

Oversight / NHS

FHWA REGION VIII OVERSIGHT?  NO  YES

NATIONAL HIGHWAY SYSTEM?  NO  YES

# DEPARTMENT OF TRANSPORTATION STATE OF COLORADO

Related Projects:  
P. E. UNDER PROJECT:  
Project Number NH 0062-011  
Project Code 12023

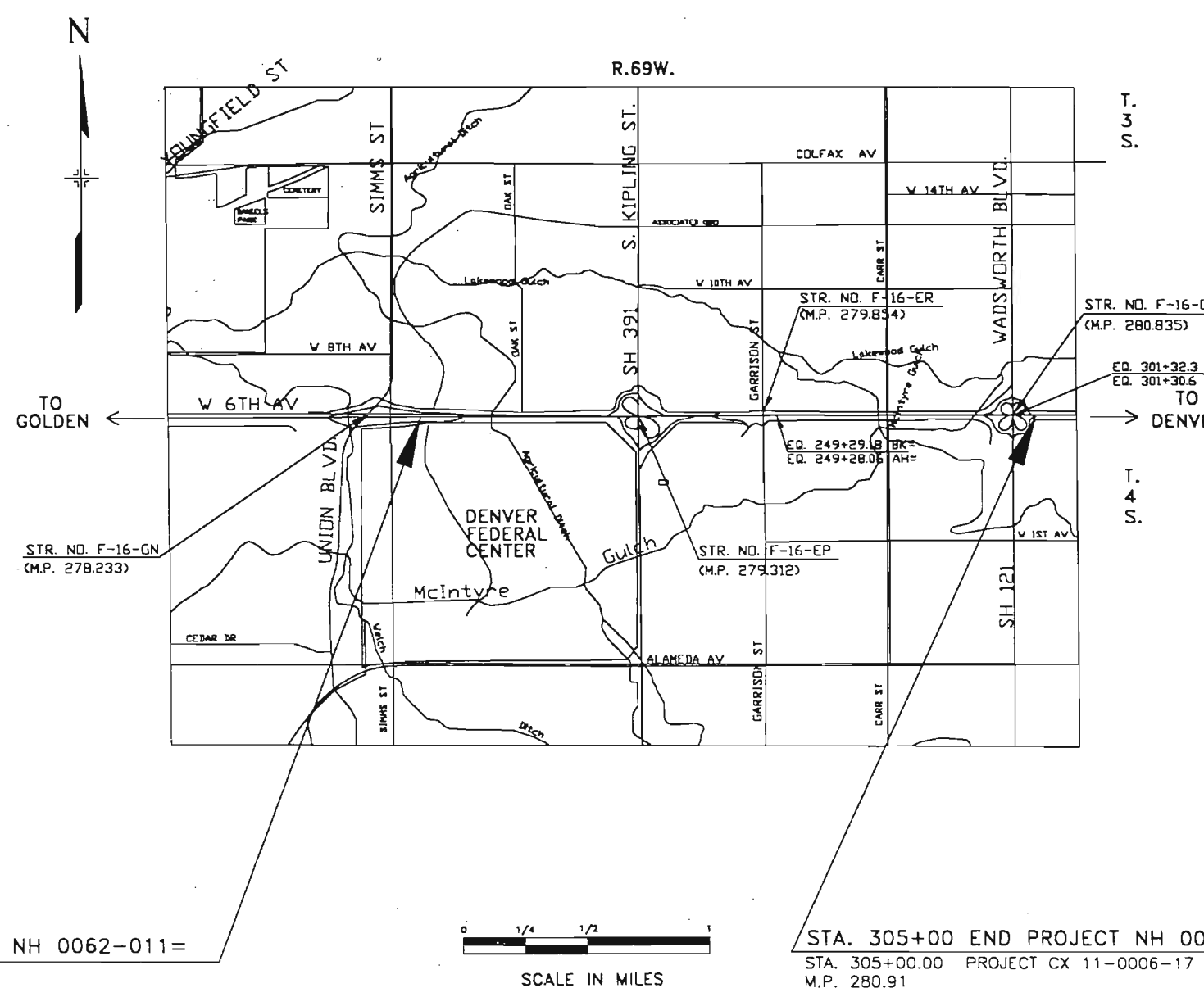
12023

R.O.W. Projects:  
R.O.W. Project Description

### TABULATION OF LENGTH & DESIGN DATA

STATION	US 6	LIN. FT.	
		ROADWAY	MAJOR STRUCTURE
STA. 175+00 BEGIN PROJECT NH 0062-011 M.P. 278.45		4,615.00	
STA. 178+00 BEGIN PAVING			
STA. 221+15 BEGIN KIPLING STR. F-16-EP			170.00
STA. 222+85 END KIPLING STR. F-16-EP		2,510.00	
STA. 247+95 BEGIN GARRISON STR. F-16-ER			132.00
STA. 249+27 END GARRISON STR. F-16-ER		2.18	
EQ. 249+29.18 BK. = 249+28.60 AH			
STA. 300+38 BEGIN WADSWORTH STR. F-16-D		5,109.94	
EQ. 301+32.30 BK. = 301+30.06 AH			94.30
STA. 302+26 END WADSWORTH STR. F-16-D			95.40
STA. 305+00 END PAVING END PROJECT NH 0062-011 M.P. 280.91		274.00	
<b>TOTAL</b>		12,511.12	491.70
<b>SUMMARY OF PROJECT LENGTH</b>		LIN. FT.	MILES
ROADWAY (NET LENGTH)		12,511.12	2.3695
MAJOR STRUCTURE		491.70	0.0931
<b>PROJECT GROSS LENGTH</b>		13,002.82	2.4626
<b>DESIGN DATA</b>			
MAXIMUM RADIUS OF CURVE	MATCH EXISTING	MATCH EXISTING	
MAXIMUM GRADE	MATCH EXISTING	MATCH EXISTING	
MINIMUM S. S. D. HORIZONTAL	MATCH EXISTING	MATCH EXISTING	
MINIMUM S. S. D. VERTICAL	MATCH EXISTING	MATCH EXISTING	
MAXIMUM DESIGN SPEED	MATCH EXISTING	MATCH EXISTING	

## HIGHWAY CONSTRUCTION BID PLANS OF PROPOSED FEDERAL AID PROJECT NH 0062-011 STATE HIGHWAY NO. 6 JEFFERSON COUNTY CONSTRUCTION PROJECT CODE NO. 12023



SHEET NO.	INDEX OF SHEETS
1	TITLE SHEET
2	STANDARD PLANS LIST
3-6	TYPICAL SECTIONS (4 SHEETS)
7	GENERAL NOTES
8-13	SUMMARY OF APPROXIMATE QUANTITIES
14	SUMMARY OF EARTHWORK QUANTITIES
15	TABULATION OF SURFACING
16	TABULATION OF REMOVALS
17	TABULATION OF GUARDRAIL
18	SURVEY TABULATION
19	SEEDING PLAN
20-21	TABULATION OF STORM DRAIN
22-26	STORM DRAIN CROSS SECTIONS
27	DETAIL OF INLET CAP
28-29	VANE GRATE INLET DETAILS (2 SHEETS)
30-37	STRUCTURE PLANS (8 SHEETS)
38	DETAIL OF GUARDRAIL AT SIGN STR. F-16-GH
39-48	PLAN SHEETS (10 SHEETS)
49-52	ITS PLANS AND STANDARD DETAILS (4 SHEETS)
53-56	ITS PLAN SHEETS (4 SHEETS)
57	SUMMARY OF TRAFFIC ITEMS
58-59	TABULATION OF SIGNS (2 SHEETS)
60	TABULATION OF OVERHEAD SIGNS
61	PAVEMENT MARKING TABULATION
62-64	LOOP DETECTOR TABULATION & PLANS (3 SHEETS)
65-67	FINAL SIGNING AND STRIPING (3 SHEETS)
68	SIGN STRUCTURE CROSS SECTION
69-70	SIGN CROSS SECTIONS (2 SHEETS)
71	TYPICAL TRAFFIC CONTROL FOR MEDIAN REPLACEMENT
72	MOBILE PAVEMENT MARKING ZONE
73-74	STEEL SIGN POST DETAIL
75-77	SAND BARREL DETAIL
78-80	SUGGESTED CONSTRUCTION PHASING
<b>NEW AND REVISED STANDARDS</b>	
M-107-1	TEMPORARY EROSION CONTROL MARCH 24, 1997 (4 SHEETS)
M-206-1	EXCAVATION AND BACKFILL FOR STRUCTURES MAY 7, 1999 (2 SHEETS)
M-606-1	GUARDRAIL TYPE 3, W BEAM MAY 7, 1999 (REVISED) (15 SHEETS)
M-606-13	GUARDRAIL TYPE 7, F SHAPE BARRIER (NEW) MAY. 7, 1999 (4 SHEETS)
M-614-50	OVERHEAD SIGNS MONOTUBE DESIGN DETAILS OCT. 18, 1999 (12 SHEETS)

	1996	2015
ADT	112,200	148,000
DHV	10.098	13,320
DHV TRUCKS %	3%	3%

STA. 175+00 BEGIN PROJECT NH 0062-011=  
STA. 175+00 PROJECT C 0062-009  
M.P. 278.45

STA. 305+00 END PROJECT NH 0062-011=  
STA. 305+00.00 PROJECT CX 11-0006-17  
M.P. 280.91

Computer File Information	
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Last Modification Date:	11\08\99 Initials: BWD
Full Path:	C:\PROJECTS\12023\TITLE
Drawing File Name:	TITLE.DWG
Acad Ver.	R14 Scale: None Units: ENGLISH

Index of Revisions	

Colorado Department of Transportation

2000 South Holly St.  
Room 185  
Denver, CO 80222  
Phone: (303) 984-5260 FAX: (303) 984-5299

Region 6 Design DEW

As Constructed
No Revisions:
Revised:
Void:

Contract Information	
Contractor	Asphalt Paving Co
Resident Engineer	SEIP HAD
Project Engineer	CHRIS PAZ
PROJECT STARTED	3-30-2000 ACCEPTED 11/10/01
Comments:	


