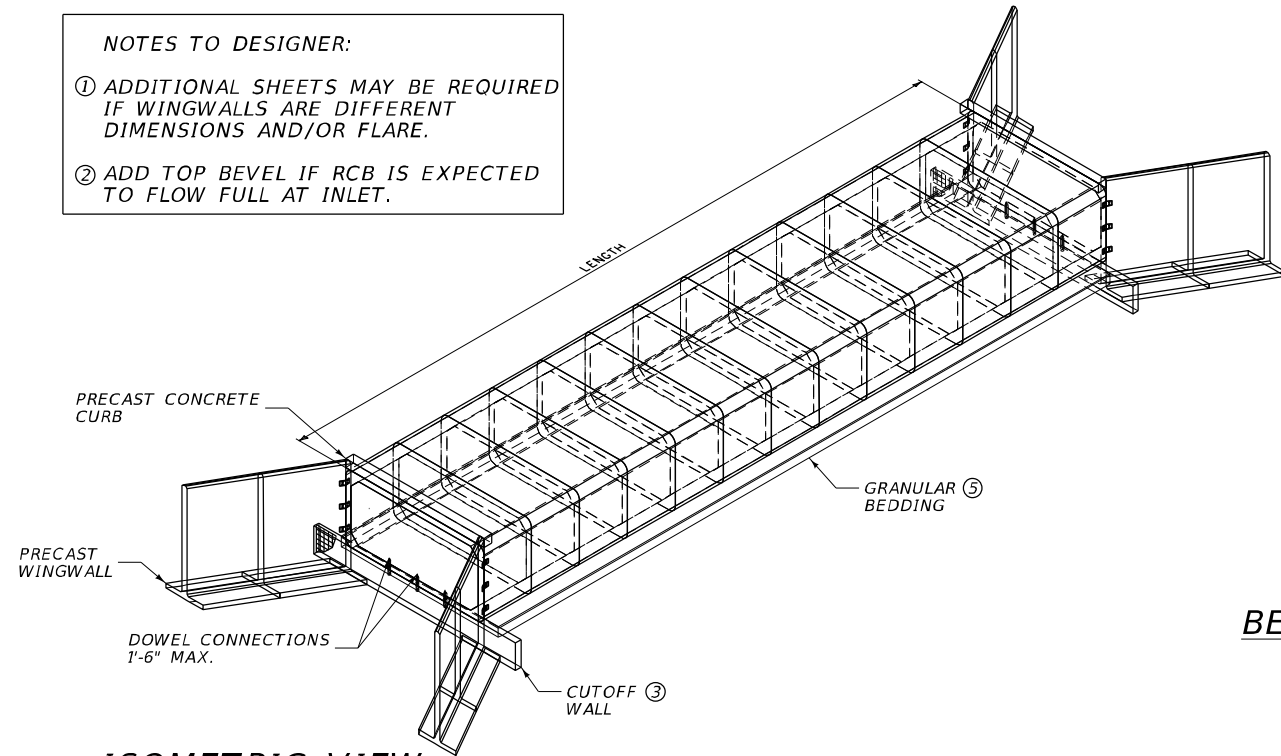
#PROVIDE A GEOCOMPOSITE STRIP DRAIN CONSTRUCTED OF A POLYMERIC DRAINAGE CORE WITH A MINIMUM COMPRESSIVE STRENGTH OF 9000 PSF PER ASTM D 1621 AND A MINIMUM FLOW CAPACITY OF 20 GPM PER ASTM D 4716. THE STRIP DRAIN MUST BE WRAPPED IN A SUBSURFACE DRAINAGE GEOTEXTILE FILTER MEETING THE REQUIREMENTS OF HIGH SURVIVABILITY, CLASS B OF SECTION 716.

RCB WITH TAPERED WING WALLS DETAIL NOT TO SCALE

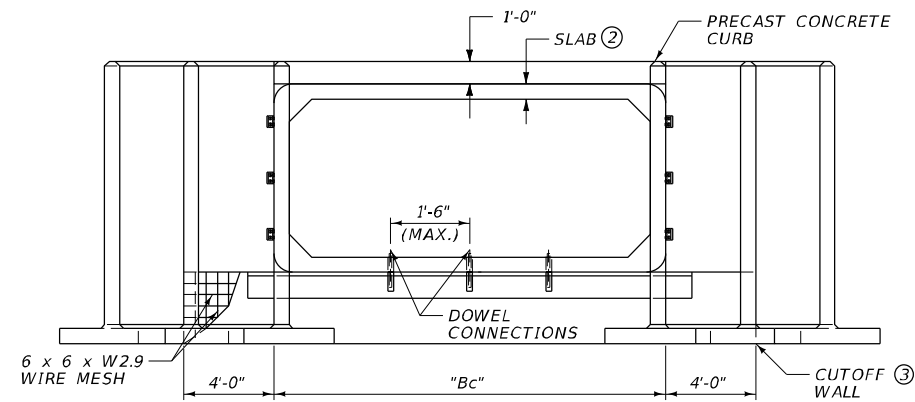
# DETAIL

**NOTES TO DESIGNER:**

- ① ADDITIONAL SHEETS MAY BE REQUIRED IF WINGWALLS ARE DIFFERENT DIMENSIONS AND/OR FLARE.
- ② ADD TOP BEVEL IF RCB IS EXPECTED TO FLOW FULL AT INLET.

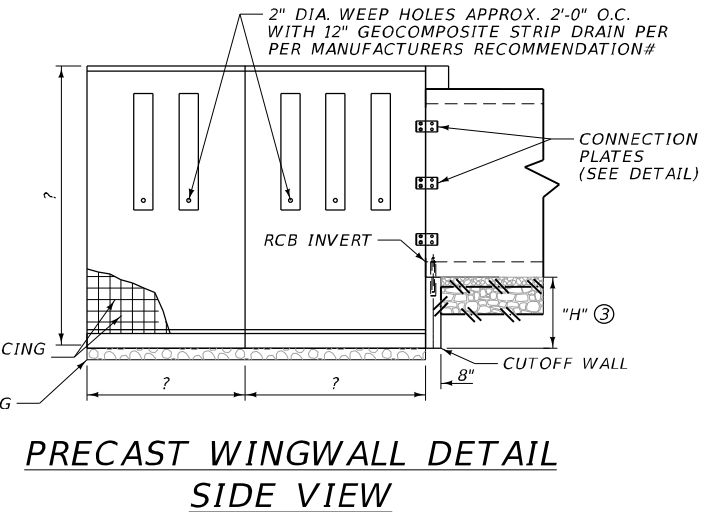
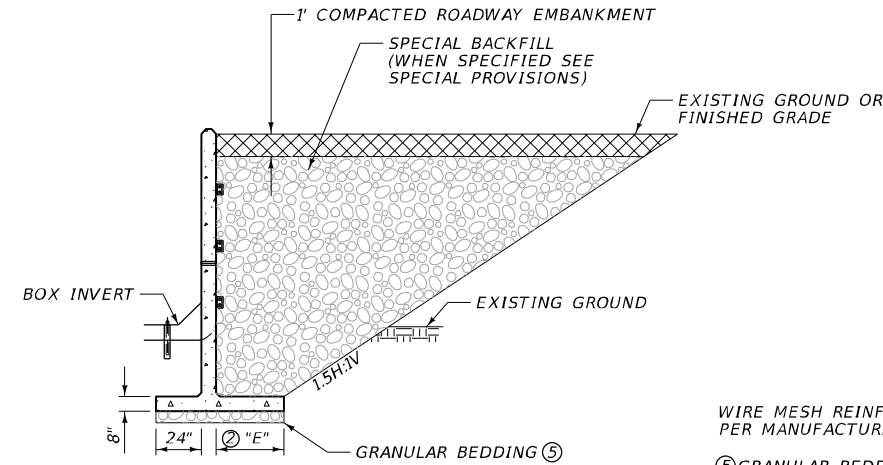


**ISOMETRIC VIEW  
OUTLET END**

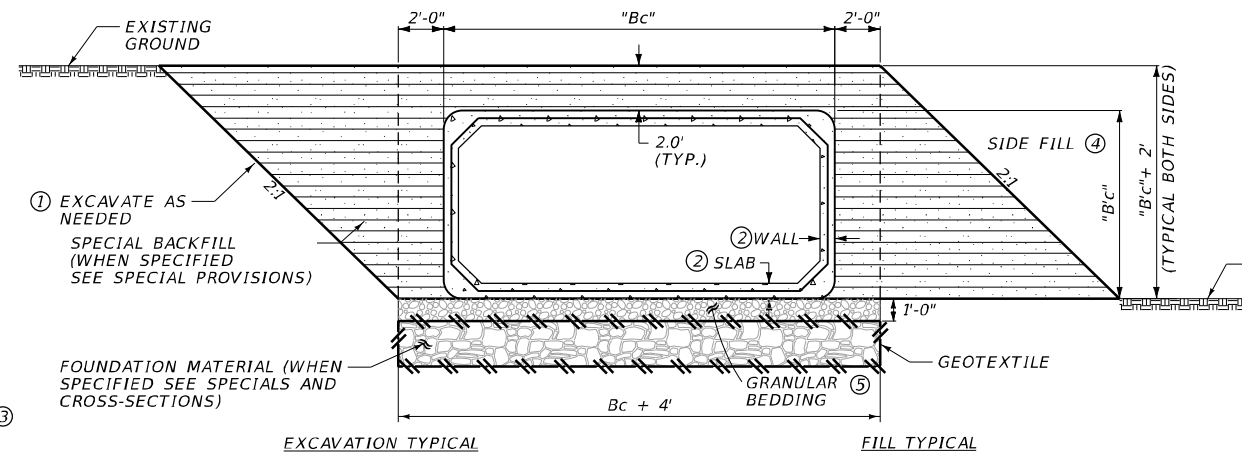


**PRECAST SINGLE CELL BOX CULVERT  
WITH CUTOFF WALL AND 45° PRECAST WINGWALLS**

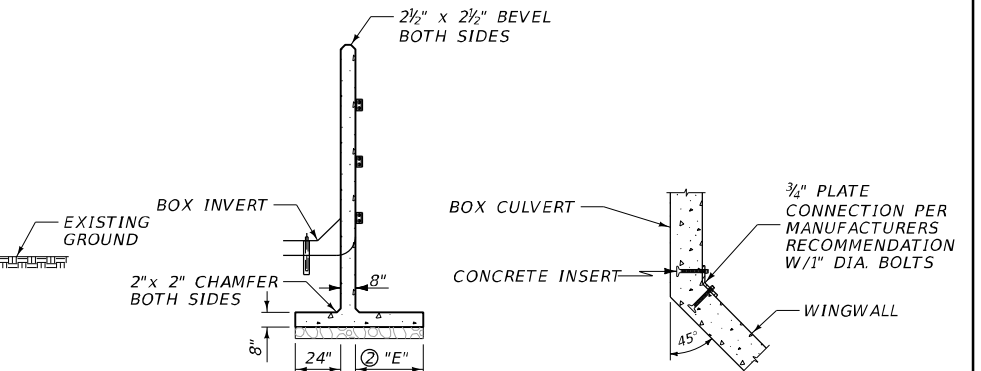
**PRECAST WINGWALL  
BEDDING AND BACKFILL DETAIL**



**PRECAST WINGWALL DETAIL  
SIDE VIEW**



**BOX CULVERT BEDDING DETAIL**



**PRECAST WINGWALL DETAIL  
END VIEW**      **45° CONNECTION  
PLATE DETAIL**

**NOTES:**

- ① EXCAVATE A SUFFICIENT AMOUNT TO PROVIDE A SAFE WORKING ENVIRONMENT AND TO ALLOW ACHIEVEMENT OF ALL CULVERT INSTALLATION AND COMPACTION REQUIREMENTS. SLOPE, BENCH OR PROVIDE SHORING FOR ALL EXCAVATIONS IN ACCORDANCE WITH THE U.S. DEPARTMENT OF LABOR, OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION.
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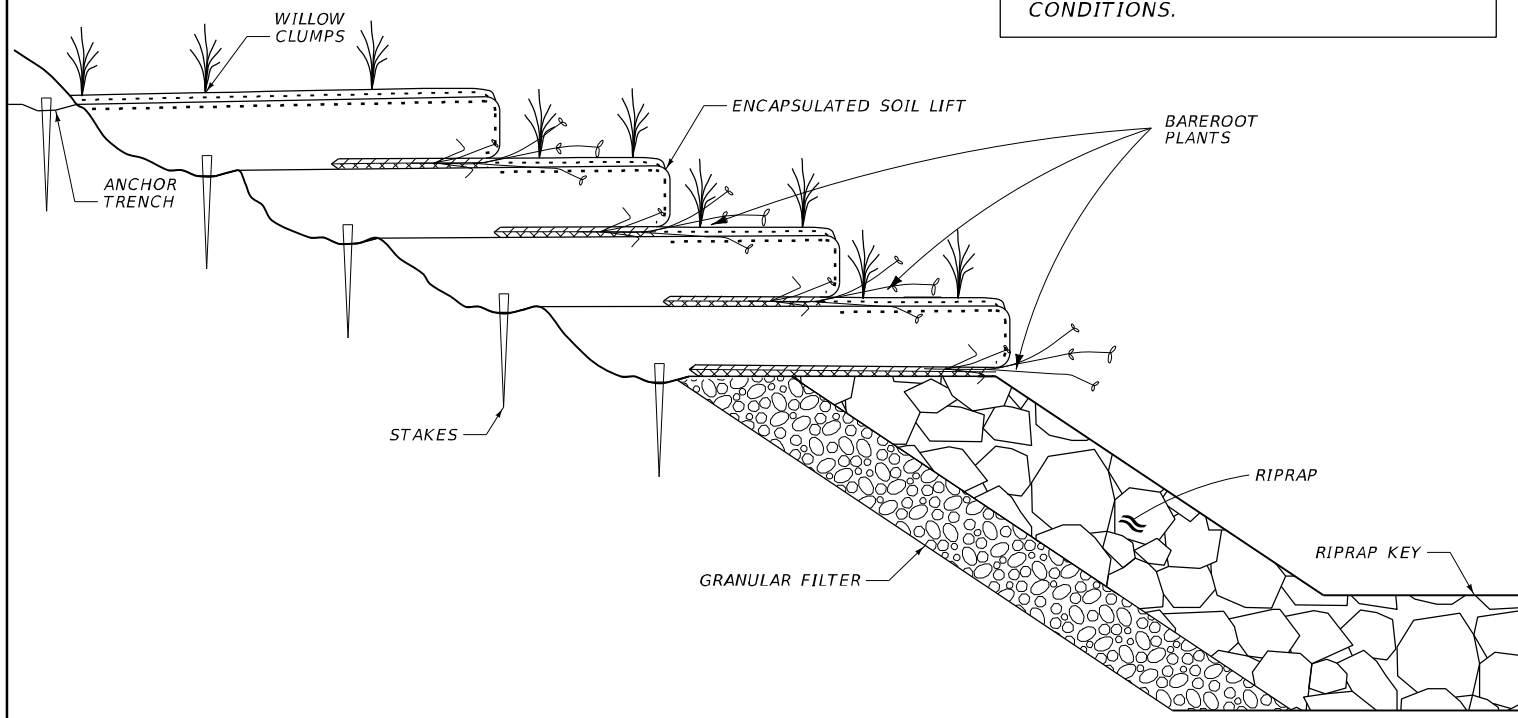
DIMENSIONS										
STATION	SPAN (ft.)	RISE (ft.)	LENGTH (ft.)	WALL (in.)	SLAB (in.)	"E" (in.)	"Bc" (ft.)	"B'c" (ft.)	"H" (ft.)	COVER (ft.)

NOTE: QUANTITIES ARE BASED ON THE DIMENSIONS IN THE TABLE. PROVIDE BOX CULVERTS MEETING ASTM C1577. INCLUDE PRECAST TAPERED WINGWALLS, PRECAST CONCRETE CURBS, CUTOFF WALLS, SPECIAL BACKFILL BEHIND PRECAST TAPERED WINGWALLS, GEOTEXTILE STRIP DRAINS, AND GRANULAR BEDDING BENEATH THE PRECAST TAPERED WINGWALLS IN THE UNIT PRICE BID PER LINEAR FOOT OF RCB. #PROVIDE A GEOTEXTILE STRIP DRAIN CONSTRUCTED OF A POLYMERIC DRAINAGE CORE WITH A MINIMUM COMPRESSIVE STRENGTH OF 9000 PSF PER ASTM D 1621 AND A MINIMUM FLOW CAPACITY OF 20 GPM PER ASTM D 4716. THE STRIP DRAIN MUST BE WRAPPED IN A SUBSURFACE DRAINAGE GEOTEXTILE FILTER MEETING THE REQUIREMENTS OF HIGH SURVIVABILITY, CLASS B OF SECTION 716.

**RCB WITH WINGWALLS  
DETAIL  
NOT TO SCALE**

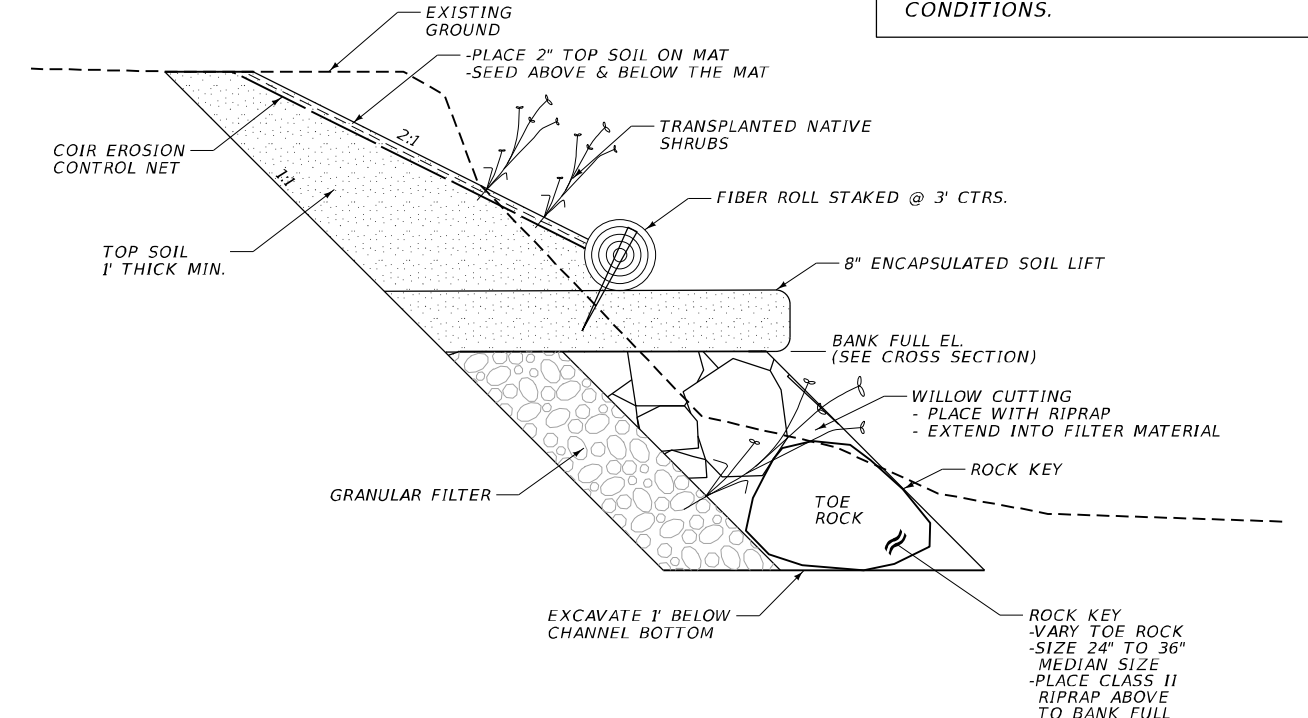


NOTE TO DESIGNER:  
FINAL DESIGN BASED ON SITE  
CONDITIONS.