Project No./Code
NH 0062-011
12023
Sheet Number
1

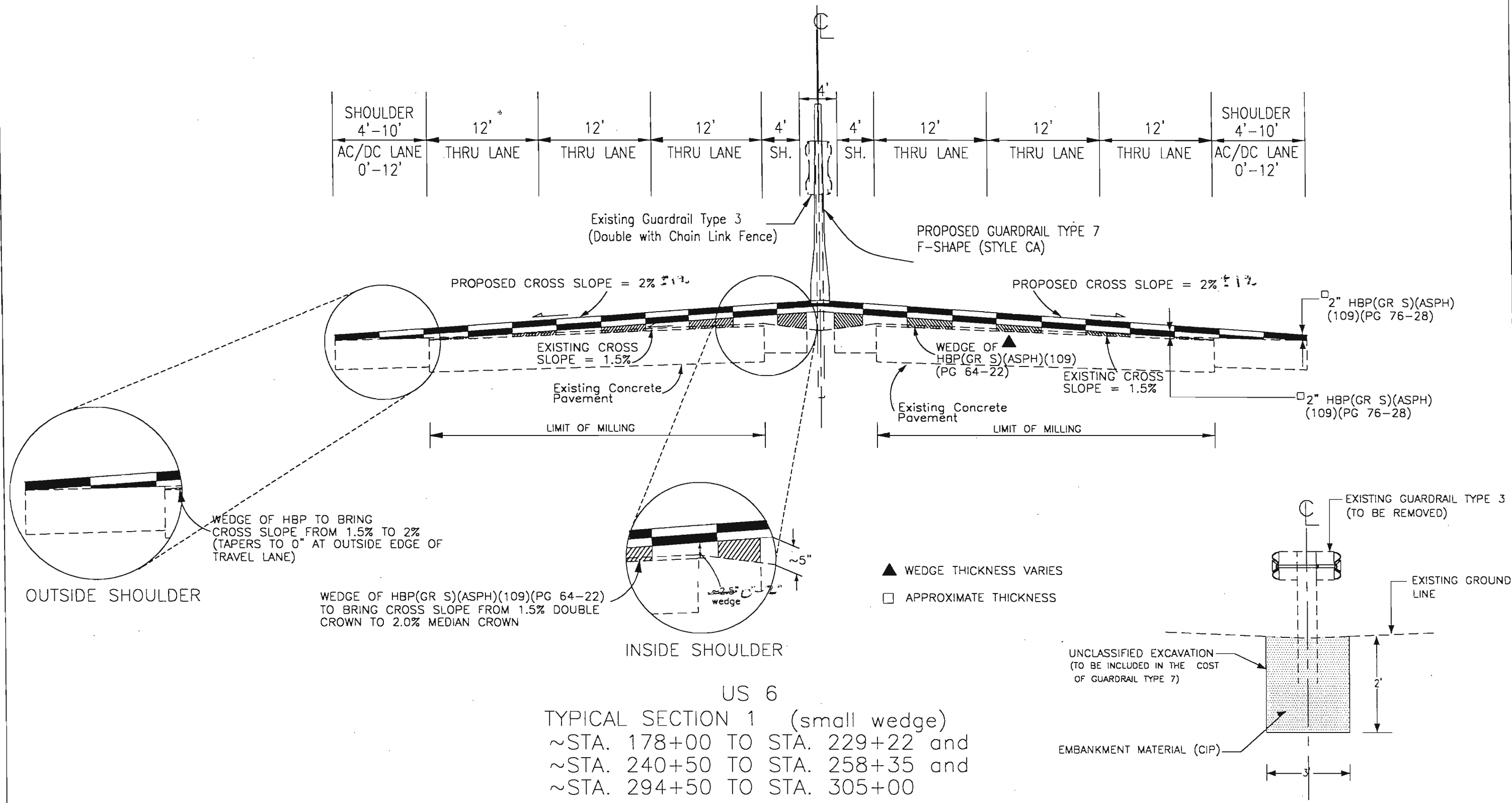
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<input checked="" type="checkbox"/> M-100-1	STANDARD SYMBOLS . . . . .	1
<input type="checkbox"/> M-107-1	TEMPORARY EROSION CONTROL . . . . .	2
<input type="checkbox"/> M-203-1	APPROACH ROADS . . . . .	3
<input type="checkbox"/> M-203-2	DITCH TYPES . . . . .	4
<input type="checkbox"/> M-203-10	SUPERELEVATION CROWNED HIGHWAYS . . . . .	5
<input type="checkbox"/> M-203-11	SUPERELEVATION DIVDED HIGHWAYS SHOULDER PIVOT . . . . .	6
<input type="checkbox"/> M-203-12	SUPERELEVATION STREETS . . . . .	7
<input type="checkbox"/> M-203-13	SUPERELEVATION DIVIDED HIGHWAYS CENTER PIVOT . . . . .	8
<input type="checkbox"/> M-206-1	EXCAVATION AND BACKFILL FOR STRUCTURES (3 SHEETS) . . . . .	9
<input type="checkbox"/> M-206-2	EXCAVATION AND BACKFILL FOR BRIDGES . . . . .	12
<input type="checkbox"/> M-210-1	MAILBOX SUPPORTS . . . . .(2 SHEETS)	13
<input type="checkbox"/> M-214-1	PLANTING DETAILS . . . . .	15
<input type="checkbox"/> M-412-1	CONCRETE PAVEMENT JOINTS . . . . .	16
<input type="checkbox"/> M-412-2	CURBED CONCRETE PAVEMENT JOINTS . . . . .	17
<input type="checkbox"/> M-504-1	STEEL CRIBBING . . . . .	18
<input type="checkbox"/> M-506-1	GABIONS AND SLOPE MATTRESS . . . . .	19
<input type="checkbox"/> M-510-1	STRUCTURAL PLATE CULVERT PIPE H-20 LOADING . . . . .	20
<input type="checkbox"/> M-601-1	SINGLE CONCRETE BOX CULVERT . . . . .(2 SHEETS)	21
<input type="checkbox"/> M-601-2	DOUBLE CONCRETE BOX CULVERT . . . . .(2 SHEETS)	23
<input type="checkbox"/> M-601-3	TRIPLE CONCRETE BOX CULVERT . . . . .(2 SHEETS)	25
<input type="checkbox"/> M-601-10	HEADWALL FOR PIPE CULVERTS . . . . .	27
<input type="checkbox"/> M-601-11	TYPE "S" SADDLE HEADWALL FOR PIPE CULVERTS . . . . .	28
<input type="checkbox"/> M-601-12	HEADWALLS AND CULVERT OUTLET PAVING . . . . .	29
<input type="checkbox"/> M-601-20	WINGWALLS FOR PIPE OR BOX CULVERTS . . . . .	30
<input type="checkbox"/> M-603-1	METAL AND PLASTIC CULVERT PIPE . . . . .(2 SHEETS)	31
<input checked="" type="checkbox"/> M-603-2	REINFORCED CONCRETE PIPE . . . . .	33
<input type="checkbox"/> M-603-3	PRECAST CONCRETE BOX CULVERT . . . . .	34
<input checked="" type="checkbox"/> M-603-10	CONCRETE AND METAL END SECTIONS . . . . .(2 SHEETS)	35
<input checked="" type="checkbox"/> M-604-10	INLET, TYPE C . . . . .	37
<input type="checkbox"/> M-604-11	INLET, TYPE D . . . . .	38
<input type="checkbox"/> M-604-12	CURB INLET, TYPE R . . . . .(2 SHEETS)	39
<input type="checkbox"/> M-604-13	CONCRETE INLET, TYPE 13 . . . . .	41
<input type="checkbox"/> M-604-20	MANHOLES . . . . .(3 SHEETS)	42
<input type="checkbox"/> M-605-1	SUBSURFACE DRAINS . . . . .	45
<input type="checkbox"/> M-606-1	GUARDRAIL, TYPE 3, W-BEAM . . . . .(12 SHEETS)	46
<input type="checkbox"/> M-606-12	GUARDRAIL, TYPE 4, CONCRETE BARRIER . . . . .(6 SHEETS)	58

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<input type="checkbox"/> M-607-2	CHAIN LINK FENCE . . . . .(3 SHEETS)	66
<input type="checkbox"/> M-607-3	BARRIER FENCE . . . . .	69
<input type="checkbox"/> M-607-4	DEER FENCE AND GATE . . . . .(2 SHEETS)	70
<input type="checkbox"/> M-607-10	PICKET SNOW FENCE . . . . .	72
<input type="checkbox"/> M-608-1	CURB RAMPS . . . . .	73
<input checked="" type="checkbox"/> M-609-1	CURBS AND GUTTERS . . . . .	74
<input type="checkbox"/> M-611-1	CATTLE GUARD . . . . .(2 SHEETS)	75
<input type="checkbox"/> M-613-1	CONVENTIONAL HIGHWAY LIGHTING . . . . .(3 SHEETS)	77
<input type="checkbox"/> M-613-2	HIGH MAST LIGHTING . . . . .(2 SHEETS)	80
<input type="checkbox"/> M-614-1	RUMBLE STRIPS . . . . .	82
<input type="checkbox"/> M-615-1	EMBANKMENT PROTECTOR, TYPE 3 . . . . .	83
<input type="checkbox"/> M-615-2	EMBANKMENT PROTECTOR, TYPE 5 . . . . .	84
<input type="checkbox"/> M-616-1	INVERTED SIPHON . . . . .(ALSO USE APPLICABLE M-603)	85
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<input checked="" type="checkbox"/> M-620-2	FIELD LABORATORY, CLASS 2 . . . . .	87
<input type="checkbox"/> M-620-11	FIELD OFFICE, CLASS 1 . . . . .	88
<input checked="" type="checkbox"/> M-620-12	FIELD OFFICE, CLASS 2 . . . . .	89
<input type="checkbox"/> M-629-1	SURVEY MONUMENTS . . . . .(2 SHEETS)	90

PLAN NUMBER	S STANDARD TITLE	PAGE NUMBER
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<input checked="" type="checkbox"/> S-614-1	TYPICAL GROUND SIGN PLACEMENT . . . . .	98
<input checked="" type="checkbox"/> S-614-2	CLASS I GROUND SIGN INSTALLATIONS . . . . .	99
<input checked="" type="checkbox"/> S-614-3	CLASS II GROUND SIGN INSTALLATIONS . . . . .	100
<input checked="" type="checkbox"/> S-614-4	CLASS III SIGNS, SHEET ALUMINUM PANELS . . . . .(3 SHEETS)	101
<input checked="" type="checkbox"/> S-614-5	BREAK-AWAY SIGN SUPPORT DETAILS FOR GROUND SIGNS . . . . .(2 SHEETS)	104
<input checked="" type="checkbox"/> S-614-6	CONCRETE FOOTINGS AND SIGN ISLANDS FOR CLASS III SIGNS . . . . .(2 SHEETS)	106
<input checked="" type="checkbox"/> S-614-10	TYPICAL MARKER ASSEMBLY INSTALLATIONS . . . . .	108
<input checked="" type="checkbox"/> S-614-11	MILEPOST SIGN AND INSTALLATION . . . . .	109
<input type="checkbox"/> S-614-12	STRUCTURE NUMBER INSTALLATION (BRIDGE INFORMATION SHEET) . . . . .	110
<input type="checkbox"/> S-614-14	FLASHING BEACON AND SIGN INSTALLATION . . . . .(2 SHEETS)	111
<input checked="" type="checkbox"/> S-614-20	TYPICAL POLE MOUNT SIGN INSTALLATION . . . . .	113
<input type="checkbox"/> S-614-21	CONCRETE BARRIER SIGN POST INSTALLATIONS . . . . .	114
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<input checked="" type="checkbox"/> S-627-1	TYPICAL PAVEMENT MARKINGS . . . . .(4 SHEETS)	119
<input checked="" type="checkbox"/> S-630-1	TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION . . . . .(9 SHEETS)	123
<input checked="" type="checkbox"/> S-630-2	BARRICADES, DRUMS, CONCRETE BARRIERS (TEMP) & VERTICAL PANELS . . . . .	132
<input checked="" type="checkbox"/> S-630-3	FLASHING BEACON (PORTABLE) DETAILS . . . . .	133

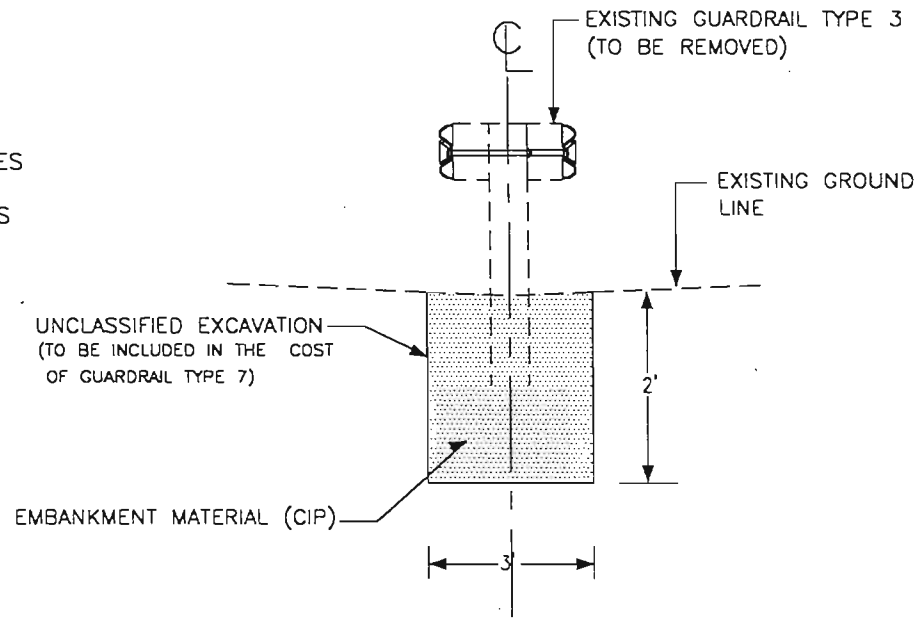
THE STANDARD PLAN SHEETS INDICATED HEREON BY A MARKED BOX ARE TO BE USED TO CONSTRUCT THIS PROJECT.

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Acad Ver. R14	Scale: 1:1 Units: English	<input type="checkbox"/>		DEW							



US 6  
 TYPICAL SECTION 1 (small wedge)  
 ~STA. 178+00 TO STA. 229+22 and  
 ~STA. 240+50 TO STA. 258+35 and  
 ~STA. 294+50 TO STA. 305+00

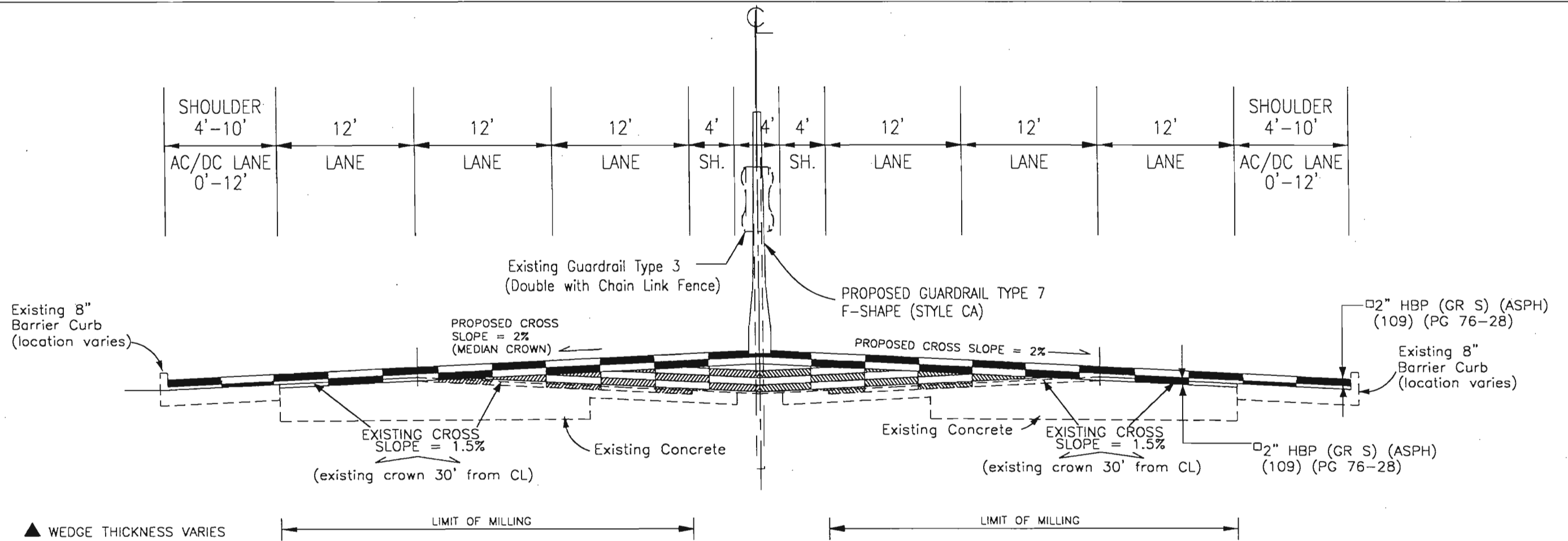
STRUCTURES TO REMAIN 1.5% CROSS SLOPE(NO WEDGE)



MEDIAN TRENCH DETAIL  
 STA. 178+00 TO 305+00  
 (Excluding Structures)

MILL OFF 1.5" (TO GET RID OF 1 1/2" PLANT MIX SEAL COAT AND 3/4" WHEEL RUTS) FULL WIDTH OF TRAVEL LANES (NOT SHOULDERS). THE CHANGE IN CROSS SLOPE FROM 1.5% MEDIAN CROWN TO 2% MEDIAN CROWN WILL COME ABOUT WITH A WEDGE OF HBP BEFORE THE FIRST FULL WIDTH LIFT IS APPLIED. MILLING DEPTH ON STRUCTURES VARIES.

Computer File Information		Sheet Revisions		Colorado Department of Transportation		As Constructed		Typical Section		Project No./Code			
Creation Date:	01\09\98	Initials:	SHK			2000 South Holly St. Room 185 Denver, CO 80222 Phone: (303) 984-5260 FAX: (303) 984-5299		No Revisions:		NH 0062-011			
Last Modification Date:	11\08\99	Initials:	BWD			Region 6 Design		Revised: <i>initial</i>		12023			
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Acad Ver.	R14	Scale:	X:XXX	Units:	English			Detailer:		Subset Sheets: 1 of 4			
										Sheet Subst:		Sheet Number	
												3	



▲ WEDGE THICKNESS VARIES  
 □ APPROXIMATE THICKNESS

LIMIT OF MILLING

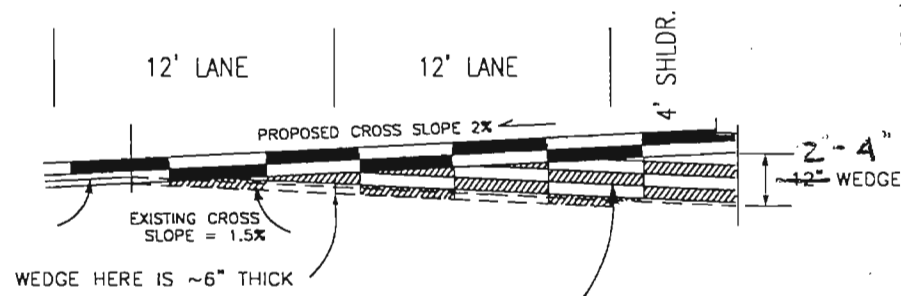
LIMIT OF MILLING

US 6 (BIG WEDGE)

TYPICAL SECTION 2

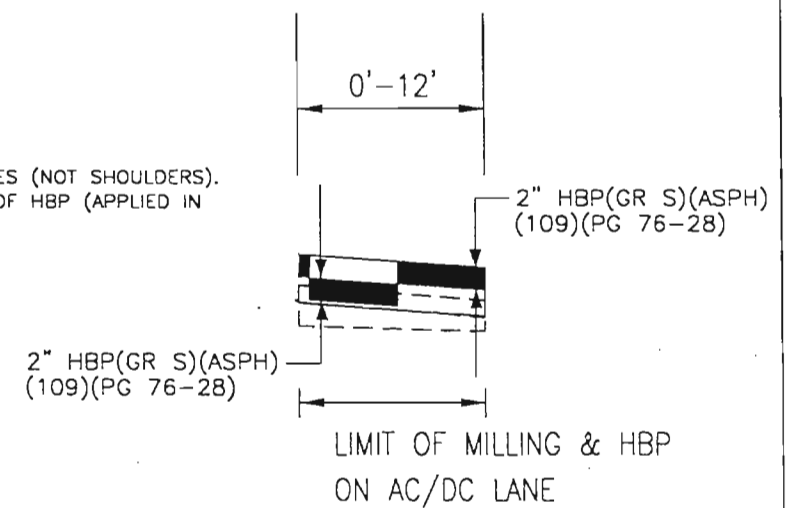
~STA. 229+22 TO STA. 240+50 and  
 ~STA. 258+35 TO STA. 294+50 and

DETAIL OF INSIDE LANES FOR CROSS SLOPE MODIFICATION

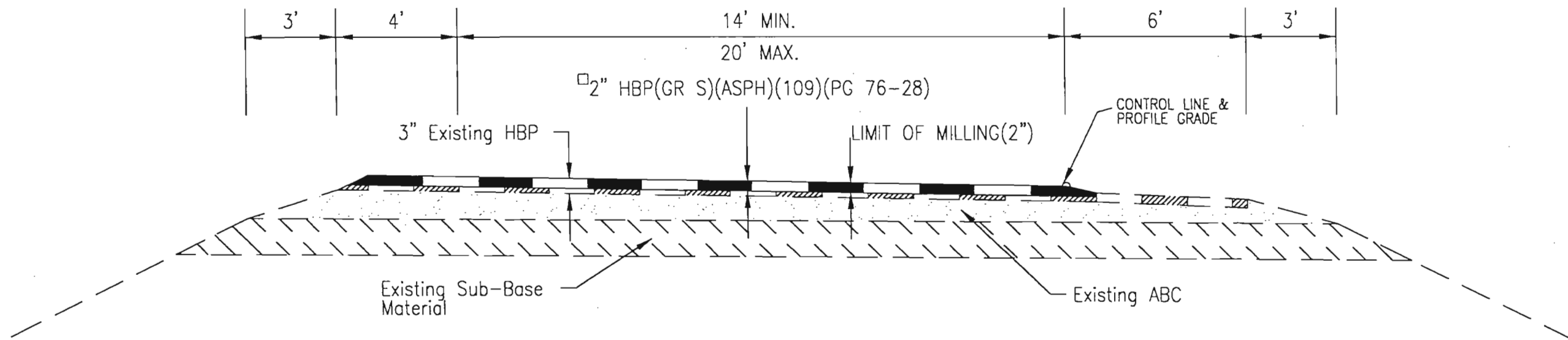


▲ WEDGE OF HBP(GR S)(ASPH)(109)(PG 64-22) TO BRING CROSS SLOPE FROM 1.5% DOUBLE CROWN TO 2.0% MEDIAN CROWN

MILL OFF 1.5" (TO GET RID OF 1 1/2" PLANT MIX SEAL COAT AND 3/4" WHEEL RUTS) FULL WIDTH OF TRAVEL LANES (NOT SHOULDERS). THE CHANGE IN CROSS SLOPE FROM 2% DOUBLE CROWN TO 2% MEDIAN CROWN WILL COME ABOUT WITH A WEDGE OF HBP (APPLIED IN SEVERAL 3" MAXIMUM LIFTS BEFORE THE FIRST FULL WIDTH LIFT IS APPLIED)