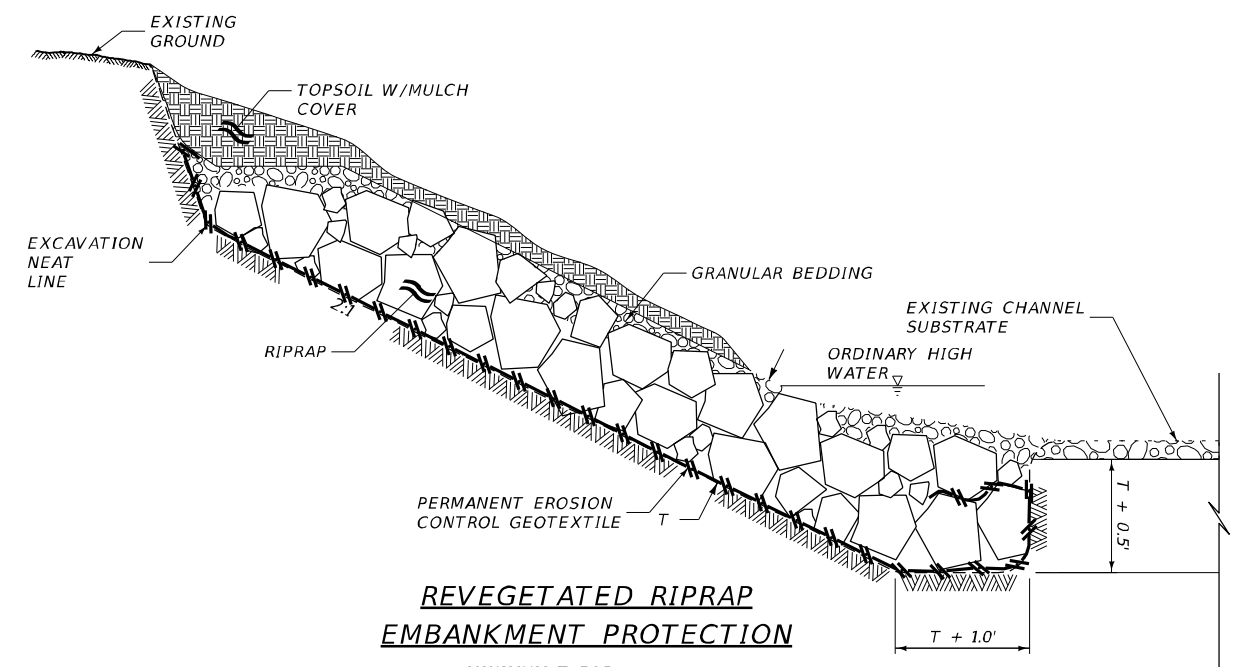


**ENCAPSULATED SOIL WITH RIPRAP KEY**

NOTE TO DESIGNER:  
FINAL DESIGN BASED ON SITE  
CONDITIONS.



**REVEGETATION/SLOPE WITH ROCK TOE DETAIL**

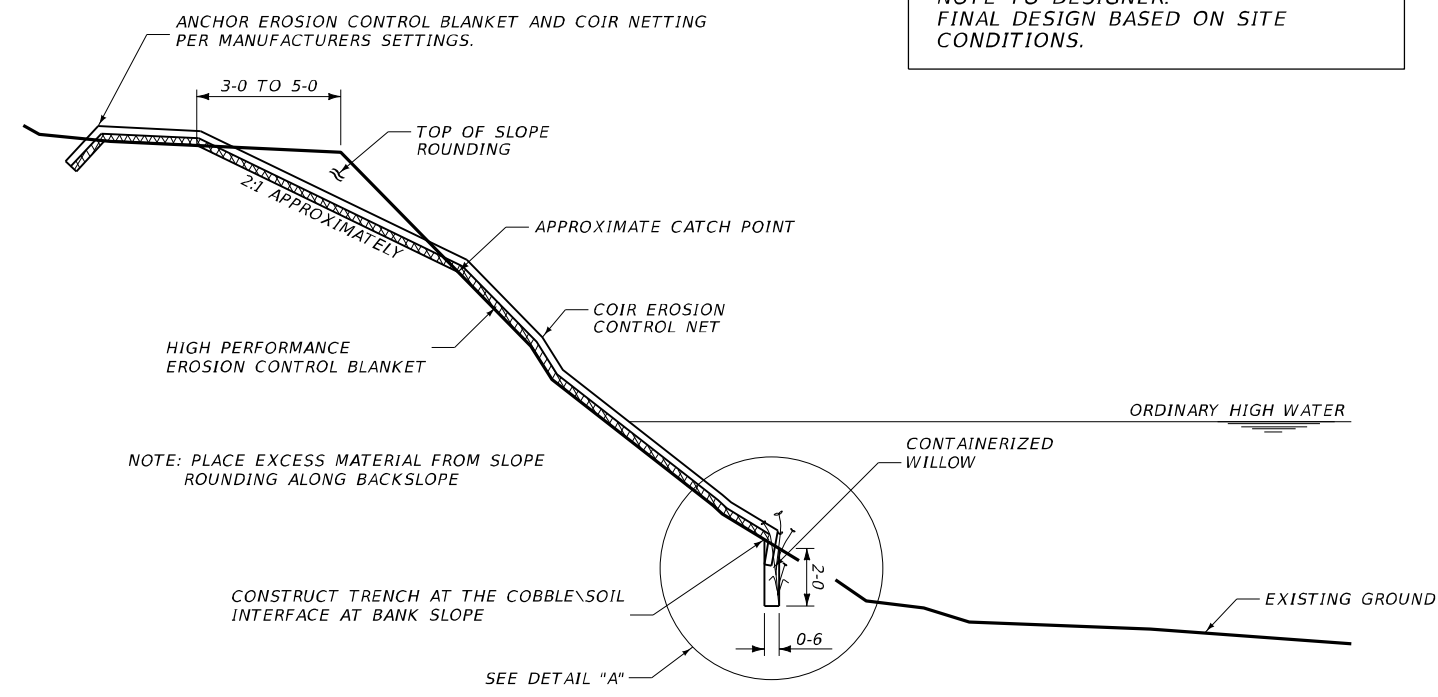


**REVEGETATED RIPRAP  
EMBANKMENT PROTECTION**

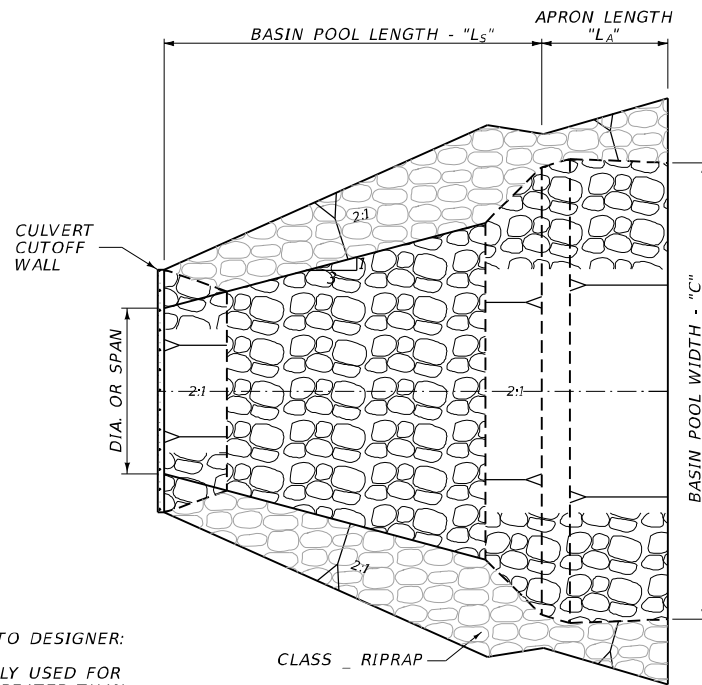
MINIMUM T FOR:  
CLASS I RIPRAP = 1'-6"  
CLASS II RIPRAP = 2'-6"  
CLASS III RIPRAP = 3'-0"

NOTES:  
FILL RIPRAP VOIDS WITH GRANULAR BEDDING OR A MATERIAL OF SIMILIAR GRADATION OBTAINED ON SITE TO PROVIDE A UNIFORM SURFACE FOR THE PLACEMENT OF TOPSOIL, AS APPROVED BY THE PROJECT MANAGER.  
PLACE TOPSOIL WITH A MINIMUM THICKNESS OF 8".

NOTE TO DESIGNER:  
FINAL DESIGN BASED ON SITE  
CONDITIONS.

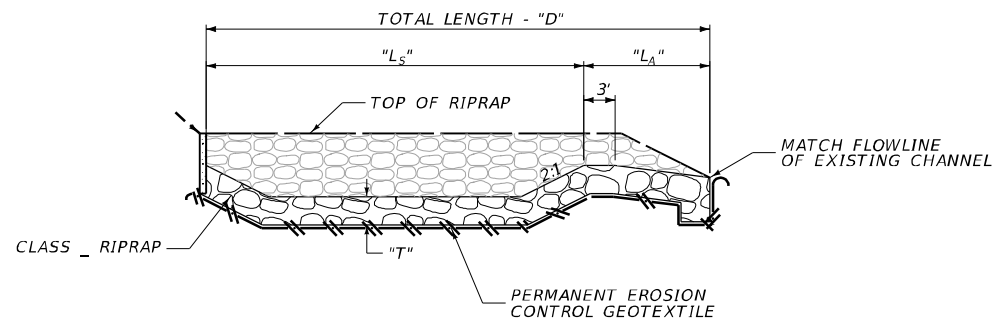


**BANK STABILIZATION AND REVEGETATION DETAIL**



- NOTES TO DESIGNER:
- ① TYPICALLY USED FOR PIPES GREATER THAN 48" EQUIVALENT.
  - ② CONSIDER FILLING RIPRAP VOIDS WITH GRANULAR BEDDING.