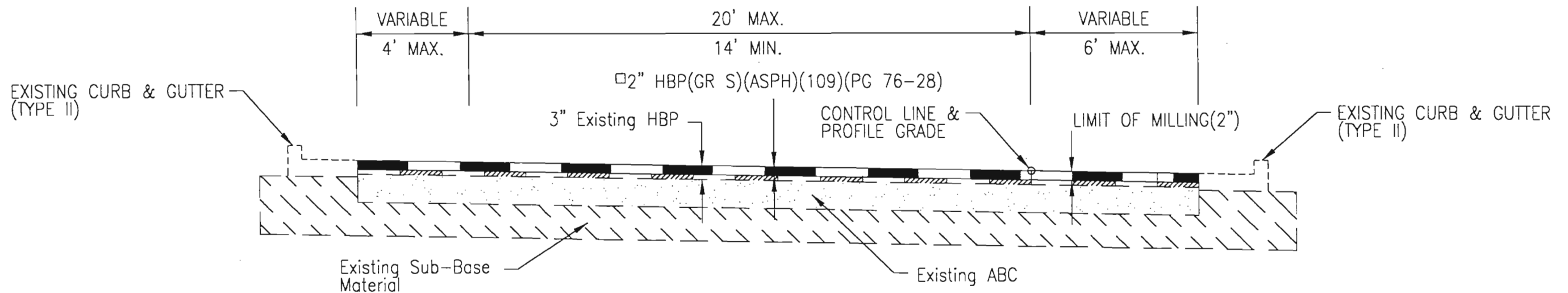


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Creation Date:	01\09\98	Initials:	SHK			2000 South Holly St. Room 185 Denver, CO 80222 Phone: (303) 984-5260 FAX: (303) 984-5299		No Revisions:		NH 0062-011	
Last Modification Date:	11\08\99	Initials:	BWD			Region 6 Design		Revised: 11/10/01		12023	
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Acad Ver.	R14	Scale:	X:XXX	Units:	English			Detailer:		Subset Sheets: 2 of 4	
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KIPLING RAMP TYPICAL SECTION

□ APPROXIMATE THICKNESS



KIPLING RAMP TYPICAL SECTION  
(AT CONNECTIONS ONLY)

□ APPROXIMATE THICKNESS

Computer File Information	
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Last Modification Date:	11/03/99 Initials: AK
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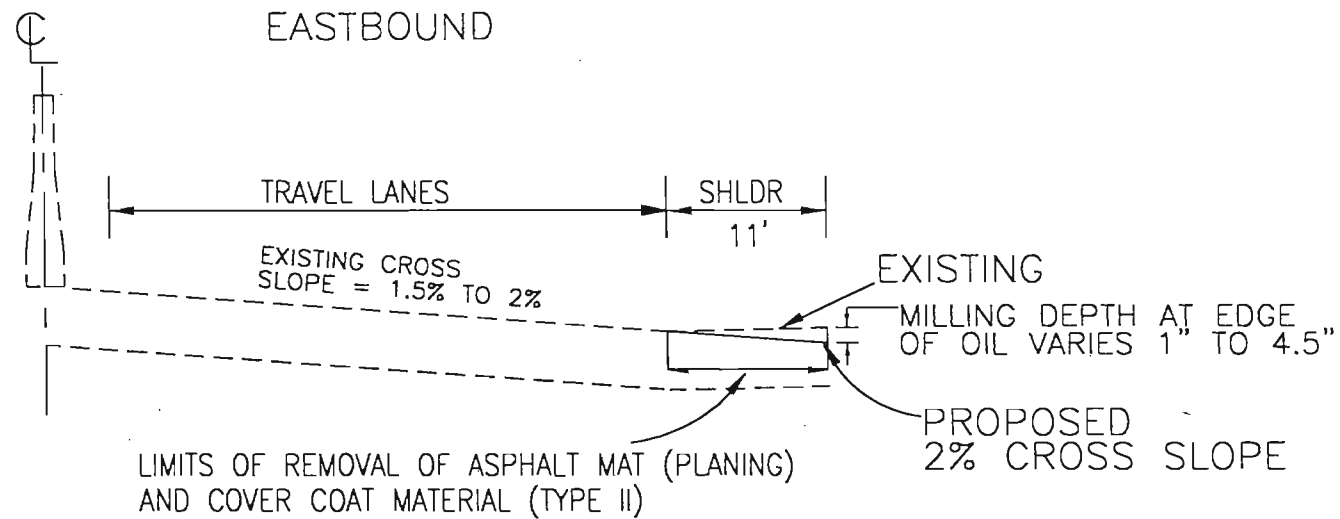
Sheet Revisions	

Colorado Department of Transportation  
 2000 South Holly St.  
 Room 185  
 Denver, CO 80222  
 Phone: (303) 984-5260 FAX: (303) 984-5299  
 Region 6 Design DEW

As Constructed
No Revisions: 1/1/98
Revised: 11/03/99
Void:

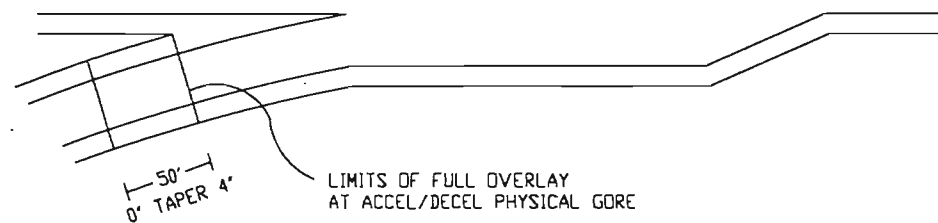
KIPLING RAMP TYPICAL SECTIONS	
Designer:	Structure Numbers
Detailer:	Subset Sheets: 3 of 4
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Project No./Code
NH 0062-011
12023
Sheet Number 5

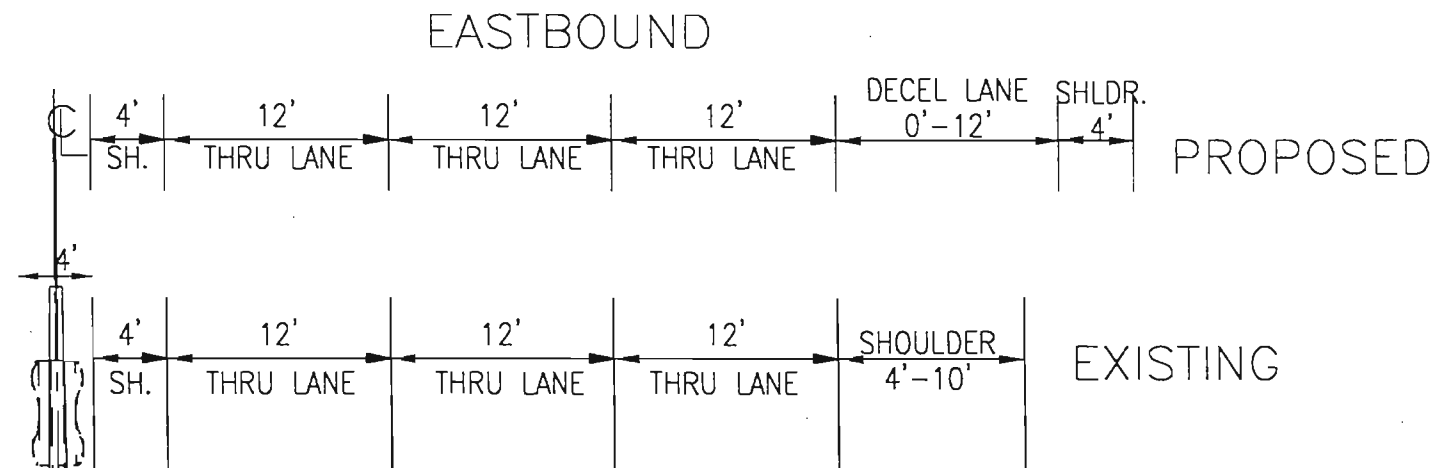
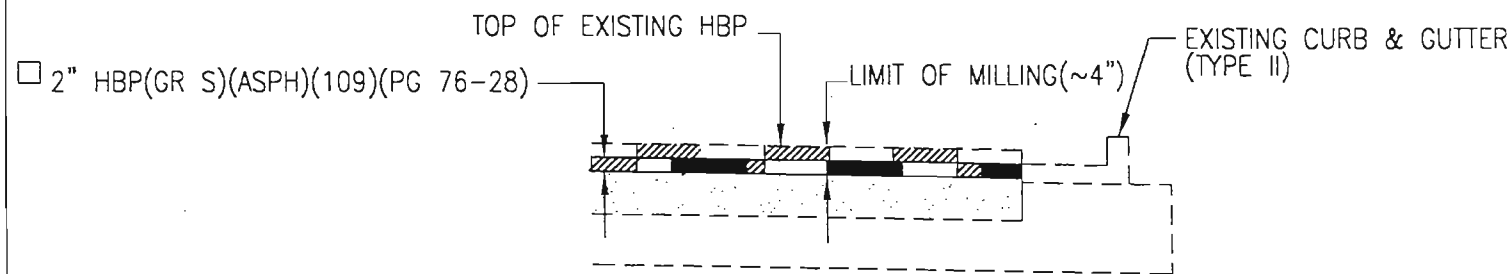


LOCATION: BEGINNING AT "WELCOME TO CITY OF LAKEWOOD" SIGN  
 (APPROX. ACROSS FROM ARBUTUS ST.) EASTWARD FOR 2756'  
 (APPROX. MP 277 TO 277.52)  
 (APPROX. STA. 111+00 TO STA. 139+00)

DETAIL OF RAMP GORES WITHOUT CURBS (TYP.)