CLASS \_ RIPRAP  
PLAN VIEW  
RIPRAP BASIN

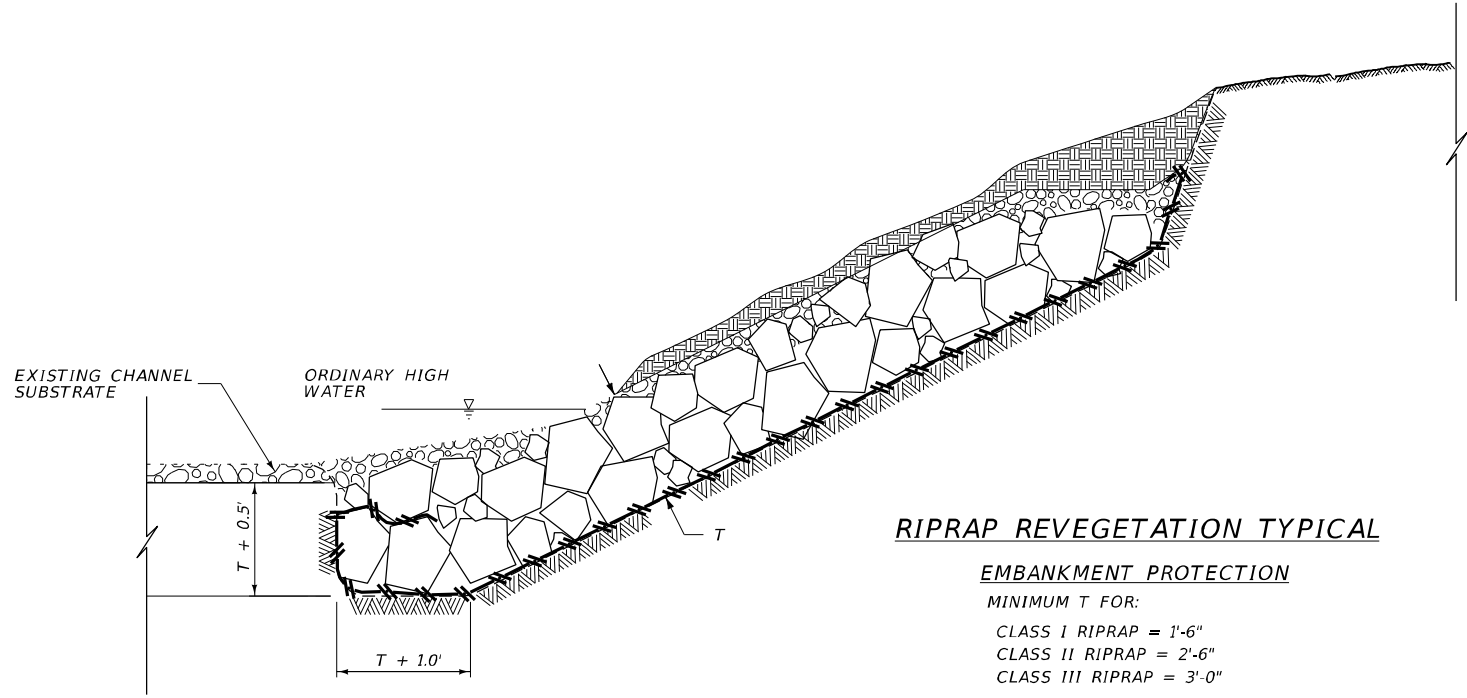


PROFILE VIEW

STATION	"Ls" (ft)	"La" (ft)	"C" (ft)	"T" (ft)	CLASS _ RIPRAP (yd <sup>3</sup> )	PERMANENT EROSION CONTROL GEOTEXTILE (yd <sup>2</sup> )
~	~	~	~	~	~	~