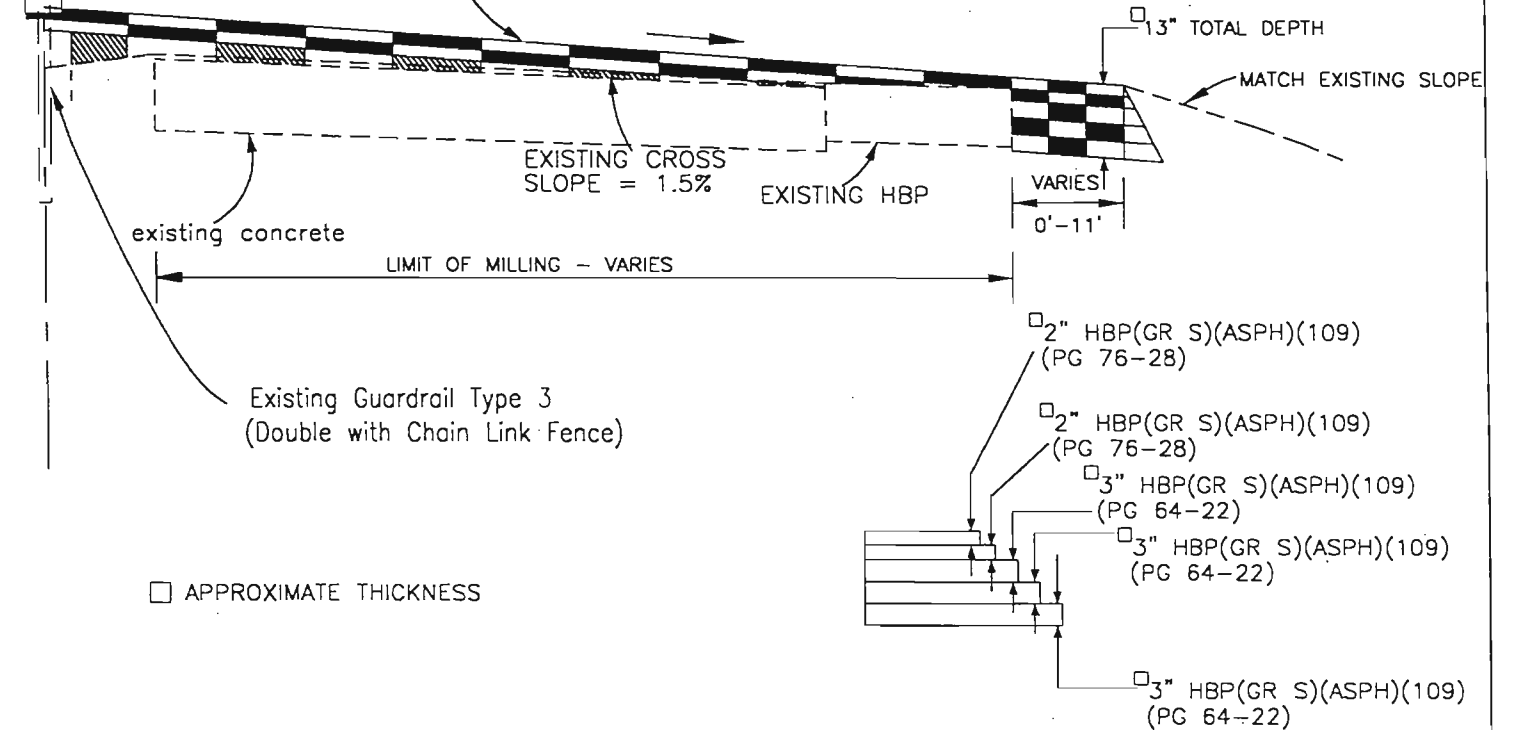


DETAIL OF MILLING AND PAVING OF RAMPS WITH CURBS



PROPOSED GUARDRAIL TYPE 7 F-SHAPE (STYLE CA)

PROPOSED CROSS SLOPE = 2%



US 6  
 WIDENING FOR KIPLING DECEL LANE  
 ~STA. 205+42 TO STA. 211+03, RT

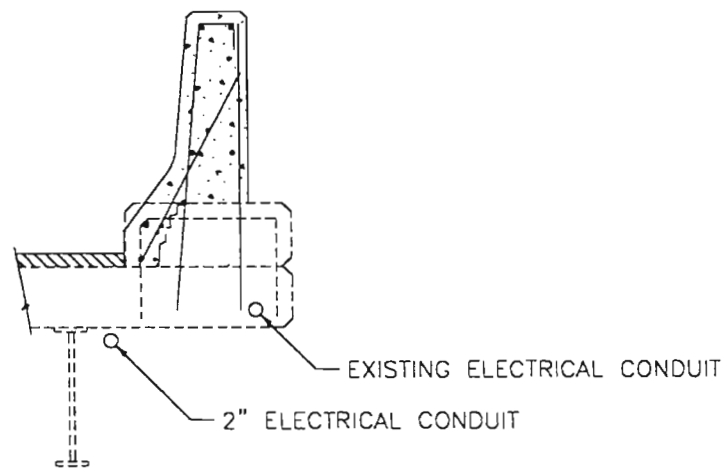
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Creation Date:	01\09\98	Initials:	SHK			2000 South Holly St. Room 185 Denver, CO 80222 Phone: (303) 984-5260 FAX: (303) 984-5299		No Revisions: 11/19/01		NH 0062-011	
Last Modification Date:	11\09\99	Initials:	BWD			Region 6 Design		Revised: <del>11/19/01</del>		12023	
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Acad Ver.	R14	Scale:	X:XXX	Units:	English			Detailer:		Subset Sheets: 4 of 4	
								Sheet Subset:		Subset Sheets: 4 of 4	

**GENERAL NOTES**

- FOR PRELIMINARY PLAN QUANTITIES OF PAVEMENT MATERIALS, THE FOLLOWING RATES OF APPLICATION WERE USED:  
 TACK COAT DILUTED EMUL. ASPH. (SLOW SETTING)      @ .10 GALS/SQ. YD. (DILUTED)  
 HOT BITUMINOUS PAVEMENT (GRADING S) (ASPHALT)(109)(PG 76-28)and(PG 64-22)      @ 110 LBS/SQ YD /IN  
 EMUL. ASPH. (HFRS-2P)(HIGH FLOAT)(POLYMERIZED)      @ .40 GALS/SQ. YD.  
 COVER COAT MATERIAL (TYPE II)      @ 40 LBS/SQ YD  
 DILUTED EMULSIFIED ASPHALT FOR TACK COAT SHALL CONSIST OF 1 PART EMULSIFIED ASPHALT AND 1 PART WATER OR AS DIRECTED BY THE ENGINEER. RATES OF APPLICATION SHALL BE AS DETERMINED BY THE ENGINEER AT THE TIME OF APPLICATION.
- WATER SHALL BE USED AS A DUST PALLIATIVE WHERE REQUIRED. LOCATIONS SHALL BE AS ORDERED. THE COST SHALL BE INCLUDED IN THE WORK.
- DEPTH OF MOISTURE-DENSITY CONTROL FOR THIS PROJECT SHALL BE AS FOLLOWS:  
 FULL DEPTH OF ALL EMBANKMENTS.  
 BASES OF CUTS AND FILLS 0.5 FEET  
 EXCAVATION REQUIRED FOR COMPACTION OF BASES OF CUTS AND FILLS WILL BE CONSIDERED AS SUBSIDIARY TO THAT OPERATION AND WILL NOT BE PAID FOR SEPARATELY.  
 TYPE OF COMPACTION FOR ITEM 203 FOR THIS PROJECT WILL BE AASHTO T99.
- ANY LAYER OF BITUMINOUS PAVEMENT THAT IS TO HAVE A SUCCEEDING LAYER PLACED THEREON SHALL BE COMPLETED FULL WIDTH BEFORE SUCCEEDING LAYER IS PLACED.
- WHERE IT IS REQUIRED TO CUT EXISTING PAVEMENT, THE CUTTING SHALL BE DONE TO A NEAT WORK LINE FULL DEPTH WITH A PAVEMENT CUTTING SAW OR OTHER METHOD AS APPROVED BY THE ENGINEER. THIS WILL NOT BE PAID FOR SEPARATELY BUT WILL BE CONSIDERED AS SUBSIDIARY TO REMOVAL OF ASPHALT MAT.
- CHIP SEAL AREAS WILL NOT BE OPENED TO TRAFFIC UNTIL AUTHORIZED BY THE ENGINEER. A MINIMUM 24 HOUR CLOSURE IS REQUIRED. THE CONTRACTOR SHALL BE REQUIRED TO COMPLETE BROOMING OF NEW CHIP SEAL AREAS ONCE DAILY FOR THREE DAYS.
- IT IS SUGGESTED THAT THE CONTRACTOR INITIATE A REQUEST TO THE PUBLIC SERVICE COMPANY FOR ANY CONSTRUCTION RELATED TEMPORARY ELECTRICAL POWER SOURCES AS SOON AS POSSIBLE. IN SOME INSTANCES UP TO 30 DAYS MAY BE REQUIRED TO PROVIDE THE SOURCES. THE REQUEST IS TO BE PROCESSED THROUGH PUBLIC SERVICE COMPANY OF COLORADO - STREET LIGHTING AT (303) 571-2505.
- IF REPLACEMENT OF BRIDGE RAIL REQUIRES INSTALLATION OF NEW CONDUIT FOR ELECTRICAL LIGHTING FEEDS, CONDUIT SHALL BE INSTALLED PER TYPICAL CONDUIT LOCATION DETAIL. IF REQUIRED, THE ELECTRICAL LIGHTING FEEDS SHALL BE SWITCHED, BY PSCO FORCES, OVER TO THE PROPOSED LOCATION PRIOR TO REMOVAL OF BRIDGE RAIL. JUNCTION BOXES SHALL BE INSTALLED ON THE STRUCTURE AT LOCATIONS ADJACENT TO THE EXISTING JUNCTION BOXES. UNDERDECK LIGHTING SHALL BE MAINTAINED AT ALL TIMES. PULL BOXES SHALL BE INSTALLED AT THE ENDS OF CONDUIT RUNS, TYPICALLY 100 FEET BEYOND THE END OF THE BRIDGE RAIL. CONDUIT SHALL BE FASTENED TO THE STRUCTURE AS APPROVED BY THE ENGINEER (SEE TYPICAL CONDUIT LOCATION DETAIL). THE CONTRACTOR SHALL COORDINATE ALL ELECTRICAL LIGHTING FEED WORK WITH PUBLIC SERVICE COMPANY OF COLORADO - STREET LIGHTING AT (303) 571-2505. WORK AS REQUIRED, SHALL BE PAID FOR IN ACCORDANCE WITH SUBSECTION 109.04 OF THE STANDARD SPECIFICATIONS, FROM FORCE ACCOUNT "ADJUST UTILITIES".