RIPRAP BASIN  
 NO SCALE

# DETAIL


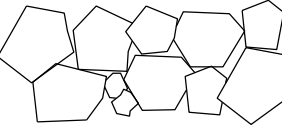






## RIPRAP REVEGETATION TYPICAL

### EMBANKMENT PROTECTION

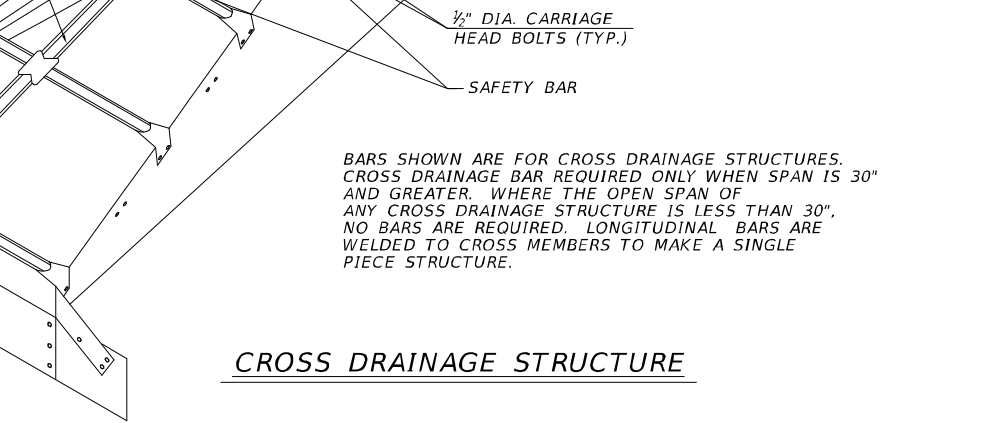
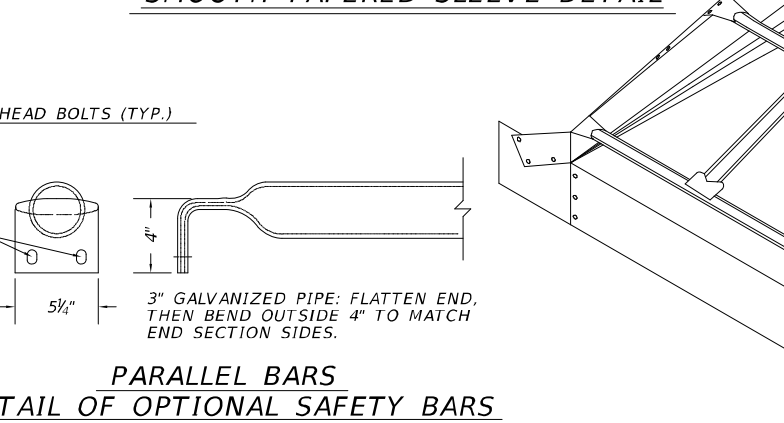
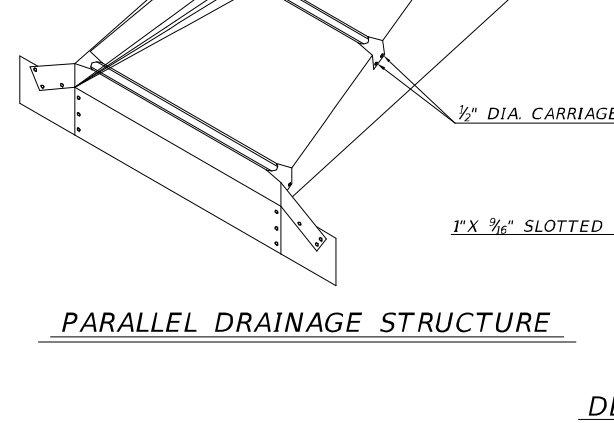
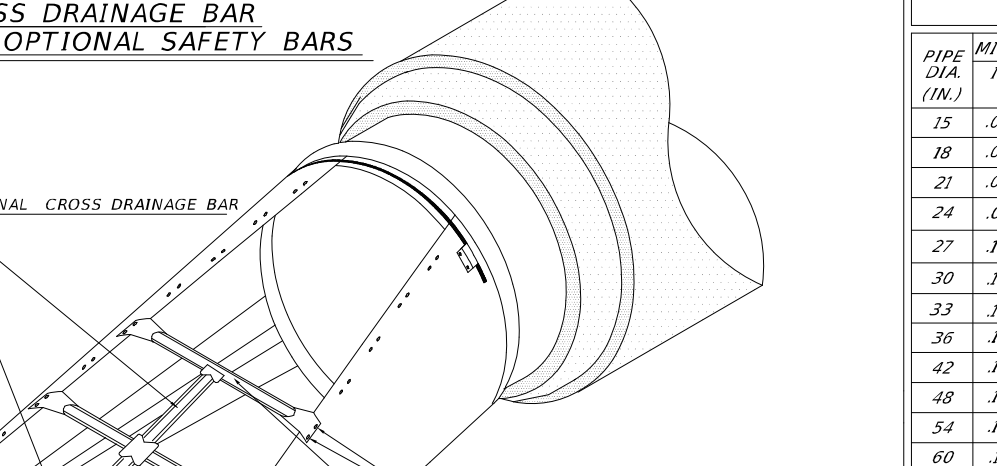
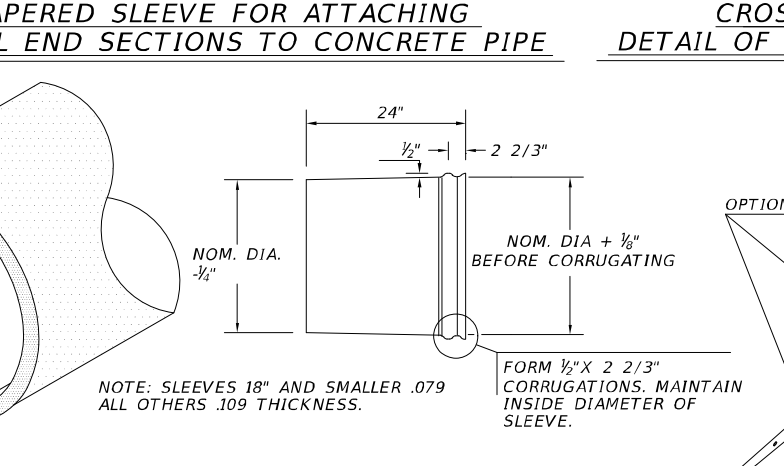
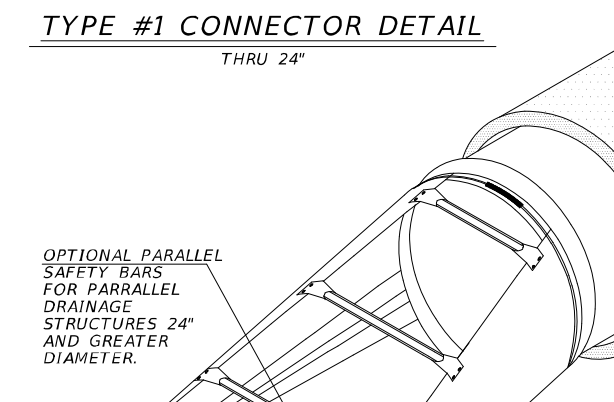
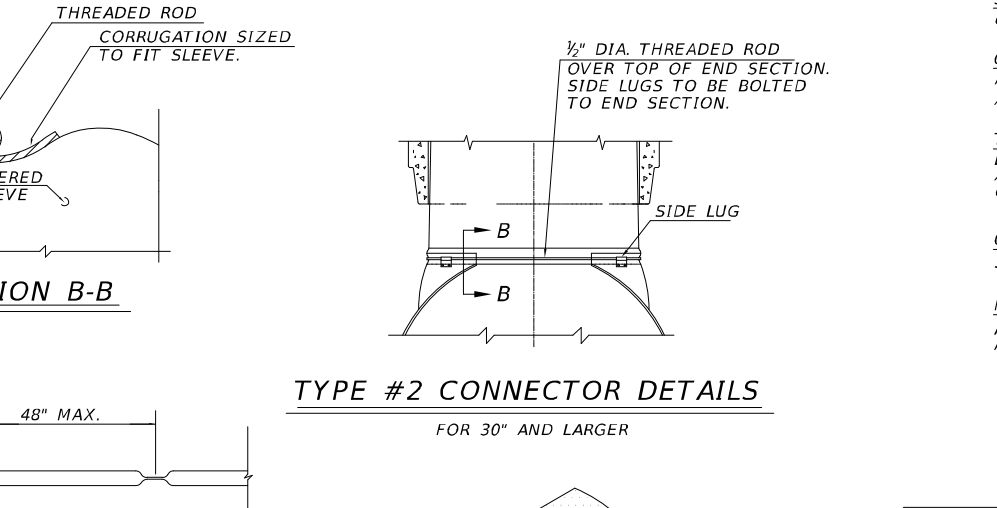
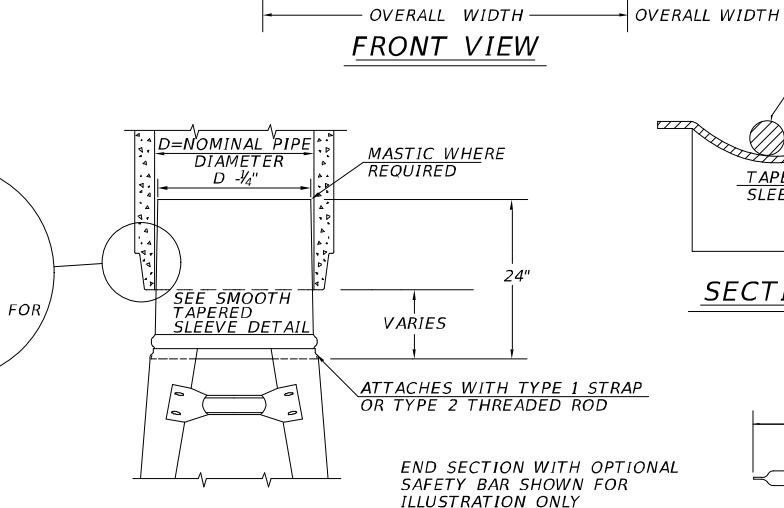
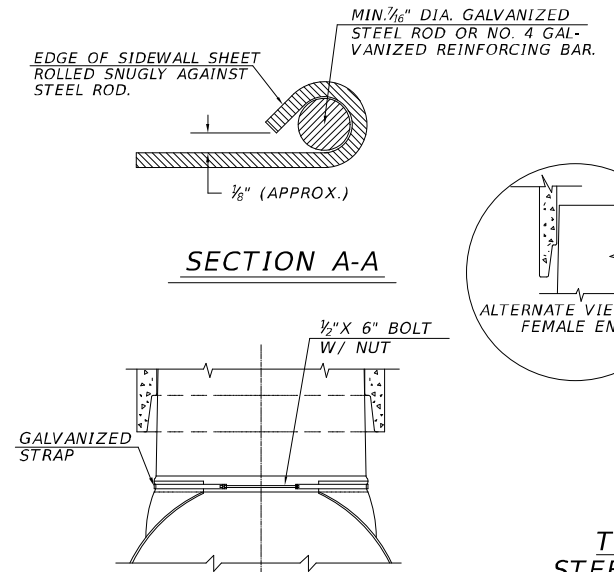
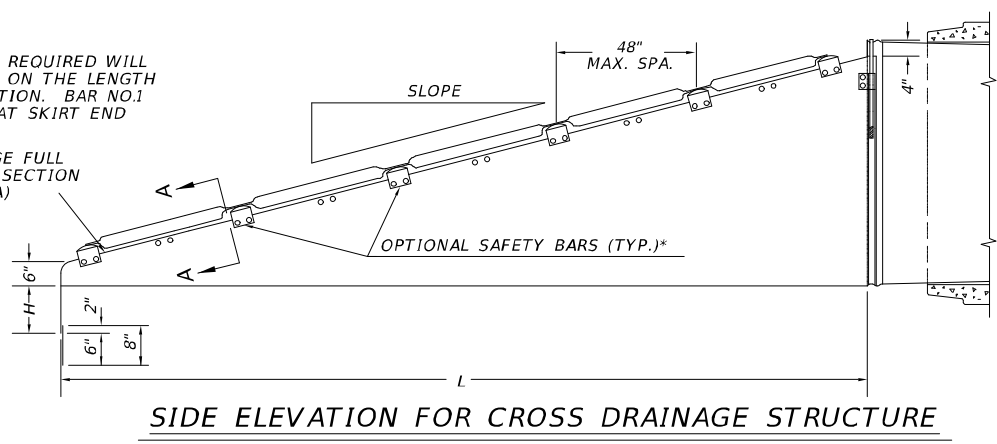
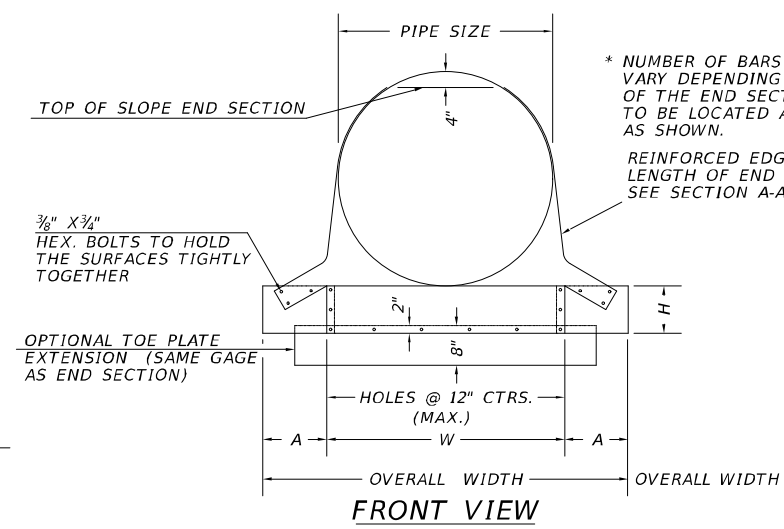
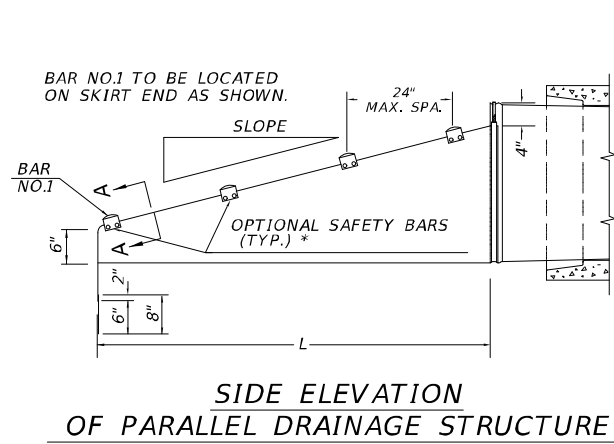
MINIMUM T FOR:  
 CLASS I RIPRAP = 1'-6"  
 CLASS II RIPRAP = 2'-6"  
 CLASS III RIPRAP = 3'-0"

### LEGEND

-  TOPSOIL WITH EROSION CONTROL BLANKET/MULCH COVER
-  RANDOM RIPRAP
-  GRANULAR BEDDING
-  EXISTING GROUND
-  PERMANENT EROSION CONTROL GEOTEXTILE
-  EXCAVATION

NOTES:  
 FILL RIPRAP VOIDS WITH GRANULAR BEDDING OR A MATERIAL OF SIMILAR GRADATION OBTAINED ON SITE TO PROVIDE A UNIFORM SURFACE FOR THE PLACEMENT OF TOPSOIL, AS APPROVED BY THE PROJECT MANAGER.  
 PLACE TOPSOIL WITH A MINIMUM THICKNESS OF 6".  
 THIS DETAIL IS TO BE USED AS A VISUAL GUIDE FOR RIPRAP REVEGETATION. REFER TO THE PLAN SHEETS AND CROSS SECTIONS FOR SPECIFIC ELEVATIONS AND GEOMETRIC CONFIGURATION OF THE RIPRAP LAYOUT.  
 REFER TO THE SPECIAL PROVISIONS FOR PLANTING AND SEEDING SPECIFICATIONS.

RIPRAP REVEGETATION  
 DETAIL  
 NO SCALE



**GENERAL NOTES**

STEEL  
GALVANIZED STEEL PER SECTION 711

CONNECTORS  
ROUND SIZES THRU 24" ATTACH TO PIPE WITH TYPE #1 STRAPS. ALL OTHER SIZES ATTACH WITH TYPE #2 RODS AND LUGS.

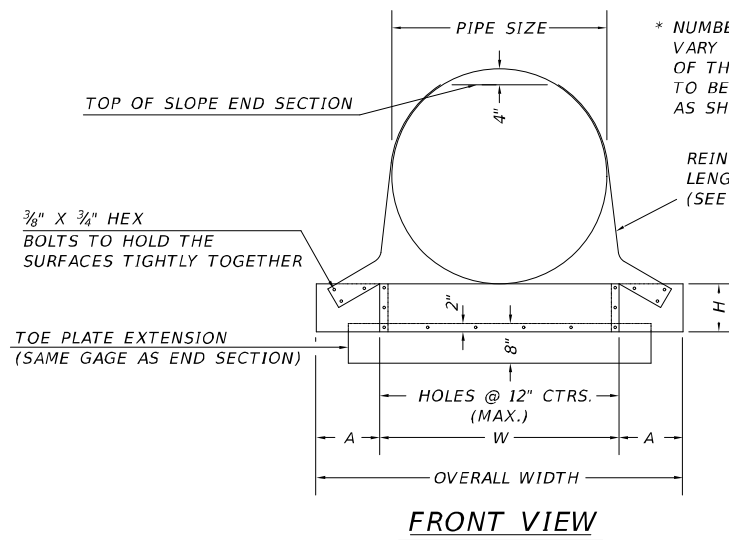
TOE PLATE EXTENSIONS  
WHEN REQUIRED, TOE PLATE EXTENSIONS ARE THE SAME GAGE AS END SECTION. TOE PLATE EXTENSIONS DIMENSIONS ARE OVERALL WIDTH LESS 6 INCHES BY 8 INCHES HIGH.

OPTIONAL SAFETY BARS  
SCHEDULED 40 GALVANIZED STEEL PIPE, WHEN SPECIFIED.

MISCELLANEOUS DETAILS  
PROVIDE SLOTTED HOLES FOR SAFETY BAR ATTACHMENT FOR ALL END SECTIONS.

PIPE DIA. (IN.)	MIN. THICK. (IN.)	GAGE	DIMENSIONS (INCHES)			L DIMENSIONS				
			A	H	W	OVERALL WIDTH	SLOPE LENGTH (IN.)	SLOPE	LENGTH (IN.)	
15	.064	16	8	6	21	37	4:1	20	6:1	30
18	.064	16	8	6	24	40	4:1	32	6:1	48
21	.064	16	8	6	27	43	4:1	44	6:1	66
24	.064	16	8	6	30	46	4:1	56	6:1	84
27	.109	12	12	9	33	57	4:1	68	6:1	102
30	.109	12	12	9	36	60	4:1	80	6:1	120
33	.109	12	12	9	39	63	4:1	92	6:1	138
36	.109	12	12	9	42	66	4:1	104	6:1	156
42	.109	12	16	12	48	80	4:1	128	6:1	192
48	.109	12	16	12	54	86	4:1	152	6:1	228
54	.109	12	16	12	60	92	4:1	176	6:1	264
60	.109	12	16	12	66	98	4:1	200	6:1	300

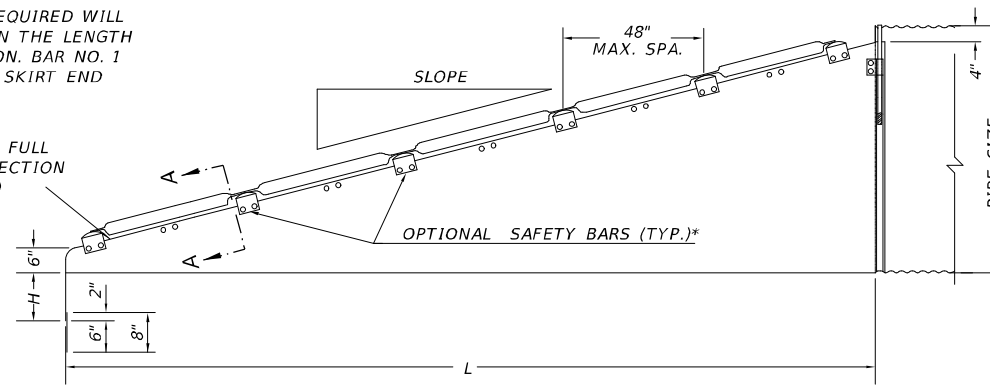
**SAFETY SLOPE END SECTION FOR ROUND RCP PIPE NO SCALE**



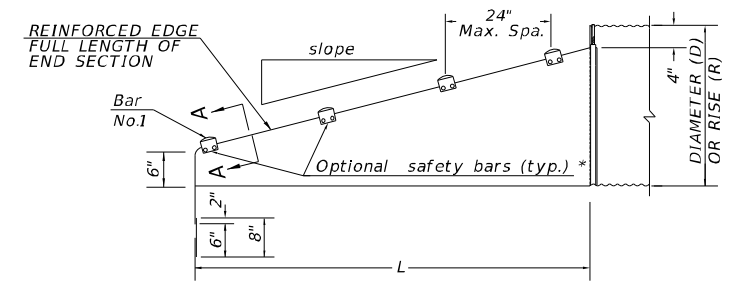
**FRONT VIEW**

\* NUMBER OF BARS REQUIRED WILL VARY DEPENDING ON THE LENGTH OF THE END SECTION. BAR NO. 1 TO BE LOCATED AT SKIRT END AS SHOWN.

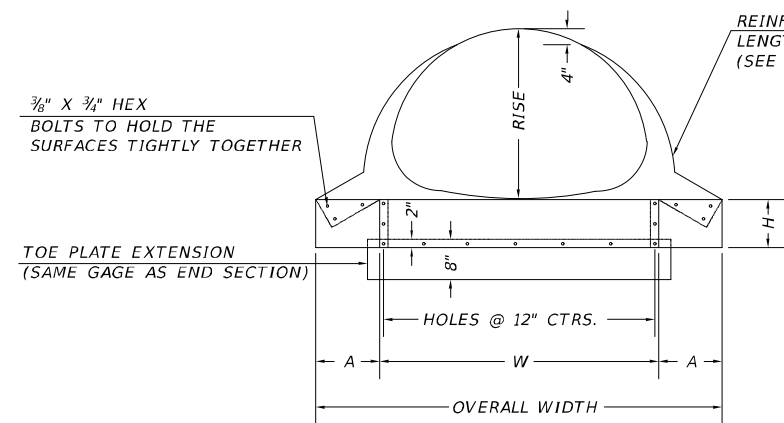
REINFORCED EDGE FULL LENGTH OF END SECTION (SEE SECTION A-A)



**SIDE ELEVATION FOR CROSS DRAINAGE STRUCTURE**

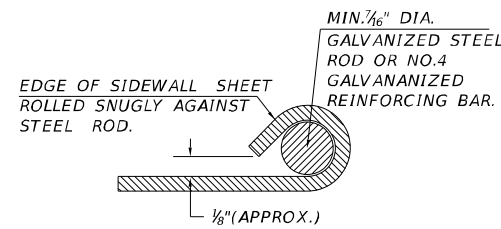


**SIDE ELEVATION OF PARALLEL DRAINAGE STRUCTURE**

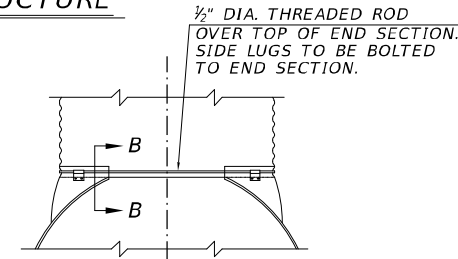


**FRONT VIEW**

REINFORCED EDGE FULL LENGTH OF END SECTION (SEE SECTION A-A)

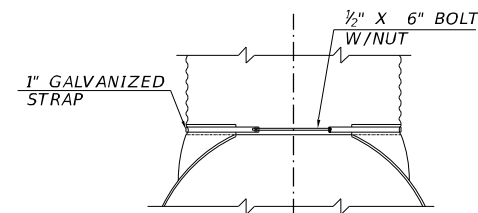


**SECTION A-A**



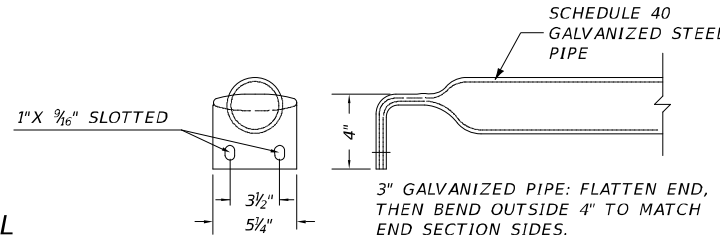
**TYPE #2 CONNECTOR DETAILS**

FOR 30" AND LARGER 21" X 15" AND LARGER



**TYPE #1 CONNECTOR DETAIL**

THRU 24"



**SAFETY BAR DETAIL**

**GENERAL NOTES**

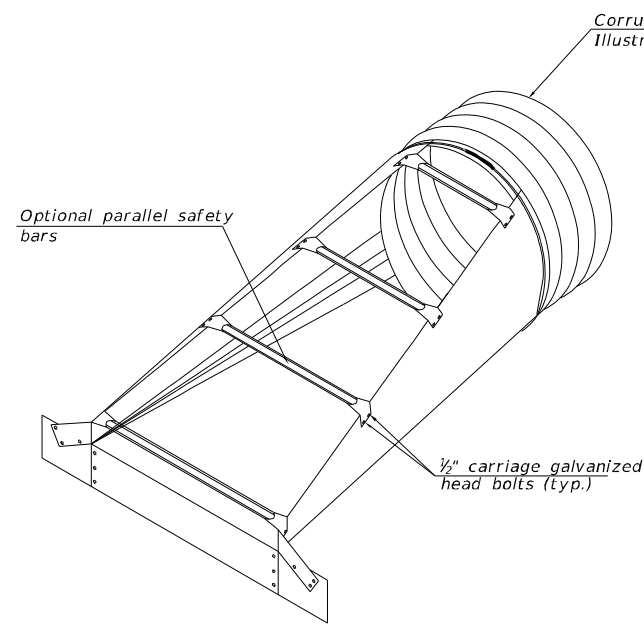
STEEL GALVANIZED STEEL PER SECTION 711.

TOE PLATE EXTENSIONS ARE THE SAME GAGE AS END SECTION. TOE PLATE EXTENSIONS DIMENSIONS ARE OVERALL WIDTH LESS 6 INCHES BY 8 INCHES HIGH.