- UTILITY LINES AS SHOWN ON THE PLAN SHEETS ARE PLOTTED FROM THE BEST AVAILABLE INFORMATION. THE CONTRACTOR'S ATTENTION IS DIRECTED TO PARAGRAPH 105.06 OF THE STANDARD SPECIFICATIONS CONCERNING UTILITIES. THE CONTRACTOR WILL CALL THE UTILITY NOTIFICATION CENTER OF COLORADO (UNCC) AT 1-800-922-1987 FOR UTILITY LOCATIONS AT LEAST TWO BUSINESS DAYS, NOT INCLUDING THE DAY OF ACTUAL NOTIFICATION, PRIOR TO ANY EXCAVATION.
- THE CONTRACTOR SHALL LIMIT CONSTRUCTION ACTIVITIES TO THOSE AREAS WITHIN THE LIMITS OF PROJECT. ANY DISTURBANCE BEYOND THESE LIMITS SHALL BE RESTORED TO ORIGINAL CONDITION BY THE CONTRACTOR AT HIS OWN EXPENSE. CONSTRUCTION ACTIVITIES, IN ADDITION TO NORMAL CONSTRUCTION PROCEDURES SHALL INCLUDE THE PARKING OF VEHICLES OR EQUIPMENT, DISPOSAL OF LITTER, AND ANY OTHER ACTION WHICH WOULD ALTER EXISTING CONDITIONS.
- CONCRETE PIPE JOINT FASTENERS AS SHOWN ON M STANDARDS ARE REQUIRED ON ALL CONCRETE CULVERT INSTALLATIONS EXCLUDING SIDE DRAINS.
- ALL RANGE POINTS, TIES, BENCHMARKS, OR OTHER SURVEY CONTROL POINTS WHICH MAY BE ENCOUNTERED DURING CONSTRUCTION MUST BE PRESERVED.
- ALL MATERIAL REMOVED ON THIS PROJECT SHALL BECOME THE PROPERTY OF THE CONTRACTOR, EXCEPT 3000 TONS OF ROTOMILLINGS. THE CONTRACTOR WILL COORDINATE WITH DOUG WANKER, PATROL 4.(303-433-2460) FOR DELIVERY OF 3000 TONS OF ROTOMILLINGS ON THIS PROJECT. THE MILLINGS WILL BE DELIVERED TO THE PARK AVENUE MAINTENANCE YARD 3601 PARK AVE. WEST. CONTACTS: DON MCCUNE (CELLULAR-303-947-5195),(OFFICE-303-433-2559) OR JOE CRICHTON (303-947-5553)
- THE MINIMUM THICKNESS OF TOPSOIL SHALL BE 4 INCHES. IT IS ESTIMATED THAT 400 CU. YD. OF TOPSOIL WILL BE REQUIRED FOR THIS PROJECT AND SHALL BE FROM THE CONTRACTOR'S SOURCE.
- IT IS ESTIMATED THAT 1 EACH CLEAN CULVERT WILL BE REQUIRED FOR THIS PROJECT. SEE PLAN SHEETS FOR LOCATION.
- IT IS ESTIMATED THAT 3370 SQ. YD. OF COVER COAT MATERIAL (TYPE II) WILL BE REQUIRED FOR THIS PROJECT. IT IS ESTIMATED THAT 1348 GALLONS OF EMULSIFIED ASPHALT (HFRS-2P)(HIGH FLOAT)(POLYMERIZED) WILL BE REQUIRED FOR THIS PROJECT.
- THE ROADWAY SURFACE SMOOTHNESS CATEGORY FOR THIS PROEJCT IS AS FOLLOWS: CATEGORY II , THE PAVEMENT SMOOTHNESS SHALL BE IN THE INCHES/MILE TABLE.
- IT IS ESTIMATED THAT 86 EACH REMOVAL OF DELINEATOR WILL BE REQUIRED FOR THIS PROJECT.
- THE DELINEATORS SHALL BE INSTALLED AS PER THE M & S STANDARDS AND AS DIRECTED BY THE ENGINEER. ALL DELINEATOR POSTS SHALL BE GREEN IN COLOR.  
 IT IS ESTIMATED THAT 64 EACH DELINEATOR (TYPE II)( BARRIER), YELLOW-YELLOW, BACK TO BACK, WILL BE REQUIRED FOR THIS PROJECT.  
 IT IS ESTIMATED THAT 54 EACH DELINEATOR (FLEXIBLE)( TYPE I) CRYSTAL IN COLOR WILL BE REQUIRED FOR THIS PROJECT.  
 IT IS ESTIMATED THAT 48 EACH DELINEATOR (FLEXIBLE)(TYPE II), 2 CRYSTAL, WILL BE REQUIRED FOR THIS PROJECT.  
 IT IS ESTIMATED THAT 9 EACH DELINEATOR (FLEXIBLE)(TYPE III) YELLOW IN COLOR WILL BE REQUIRED FOR THIS PROJECT.
- FLOWLINE ELEVATIONS FOR EXISTING AND PROPOSED INLETS SHALL BE FIELD VERIFIED BY THE CONTRACTOR.
- THE AUTOMATIC TRAFFIC RECORDER(ATR) DETECTOR LOOPS WILL BE TESTED AFTER MILLING AND THE LOOPS WILL BE REMOVED AND REPLACED IF THEY DO NOT OPERATE CORRECTLY .
- THE CONTRACTOR WILL BE REQUIRED TO OBTAIN AN EXEMPTION FROM THE CITY OF LAKEWOOD NOISE ORDINANCE FOR NIGHT TIME WORK.
- IT IS ESTIMATED THAT 20 HOURS BLADING WILL BE REQUIRED AMONG THE FOLLOWING LOCATIONS  
 REGRADE DITCH--STA. 177+80 TO 179+75, RT.  
 WIDENED AREA--STA. 205+42 TO STA. 211+03, RT.  
 ADJACENT TO MILLED SHOULDER AREA--M.P. 277 TO M.P. 277.58, RT. (APPR. STA. 111+00 TO STA. 139+00)
- IT IS ESTIMATED THAT 40 HOURS OF POTHOLING WILL BE REQUIRED ON THIS PROJECT AS DIRECTED BY THE ENGINEER.
- IT IS ESTIMATED THAT 1 C.Y. CONCRETE SLOPE AND DITCH PAVING WILL BE REQUIRED FOR THIS PROJECT. SEE PLAN SHEETS FOR LOCATION.
- IT IS ESTIMATED THAT 45 L.F. GUTTER TYPE 2 (5 FOOT) WILL BE REQUIRED FOR THIS PROJECT. SEE PLAN SHEETS FOR LOCATION.
- IT IS ESTIMATED THAT 8 HOURS OF MONITORING TECHNICIAN WILL BE REQUIRED FOR THIS PROJECT.
- IT IS ESTIMATED THAT 8 HOURS OF HEALTH AND SAFETY OFFICER WILL BE REQUIRED FOR THIS PROJECT.
- IT IS ESTIMATED THAT 1 EA. ADJUST MONUMENT WILL BE REQUIRED FOR THIS PROJECT. SEE PLAN SHEETS FOR LOCATION.

**TYPICAL CONDUIT LOCATION DETAIL**



Computer File Information		Sheet Revisions		Colorado Department of Transportation		As Constructed		GENERAL NOTES		Project No./Code	
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Drawing File Name:	G_NOTES.DWG			(R-X)	mm/dd/yy	xxxxx	xxx			Detailer:	BWD
Acad Ver.	R14	Scale:	1:1	Units:	None	(R-X)	mm/dd/yy	xxxxx	xxx	Sheet Subset:	Roadway
										Subset Sheets:	7

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**DOT**  
DEPARTMENT OF TRANSPORTATION

R-6 DEW

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BOOK	PAGE	SHEET				PLAN	AS CONST.	PLAN	AS CONST.	PLAN	AS CONST.	PLAN	AS CONST.	PLAN	AS CONST.	PLAN	AS CONST.
			202-00001	Removal of Structure	EACH	7	5									7	5
			202-00090	Removal of Delineator	EACH	86										86	
			202-00201	Removal of Curb	LF	930	53									930	53
			202-00203	Removal of Curb and Gutter	LF	238	375									238	375
			202-00240	Removal of Asphalt Mat (Planing)	SY	131,902	142,057									131,902	142,057
			202-00246	Removal of Asphalt Mat (Planing) (Special)	SY					1,310		2,237		2,077	2,078	5,624	5,625
			202-00250	Removal of Pavement Marking	SF	30,015	1,547	2,614								30,015	1,547
			202-00425	Removal of Bridge Railing	LF					411		593		524		1,528	
			202-00495	Removal of Portions of Present Structure	L S	1	∅								1	∅	
			202-00805	Removal of Overhead Sign Structure	EACH	1									1		
			202-00810	Removal of Ground Sign	EACH	46	41									46	
			202-01130	Removal of Guardrail Type 3	LF	14,540	15,283	17,254								14,540	15,283
			202-01140	Removal of Guardrail Type 4	LF	380	300									380	300
			202-04000	Plug Structure	EACH	14	13									14	13
			202-04002	Clean Culvert	EACH	1										1	
			203-00060	Embankment Material (Complete In Place)	CY	3,249	∅									3,249	∅
			203-01500	Bloding	HOUR	20	16									20	16
			203-01597	Patholing	HOUR	40	24									40	24
			207-00205	Topsoil	CY	400	∅									400	∅
			208-00011	Erosion Bales (Weed Free)	EACH	40	∅									40	∅
			208-00100	Sediment Removal and Disposal	L S	1	∅									1	∅
			210-00500	Rebuild Portions of Present Structure	EACH					5						5	

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As Constructed	SUMMARY OF APPROXIMATE QUANTITIES	
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BOOK	PAGE	SHEET				PLAN	AS CONST.	PLAN	AS CONST.	PLAN	AS CONST.	PLAN	AS CONST.	PLAN	AS CONST.	PLAN	AS CONST.
			210-04020	Modify Inlet	EACH	2	3									2	3
			212-00006	Seeding (Native)	ACRE	2	✓									2	✓
			213-00002	Mulching (Weed Free Hay)	ACRE	2	✓									2	✓
			213-00061	Mulch Tackifier	LB	800	✓									800	✓
			250-00050	Monitoring Technician	HOUR	8	<del>8</del> 4									8	<del>8</del> 4
			250-00110	Health and Safety Officer	HOUR	8	<del>8</del> 7									8	<del>8</del> 7
			403-00720	Hot Bituminous Pavement (Patching) (Asphalt)	TON	150	855.47									150	855.47
			403-35345	Hot Bituminous Pavement (Grading S)(Asphalt) (109)(PG 76-28)	TON	32,240	<del>30,716.6</del> 30,144.61			<del>204</del> 144.10		482	<del>482</del>	220	<del>220</del>	33,226	30,996.71
			403-35354	Hot Bituminous Pavement (Grading S)(Asphalt) (109)(PG 64-22)	TON	19,497	6,123.22									19,497	6,123.22
			409-02015	Cover Coat Material (Type II)	SY	3,370	∅									3,370	∅
			411-10255	Emulsified Asphalt (Slow-Setting)	GAL	22,760	8,744									22,760	8,744
			411-10375	Emulsified Asphalt (HFRS-2P) (High Float) (Polymerized)	GAL	1,348	∅									1,348	∅
			420-00500	Geotextile (Paving)	SY					1,325		2,237	<del>2,237</del>	2,077	<del>2,077</del>	1,325	3,563
			503-00054	Drilled Caisson (54 Inch)	LF	48	✓									48	✓
			506-00206	Riprap (6 Inch)	CY	2	✓									2	✓
			506-00209	Riprap (9 Inch)	CY	1	✓									1	✓
			507-00000	Concrete Slope and Ditch Paving	CY	1	<del>1</del> 89									1	<del>1</del> 89
			515-00120	Waterproofing (Membrane)	SY							2,237	∅	2,077	∅	4,314	∅
			515-00410	Concrete Sealer (Calcium Nitrite)	SY					1	14	6	14	6	0	13	28
			518-03000	Sawing and Sealing Bridge Joint	LF					192	174	224	205	232	210	648	589
			601-06100	Concrete (Patching)	CY					18	0	13	0	12	0	43	0

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BOOK	PAGE	SHEET				PLAN	AS CONST.	PLAN	AS CONST.	PLAN	AS CONST.	PLAN	AS CONST.	PLAN	AS CONST.	PLAN	AS CONST.	PLAN	AS CONST.				
			601-06150	Concrete (Patching)	SF							4,720	125			2,063	126			8,702	251		
			603-01180	18 Inch Reinforced Concrete Pipe	LF	164	162														164	162	
			603-02180	23x14 Inch Reinforced Concrete Pipe Elliptical	LF	30	✓														30	✓	
			603-05018	18 Inch Reinforced Concrete End Section	EACH	4	5														4	5	
			603-05118	23x14 Inch Reinforced Concrete End Section Elliptical	EACH	1	✓														1	✓	
			603-10240	24 Inch Corrugated Steel Pipe	LF	4	9														4	9	
			604-00305	Inlet Type C (5 Foot)	EACH	1	✓														1	✓	
			604-25005	Vane Grate Inlet (5 Foot)	EACH	✓	2														✓	2	
			604-26005	Vane Grate Inlet (Double) (5 Foot)	EACH	6	5.6														6	5.6	
			604-26010	Vane Grate Inlet (Double) (10 Foot)	EACH	5	3.2														5	3.2	
			606-00301	Guardrail Type 3 (6-3 Post Spacing)	LF	3,245	3,588														3,245	3,588	
			606-00710	Guardrail Type 7 (Style CA)	LF	13,178	13,132														13,178	13,132	
			606-00720	Guardrail Type 7 (Style CC)	LF		13,567					132	✓			189	✓			170	✓	491	✓
			606-01340	End Anchorage Type 3D	EACH	8	✓														8	✓	
			606-01370	End Anchorage Type 3G	EACH	7	6														7	6	
			606-01380	End Anchorage Type 3H	EACH	5	4														5	4	
			606-02001	End Anchorage (Slotted Rail Terminal)	EACH	6	7														6	7	
			606-02003	End Anchorage (Nonflared)	EACH	2	✓														2	✓	
			606-10750	Bridge Rail Type 7R	LF							264	✓			460	✓			340	✓	1,064	✓
			607-11580	Fence (Temporary)	LF	1,150	1,291														1,150	1,291	
			607-53137	Fence Chain Link (Special) (36 Inch)	LF							264	✓			380	✓			340	✓	984	✓
			609-24005	Gutter Type 2 (5 Foot)	LF	45	∅														45	∅	