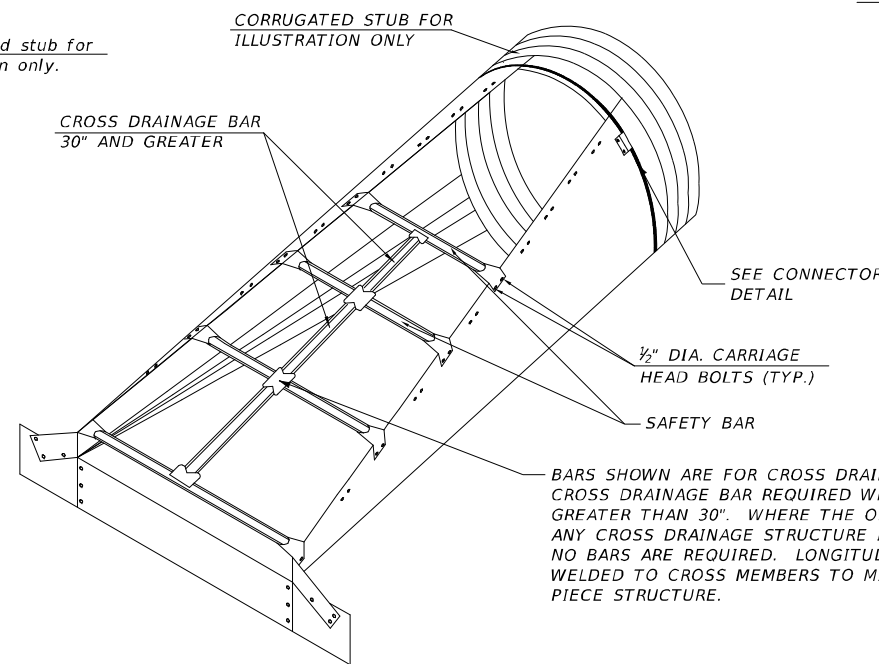
PIPE DIA. (IN.)	MIN. THICK. (IN.)	GAGE	DIMENSIONS (INCHES)				L DIMENSIONS					
			A	H	W	OVERALL WIDTH	SLOPE	LENGTH (IN.)	SLOPE	LENGTH (IN.)		
15	.064	16	8	6	21	37	4:1	20	6:1	30	10:1*	70
18	.064	16	8	6	24	40	4:1	32	6:1	48	10:1*	100
21	.064	16	8	6	27	43	4:1	44	6:1	66	10:1*	130
24	.064	16	8	6	30	46	4:1	56	6:1	84	10:1*	160
30	.109	12	12	9	36	60	4:1	80	6:1	120	10:1*	220
36	.109	12	12	9	42	66	4:1	104	6:1	156	10:1*	280
42	.109	12	16	12	48	80	4:1	128	6:1	192	~	~
48	.109	12	16	12	54	86	4:1	152	6:1	228	~	~
54	.109	12	16	12	60	92	4:1	176	6:1	264	~	~
60	.109	12	16	12	66	98	4:1	200	6:1	300	~	~

EQUIV. DIA. (IN.)	(INCHES)		MIN. THICK. (IN.)	GAGE	DIMENSIONS (INCHES)				L DIMENSIONS					
	SPAN	RISE			A	H	W	OVERALL WIDTH	SLOPE	LENGTH (IN.)	SLOPE	LENGTH (IN.)		
18	21	15	.064	16	8	6	27	43	4:1	20	6:1	30	10:1*	70
21	24	18	.064	16	8	6	30	46	4:1	32	6:1	48	10:1*	70
24	28	20	.064	16	8	6	34	50	4:1	40	6:1	60	10:1*	100
30	35	24	.079	14	12	9	41	65	4:1	56	6:1	84	10:1*	120
36	42	29	.109	12	12	9	48	72	4:1	76	6:1	114	10:1*	160
42	49	33	.109	12	16	12	55	87	4:1	92	6:1	138	10:1*	210
48	57	38	.109	12	16	12	63	95	4:1	112	6:1	168	~	~
54	64	43	.109	12	16	12	70	102	4:1	132	6:1	198	~	~
60	71	47	.109	12	16	12	77	109	4:1	148	6:1	222	~	~

\* MINIMUM THICKNESS OF ALL 10:1 SLOPE END SECTIONS IS .109" - 12 GAGE

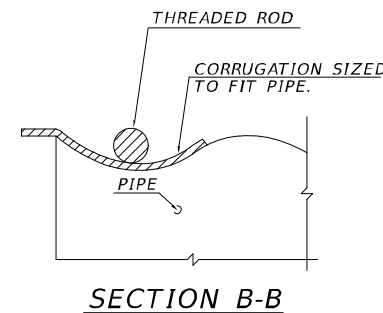


**PARALLEL DRAINAGE STRUCTURE**

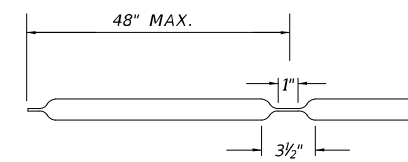


**CROSS DRAINAGE STRUCTURE**

BAR SHOWN ARE FOR CROSS DRAINAGE STRUCTURES. CROSS DRAINAGE BAR REQUIRED WHEN SPAN IS GREATER THAN 30". WHERE THE OPEN SPAN OF ANY CROSS DRAINAGE STRUCTURE IS LESS THAN 30", NO BARS ARE REQUIRED. LONGITUDINAL BARS ARE WELDED TO CROSS MEMBERS TO MAKE A SINGLE PIECE STRUCTURE.



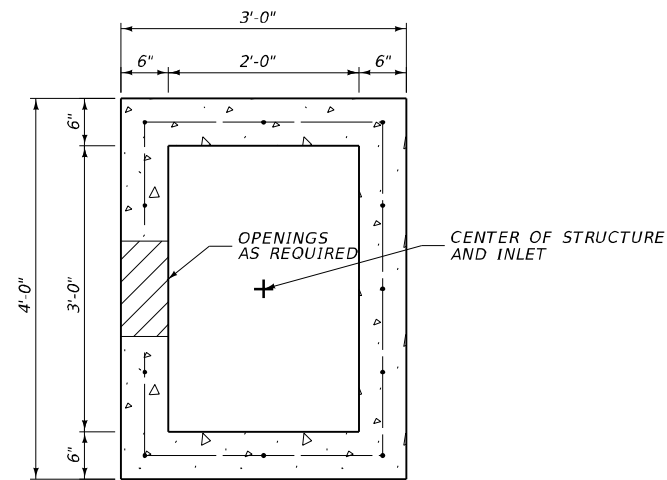
**SECTION B-B**



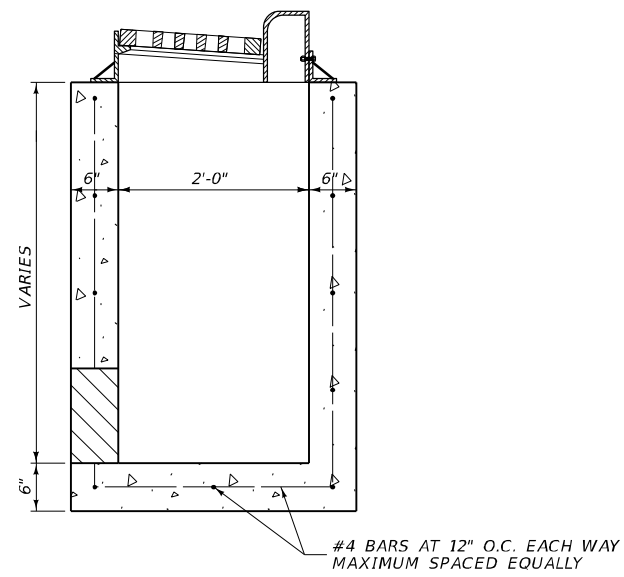
**CROSS DRAINAGE BAR DETAIL**

**SAFETY SLOPE END SECTION FOR CSP & CSP A NO SCALE**

# DETAIL

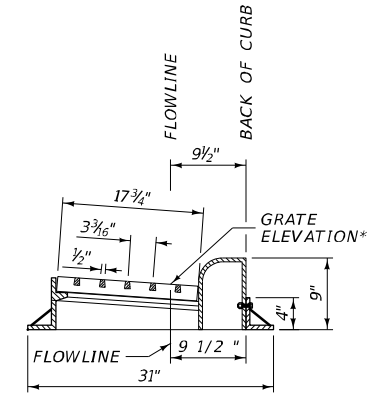
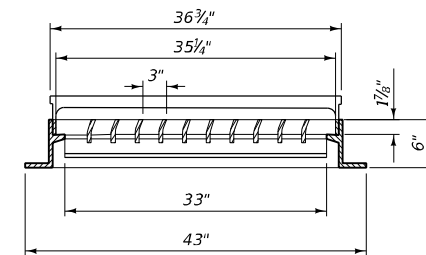


**SPECIAL DESIGN CURB INLET - PLAN VIEW**

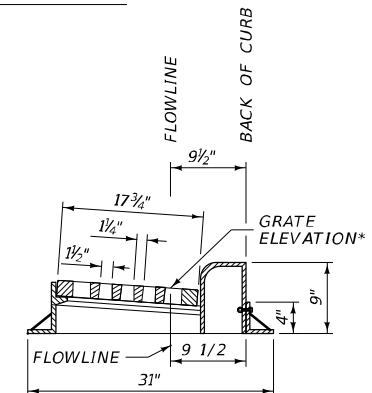
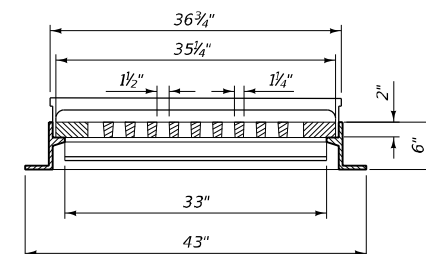


**SPECIAL DESIGN CURB INLET - SECTION VIEW**

- NOTES: ① SEE PLANS FOR LOCATIONS AND QUANTITIES.  
 ② PLAN STATION AND OFFSET FOR SPECIAL DESIGN CURB INLET IS CENTER OF STRUCTURE.  
 ③ STANDARD UNLESS OTHERWISE NOTED ON PLANS.  
 ④ SET ALL FINAL INLET GRATE ELEVATIONS TO ENSURE THAT POSITIVE DRAINAGE IS PROVIDED.