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BOOK	PAGE	SHEET				PLAN	AS CONST.	PLAN	AS CONST.	PLAN	AS CONST.	PLAN	AS CONST.	PLAN	AS CONST.	PLAN	AS CONST.
			609-60011	Curb Type 6 (Section M)	LF	2,149	2,692									2,149	2,692
			612-00022	Delineator (Type II) (Barrier)	EACH	64	66									64	66
			612-00041	Delineator (Flexible) (Type I)	EACH	54	187									54	187
			612-00042	Delineator (Flexible) (Type II)	EACH	48	49 <sup>cl</sup> 53									48	49 <sup>cl</sup> 53
			612-00043	Delineator (Flexible) (Type III)	EACH	9	24									9	24
			613-00201	2 Inch Electrical Conduit (Jacked)	LF			4,220	3,978							4,220	3,978
			613-01200	2 Inch Electrical Conduit (Plastic)	LF			140	210							140	210
			613-07000	Pull Box (Special)	EACH			7	✓							7	✓
			614-00011	Sign Panel (Class I)	SF	27	✓									27	✓
			614-00012	Sign Panel (Class II)	SF	408	318 <sup>cl</sup> 422									408	422 <sup>cl</sup> 318
			614-00013	Sign Panel (Class III)	SF	933	265 <sup>cl</sup> 433									933	433 <sup>cl</sup> 265
			614-00200	Steel Sign Post (U-2)	LF	36	✓									36	✓
			614-00818	Steel Sign Post (W 8x18)	LF	71	✓									71	✓
			614-00821	Steel Sign Post (W 8x21)	LF	37	73									37	73
			614-01022	Steel Sign Post (W 10x22)	LF	41	✓									41	✓
			614-01552	Steel Sign Post (2.5 Inch Round) (Slipbase)	LF	521	539									521	539
			614-03003	Concrete Footing (Type 3)	EACH	4	✓									4	✓
			614-03004	Concrete Footing (Type 4)	EACH	2	✓									2	✓
			614-03005	Concrete Footing (Type 5)	EACH	2	✓									2	✓
			614-10030	Point Overhead Sign Structure	EACH	2	1									2	1
			614-10600	Sign Bridge Structure (60 to less than 65 Foot Frame)	EACH	1	✓									1	✓
			614-72875	Loop Detector Wire	LF	5,606	2,862									5,606	2,862

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BOOK	PAGE	SHEET				PLAN	AS CONST.					PLAN	AS CONST.			PLAN	AS CONST.			PLAN	AS CONST.	PLAN	AS CONST.		
			614-85115	Impact Attenuator (Quadguard)	EACH	1	✓													1	✓				
			620-00002	Field Office (Class 2)	EACH	1	✓													1	✓				
			620-00012	Field Laboratory (Class 2)	EACH	1	✓													1	✓				
			620-00020	Sanitary Facility	EACH	1	✓													1	✓				
			625-00000	Construction Surveying	L S	1	✓													1	✓				
			626-00000	Mobilization	L S	1	✓													1	✓				
			627-00001	Pavement Marking Paint	GAL	1,430														1,430	259 107				
			627-00002	Thermoplastic Pavement Marking	SF	21,599														21,599	23,561				
			627-01000	Prefarmed Plastic Pavement Marking (Type A)	SF	8,416														8,416	4,130				
			629-01210	Adjust Monument Box	EACH	1	✓													1	✓				
			630-00000	Flagging	HOUR	3,000														3,000	1254				
			630-00002	Traffic Control Supervisor	DAY	150														150	172				
			630-00003	Uniformed Traffic Control	HOUR	500														500	1126				
			630-00007	Traffic Control Inspection	DAY	65														65	95				
			630-80001	Flashing Beacon (Portable)	EACH	4	✓													4	✓				
			630-80336	Barricade (Type 3 M-B) (Temporary)	EACH	4														4	1				
			630-80341	Construction Traffic Sign (Panel Size A)	EACH	12														12	6 <sup>10</sup> <sub>10</sub>				
			630-80342	Construction Traffic Sign (Panel Size B)	EACH	33														33	57 <sup>71</sup>				
			630-80343	Construction Traffic Sign (Panel Size C)	EACH	12														12	φ <sup>4</sup>				
			630-80344	Construction Traffic Sign (Special)	SF	260														260	φ				
			630-80358	Advance Warning Flashing or Sequencing Arrow Panel (C Type)	EACH	4	✓													4	✓				
			630-80360	Drum Channelizing Device	EACH	500														500	20 60 <sup>10</sup>				

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Colorado Department of Transportation  
 2000 South Holly St.  
 Room 185  
 Denver, CO 80222  
 Phone: (303) 984-5260 FAX: (303) 984-5299  
 Region 6 Design DEW

As Constructed
No Revisions:
Revised: 11/9/01
Void:

SUMMARY OF APPROXIMATE QUANTITIES	
Designer:	Structure Numbers
Detailer:	
Sheet Subset:	Subset Sheets:

Project No./Code
NH 0062-011
12023
Sheet Number: 12

INDEX			CONTRACT ITEM NO.	CONTRACT ITEM	UNIT	ROADWAY		INTELLIGENT TRANSPORTATION SYSTEM				STRUCTURE F-16-ER 6TH/GARRISON		STRUCTURE F-16-0 6TH/WADSWORTH		STRUCTURE F-16-EP 6TH/KIPLING		PROJECT TOTALS	
BOOK	PAGE	SHEET				PLAN	AS CONST.	PLAN	AS CONST.	PLAN	AS CONST.	PLAN	AS CONST.	PLAN	AS CONST.	PLAN	AS CONST.	PLAN	AS CONST.
			630-80370	Concrete Barrier (Temporary)	LF	6,000	✓											6,000	✓
			630-80380	Traffic Cone	EACH	500	✓											500	✓
			630-80520	Mobile Pavement Marking Zone	DAY	6												6	2
			630-85010	Impact Attenuator (Temporary)	EACH	2	✓											2	✓
			700-70010	FORCE ACCOUNT =====	F A	1												1	
			700-70012	F/A Minor Contract Revisions	F A	1												1	
			700-70012	F/A Asphalt Pavement Incentive	F A	1												1	\$ 53,076.33
			700-70022	F/A OJT Pilot	F A	1												1	0
			700-70023	F/A On-The-Job Trainee	F A	1												1	0
			700-70025	F/A Quality Incentive Payment Smoothness	F A	1												1	0
			700-70028	F/A ESB Program	F A	1												1	0
			700-70060	F/A Adjust Utilities	F A	1												1	0
			700-70589	F/A Environmental Health & Safety Management	F A	1												1	0
				PRO 00008 ADDED ITEM - TRAFFIC CTL INCIDENTS	\$														(9000)
			625-0001	CONSTRUCTION SURVEYING (HORIZ)	Hour														31
			210-0005	RES CH SIGN STR	\$														2517.50
			614-0031	STEEL SIGN POST (3 3/4" DIA)	LF														6

Computer File Information		Sheet Revisions		 Colorado Department of Transportation 2000 South Holly St. Room 185 Denver, CO 80222 Phone: (303) 984-5260 FAX: (303)984-5299 Region 6 Design DEW	As Constructed		SUMMARY OF APPROXIMATE QUANTITIES		Project No./Code	
Creation Date: 09-Nov-1999	Initials:				No Revisions:	NH 0062-011				
Last Modification Date:	Initials:				Revised: 11/19/01	Designer:	Structure Numbers:	12023		
Full Path: C:\Projects\6th Overlay, 12023					Void:	Detailer:	Subset Sheets:	Sheet Number: 13		
Drawing File Name: SAQ13.DWG										
Acad Ver. R14 W										

## SUMMARY OF EARTHWORK QUANTITIES

INDEX			PAY ITEM	PROJECT TOTALS	
BOOK	PAGE	SHEET		CU. YD.	
			EMBANKMENT MATERIAL (CIP)		
			MEDIAN TRENCH	2713	
			SRT FLARES	390	
			STORM SEWER PIPES	146	
			TOTAL	3249	e
			<u>FOR INFORMATION ONLY</u>		
			UNCLASSIFIED EXCAVATION		
			MEDIAN TRENCH	2713	
			TOTAL	2713	e
			COMPACTION (AASHTO T-99)		
			EMBANKMENT (NET)		
			MEDIAN TRENCH	2713	
			SRT FLARES	390	
			STORM SEWER PIPES	146	
			TOTAL	3249	
			WETTING		
			COMPACTION TOTAL	76000 GAL.	
			<u>EARTHWORK QUANTITIES BALANCE</u>		
			EMBANKMENT X FACTOR (1.15)		
			MEDIAN TRENCH	3120	
			SRT FLARES	449	
			STORM SEWER PIPES	168	
			TOTAL	3737	
			UNCLASSIFIED EXCAVATION (SEE NOTE #3)	0	
			TOTAL BORROW FROM CONTRACTOR'S SOURCE	3737	

**NOTES:**

1. ALL EXCAVATED MATERIAL WILL BECOME THE PROPERTY OF THE CONTRACTOR
2. IF THE EXCAVATED MATERIAL DOES NOT MEET SECTION 203.03 OF THE STANDARD SPECIFICATIONS, THEN THE CONTRACTOR SHALL IMPORT SUITABLE EMBANKMENT MATERIAL.
3. MINIMUM R VALUE OF EMBANKMENT MATERIAL SHALL BE 10.