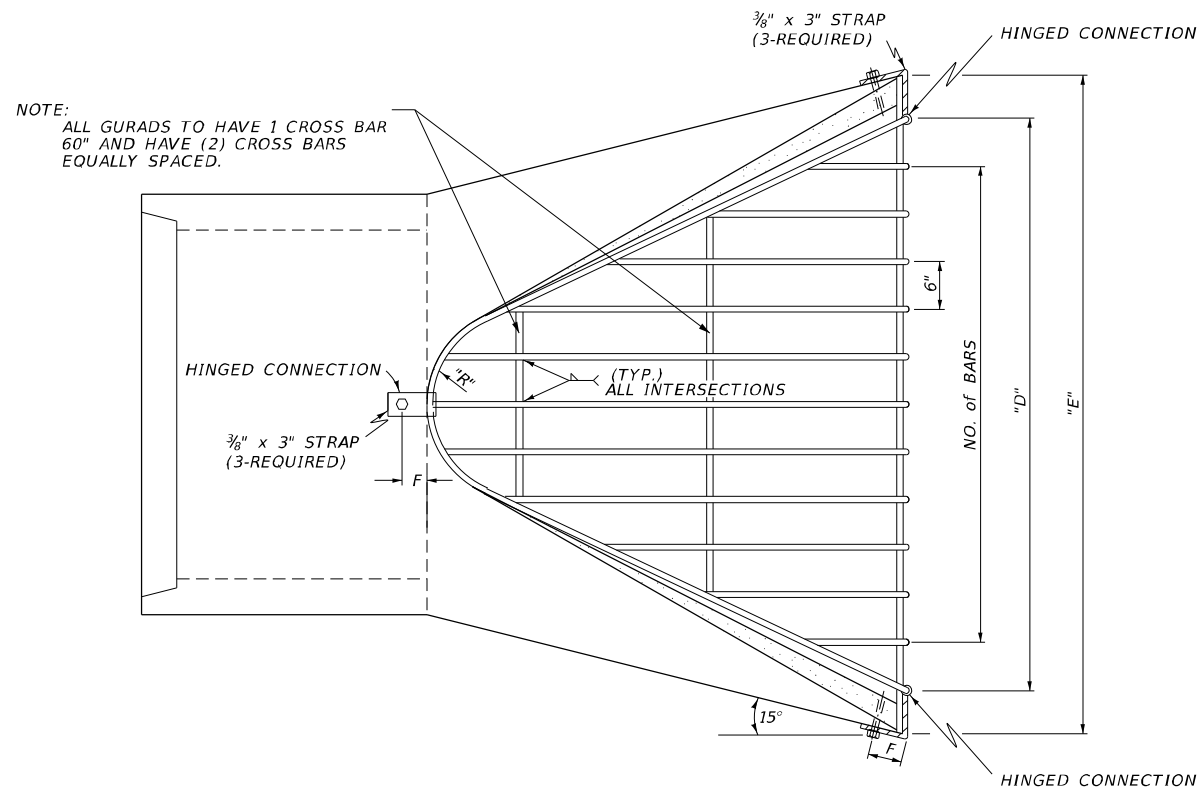
**CURVED VANE STYLE #**



**STRAIGHT BAR STYLE #**

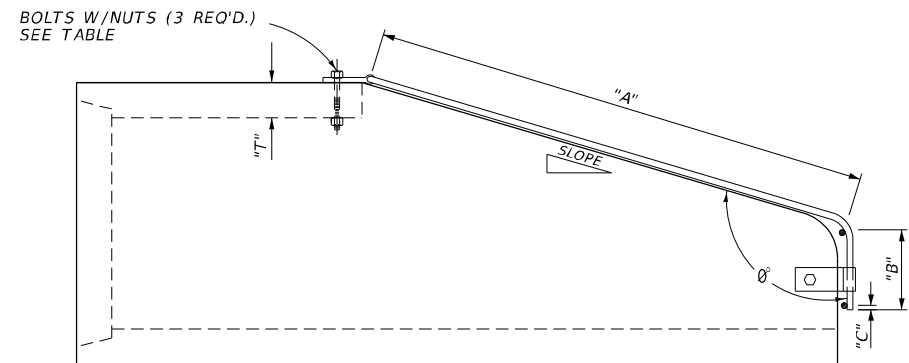
- # PROVIDE SPECIAL DESIGN CURB INLETS WITH CURVED VANE UNLESS OTHERWISE NOTED IN THE PLANS.  
 \* GRATE ELEVATIONS FOR SPECIAL DESIGN CURB INLETS SHOWN IN PLANS ARE 1" LESS THAN GUTTER FLOW LINE ELEVATION.

SPECIAL DESIGN  
CURB INLET DETAIL  
NO SCALE



NOTE:  
ALL GURADS TO HAVE 1 CROSS BAR  
60" AND HAVE (2) CROSS BARS  
EQUALLY SPACED.

TOP VIEW



SIDE VIEW

REINFORCED CONCRETE ROUND PIPE

PIPE SIZE	T	BAR SIZE Ø	NO. OF BARS	BOLT SIZE & LENGTH	SLOPE	RADIUS "R"	"A"	"B"	"C"	"D"	"E"	"F"	Ø°
12"	2"	5/8"	3	5/8" x 4 1/2"	2.4:1	3 1/4"	27"	3"	1"	24"	30"	4"	113°
15"	2 1/4"	5/8"	4	5/8" x 4 1/2"	2.4:1	4 1/6"	29"	5"	1"	30"	36"	4"	113°
18"	2 1/2"	5/8"	5	5/8" x 5"	2.3:1	5"	31"	8"	1"	36"	42"	4"	113°
21"	2 3/4"	5/8"	6	5/8" x 5"	2.4:1	5 5/8"	40"	8"	2"	42"	48"	4"	113°
24"	3"	5/8"	7	5/8" x 5 1/2"	2.5:1	6 1/2"	48"	8 1/2"	2"	48"	56"	4"	112°
27"	3 1/4"	3/4"	8	3/4" x 5 1/2"	2.5:1	7 3/8"	55"	9 1/2"	2"	54"	62"	4"	112°
30"	3 1/2"	3/4"	9	3/4" x 6"	2.5:1	8 1/4"	58"	11"	2"	60"	69"	6"	112°
36"	4"	3/4"	11	3/4" x 6 1/2"	2.5:1	10"	68"	14"	2"	72"	82"	6"	112°
42"	4 1/2"	3/4"	12	3/4" x 7"	2.5:1	11 3/4"	68"	20"	2"	78"	90"	6"	112°
48"	5"	3/4"	13	3/4" x 7 1/2"	2.5:1	13 1/2"	74"	23"	2"	84"	96"	6"	112°
54"	5 1/2"	1"	14	1" x 8"	2.0:1	15"	72"	25"	4"	90"	103"	6"	116°
60"	6"	1"	15	1" x 8 1/2"	1.9:1	16 3/4"	69"	33"	4"	96"	108"	8"	118°
66"	6 1/2"	1"	16	1" x 9"	1.7:1	18 1/2"	83"	28"	4"	102"	115"	8"	121°
72"	7"	1"	17	1" x 9 1/2"	1.8:1	20 1/4"	91"	34"	4"	108"	122"	8"	119°
78"	7 1/2"	1"	18	1" x 10"	1.8:1	22"	105"	34"	4"	114"	129"	8"	119°
84"	8"	1"	19	1" x 10 1/2"	1.6:1	23 3/4"	109"	34"	4"	120"	135"	8"	122°
90"	8 1/2"	1"	21	1" x 11"	1.5:1	25 1/2"	107"	39"	4"	132"	147"	8"	124°

REINFORCED CONCRETE ARCH PIPE

SPAN	RISE	T	BAR SIZE (DIA.)	NO. OF BARS	BOLT SIZE & LENGTH	SLOPE	RADIUS "R"	"A"	"B"	"C"	"D"	"E"	"F"	Ø°
22"	14"	2 1/2"	5/8"	5	5/8" x 5 1/2"	3:1	5 3/4"	30"	6"	1"	36"	41"	4"	108°
29"	18"	3 1/2"	5/8"	7	5/8" x 6"	3:1	7 7/8"	43"	7 1/2"	1"	48"	58"	4"	108°
36"	23"	4"	3/4"	9	3/4" x 6 1/2"	3:1	10 1/6"	54"	8 1/2"	1"	60"	70"	6"	108°
44"	27"	4 1/2"	3/4"	11	3/4" x 7"	3:1	12 3/6"	62"	10 1/8"	1"	72"	83"	6"	108°
51"	32"	4 1/2"	3/4"	12	3/4" x 7"	3:1	14"	62"	14 3/4"	1"	78"	89"	6"	108°
58"	36"	5"	3/4"	13	1" x 7 1/2"	3:1	16 1/8"	62"	20"	1"	84"	96"	6"	108°
65"	40"	5 1/2"	1"	14	1" x 8"	3:1	17 3/4"	62"	23 1/2"	2"	90"	103"	8"	108°
73"	45"	6"	1"	15	1" x 8 1/2"	3:1	20"	65"	29"	2"	96"	110"	8"	108°
88"	54"	7"	1"	19	1" x 9 1/2"	3:1	24 1/4"	65"	29"	2"	120"	135"	8"	108°

- NOTE:
1. ALL STRUCTURAL STEEL FOR TRASHGUARDS MUST CONFORM TO THE REQUIREMENTS FOR ASTM A-36 STRUCTURAL CARBON STEEL.
  2. PAINT ONE COAT OF RED OXIDE PRIMER AND TWO COATS OF ALUMINUM PAINT.
  3. BECAUSE OF VARIABLE FORMS BEING USED, TAKE FIELD MEASUREMENT OF FLARED ENDS BEFORE FABRICATING TRASHGUARD.

TRASHGUARD FOR  
PRECAST RCP  
FLARED ENDS  
NO SCALE