Computer File Information				Sheet Revisions				Colorado Department of Transportation				As Constructed				SUMMARY OF EARTHWORK QUANTITIES				Project No./Code					
Creation Date:		08/10/99		Initials:		BWD		(R-X) mm/dd/yy		xxxxx		xxx		No Revisions:		mm/dd/yy		Designer: BWD		Structure Numbers		NH 0062-011			
Last Modification Date:		11/03/99		Initials:		BWD		(R-X) mm/dd/yy		xxxxx		xxx		Revised: 11/10/99		mm/dd/yy								Detailer: BWD	
Full Path: C:\PROJECTS\12023\6THEARTH.DWG				(R-X) mm/dd/yy				xxxxx				xxx				Void: mm/dd/yy				Sheet Subset: Roadway		Subset Sheets: of		Sheet Number 14	
Drawing File Name: 6THEARTH.DWG				(R-X) mm/dd/yy				xxxxx				xxx													
Acad Ver. R14 Scale: NONE Units: None				(R-X) mm/dd/yy				xxxxx				xxx													

# TABULATION OF SURFACING

LOCATION		HOT BITUMINOUS PAVEMENT (GRADING S)(ASPHALT) (109) (PG 64-22)		HOT BITUMINOUS PAVEMENT (GRADING S)(ASPHALT) (109) (PG 76-28)		HOT BITUMINOUS PAVEMENT (PATCHING)(ASPHALT)	EMULSIFIED ASPHALT (SLOW SETTING) (DILUTED)	COMMENTS
		TON	TON	TON	GAL			
				1ST LIFT	2ND LIFT			
<u>U.S. 6 MAINLINE</u>		SIDE						
STA. 178+00 TO 221+15	RT. & LT.	2498		5172	5762		6880	
STA. 178+00 TO 221+15	CL	1258					348	~9' WIDE LAYERS UNDER MEDIAN TYPE 7
STA. 206+75 TO 211+00	RT.	55					26	WIDENING FOR KIPLING DECEL LANE
STA. 221+15 TO 222+85	RT. & LT.							KIPLING STR. - SEE BRIDGE PLANS
<u>KIPLING RAMPS</u>								
SW 1	RT.			248			117	
SW 2	RT.			234			105	
SE 2	RT.			220			100	
SE 1	RT.			275			140	
NW 1	LT.			303			128	
NE 1	LT.			248			105	
NE 2	LT.			165			70	
<u>U.S. 6 MAINLINE</u>								
STA. 222+85 TO 229+22	RT. & LT.	350		748	868		1016	
STA. 222+85 TO 229+22	CL	186					51	~9' WIDE LAYERS UNDER MEDIAN TYPE 7
STA. 229+22 TO 240+50	RT. & LT.	2768		1516	1627		1723	
STA. 229+22 TO 240+50	CL	807					219	~9' WIDE LAYERS UNDER MEDIAN TYPE 7
STA. 240+50 TO 247+97	RT. & LT.	292		768	988		1208	
STA. 240+50 TO 247+97	CL	218					60	~9' WIDE LAYERS UNDER MEDIAN TYPE 7
STA. 247+97 TO 249+29	RT. & LT.							GARRISON STR. - SEE BRIDGE PLANS
STA. 249+29 TO 258+35	RT. & LT.	354		930	1152		1445	
STA. 249+29 TO 258+35	CL	264					73	~9' WIDE LAYERS UNDER MEDIAN TYPE 7
STA. 258+35 TO 294+50	RT. & LT.	7154		3998	4845		6776	
STA. 258+35 TO 294+50	CL	2586					703	~9' WIDE LAYERS UNDER MEDIAN TYPE 7
STA. 294+50 TO 300+38	RT. & LT.	282		644	790		947	
STA. 294+50 TO 300+38	CL	171					47	~9' WIDE LAYERS UNDER MEDIAN TYPE 7
STA. 300+38 TO 302+25	RT. & LT.							WADSWORTH STR. - SEE BRIDGE PLANS
STA. 302+25 TO 305+00	RT. & LT.	174		334	405		451	
STA. 302+25 TO 305+00	CL	80					22	~9' WIDE LAYERS UNDER MEDIAN TYPE 7
STA. 249+29 TO 256+14	LT.					17		AT NEW SIGN BRIDGE
STA. 227+45 TO 229+00	LT.					7		TO FILL TROUGH AT EDGE OF OIL
<u>FRONTAGE ROAD</u>								
STA. 261+00 (NEAR EVERETT ST.)	LT.					7		
STA. 261+00 (NEAR ESTES ST.)	RT.					8		
STA. 261+00 (NEAR CODY CT.)	LT.					7		
STA. 261+00 (NEAR DOVER ST.)	RT.					10		
VARIOUS LOCATIONS AT NEW INLETS	RT. & LT.					55		
MISCELLANEOUS	RT. & LT.					39		
SUBTOTAL		19,497		15,803	16,437	450	22,760	
PROJECT TOTAL		6123.22 19,497		30144.63 15,803	32,240	255.47 450	2741 22,760	

HBP QUANTITIES FOR GUARDRAIL FLARES HAVE BEEN INCLUDED  
HBP FOR THIS PROJECT IS CONTRACTOR SOURCE


### FLEXIBLE PAVEMENT DESIGN CRITERIA NOTE:

Roadway	Design Parameter	Flexible Overlay Design	Patching/Widening
Mainline US 6. Union to Wadsworth	DESIGN LIFE (YEARS)	10	20
	18-KIP ESAL	2,141,000	4,573,000
	INITIAL SERVICEABILITY	4.5	4.5
	TERMINAL SERVICEABILITY	2.5	2.5
	% RELIABILITY	85	95
	OVERALL STANDARD DEVIATION	.44	.44
	R-VALUE DESIGN	11	10
	SOIL RESILIENCE MODULUS (PSI)	3681	3562
	TOTAL REQUIRED STRUCTURAL NUMBER	4.63	5.64
	OVERLAY STRUCTURAL NUMBER	1.35	--
	STRUCTURAL COEFFICIENT	.44	.44
	DRAINAGE COEFFICIENT	1	1
PAVEMENT THICKNESS (in)	----	13	
OVERLAY THICKNESS (in)	4	--	
MILLING THICKNESS (in)	1.5	--	
HBP GRADING	S(ASPH)(109)(PG 76-28)	S(ASPH)(109)*	
LIFT THICKNESS (BOTTOM TO TOP) (in)	2-2	3-3-3-2-2	

\*THE TOP 2 LAYERS SHALL BE ( PG 76-28), AND THE BOTTOM LAYERS SHALL BE (PG 64-22)

SMALL WEDGE ~5" AT C.L. : STA. 178+00 TO STA. 229+22 (LESS KIPLING STRUCTURE)  
STA. 240+50 TO STA. 258+35 (LESS GARRISON STRUCTURE)  
STA. 294+50 TO STA. 305+00 (LESS WADSWORTH STRUCTURE)

BIG WEDGE ~12" AT C.L. : STA. 229+22 TO STA. 240+50  
STA. 258+35 TO STA. 294+50

Computer File Information		Sheet Revisions		 Colorado Department of Transportation 2000 SOUTH HOLLY ST. ROOM 185 DENVER, CO 80222 Phone: (303) 757-9879 FAX: (303) 757-9053 Region 6 GCH	As Constructed	TABULATION OF SURFACING		Project No./Code	
Creation Date: 04/23/98	Initials: AK	<input type="checkbox"/>	<input type="checkbox"/>		No Revisions:			NH 0062-011	
Last Modification Date: 11/03/99	Initials: AK	<input type="checkbox"/>	<input type="checkbox"/>		Revised: <i>11/9/01</i>	Designer:	Sheet Number		
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Drawing File Name: SURF_TAB.DWG		<input type="checkbox"/>	<input type="checkbox"/>		Sheet Subset:	Subset Sheets:			
Acad Ver. R14	Scale: NOT TO SCALE	Units: ENGLISH							

LOCATION	SIDE	REMOVAL OF STRUCTURE	REMOVAL OF PORTIONS OF PRESENT STRUCTURE	REMOVAL OF CURB	REMOVAL OF CURB AND GUTTER	REMOVAL OF ASPHALT MAT (PLANING)											MISCELLANEOUS AND COMMENTS				
		EACH	L. S.	L. F.	L. F.	SQ. YD.															
~STA. 111+00 TO STA. 139+00 M. P. 277 TO M. P. 277.52	RT.					3370											SHOULDER ONLY				
STA. 177+80	RT.		+ 0														REPLACE APRON AT DROP INLET (TYPE C) STRUCTURE MODIFIED				
STA. 178 +00 TO STA. 221+15	RT. & LT.					41,028															
KIPLING RAMPS	RT.					8,875															
KIPLING RAMPS	LT.					6,500															
STA. 222+85 TO STA. 247+97	RT. & LT.					24,310															
STA. 228+17 TO STA. 239+09	LT.				53												VARIOUS LOCATIONS				
STA. 228+17 TO STA. 228+95 294+50 to 295+50	LT.																VARIOUS LOCATIONS				
STA. 230+00	56' LT.	1 ✓															TYPE 3 INLET, EXISTING 24" RCP FLOWS NORTH				
STA. 237+00	LT.	1 ✓				135											TYPE 3 INLET, EXISTING 24" RCP FLOWS NORTH				
STA. 243+25	50' LT.	1	0														INLET, EXISTING 24" RCP FLOWS NORTH				
STA. 249+29 TO STA. 300+38	RT. & LT.					44,906															
STA. 256+00	45' RT.	1 ✓															INLET, EXISTING 24" RCP FLOWS NORTH				
STA. 256+00	60' LT.	1 ✓															TYPE C INLET, EXISTING 24" RCP FLOWS NORTH				
STA. 263+15	RT.	1	0														CAPPED CONCRETE DROP INLET, EXISTING 24" RCP				
STA. 289+00	RT.	1 ✓															TYPE 3 INLET, EXISTING 18" RCP FLOWS SOUTH				
STA. 294+50 TO STA. 295+25	LT.					160											AT WADSWORTH NW QUADRANT				
VARIOUS LOCATIONS STA. 302+25 TO STA. 305+00	RT. & LT.																10,155				
SHEET TOTALS		7	5	1	2	930	238	375	131,902												
PROJECT TOTALS		7	5	1	2	930	238	375	131,902	142,057											

Computer File Information			
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Last Modification Date:	11/08/99	Initials:	AK
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Drawing File Name:	REMTAB.DWG		
Acad Ver.	R14	Scale:	NTS
		Units:	ENGLISH

Sheet Revisions			

Colorado Department of Transportation  
 Address: 2000 S. Holly St. Denver, Co 80222  
 Phone: 303-757-9879 FAX: 303-757-9053  
 Region Number 6 GCH

As Constructed  
 No Revisions:  
 Revised: 11/9/01  
 Void:

TABULATION OF REMOVALS	
Designer:	Structure Numbers
Detailer:	Subset Sheets:
Sheet Subset:	

Project No./Code  
 NH 0062-011  
 12023  
 Sheet Number 16



# TABULATION OF GUARDRAIL

STATION TO STATION	SIDE	REMOVAL OF GUARDRAIL		GUARDRAIL TYPE 3 (6-3 POST SPACING)	CURB TYPE 6 (SECTION M)	GUARDRAIL TYPE 7		END ANCHORAGE					IMPACT ATTENUATOR (QUADGUARD)	REMARKS	
		TYPE 3	TYPE 4			STYLE	CA	TYPE 3G	TYPE 3H	TYPE 3D	SRT	NONFLARED			
		LF	LF			LF	LF	EACH	EACH	EACH	EACH	EACH			
STA 176+00 TO STA 182+30	RT.				630									MEDIAN BARRIER	
STA 178+50 TO STA 211+40	CL.	3290*				3290								MEDIAN BARRIER	
STA 187+75 TO STA 190+60	RT.	110		250					1		1			TO PROTECT THE CULVERT	
STA 211+40 TO STA 213+70	CL.		230			230								TO PROTECT F-16-GI SIGN STRUCTURE	
STA 212+35 TO STA 213+75	RT.	140		112.5					1		1			TO PROTECT F-16-IN SIGN STRUCTURE	
STA 213+70 TO STA 221+15	CL.	745*				745								MEDIAN BARRIER	
STA 219+22 TO STA 221+15	RT.	115		137.5				1			1			E.B. KIPLING STRUCTURE APPROACH	
STA 219+59 TO STA 221+15	LT.			137.5					1		1			W.B. KIPLING STRUCTURE DEPARTURE	
STA 222+85 TO STA 247+97	CL.	2512*				2512								MEDIAN BARRIER	
STA 222+85 TO STA 224+41	RT.			137.5					1		1			E.B. KIPLING STRUCTURE DEPARTURE	
STA 222+85 TO STA 226+29	LT.	325		287.5	301			1			1			W.B. KIPLING STRUCTURE APPROACH	
STA 227+96 TO STA 228+75	LT.	100		75				1			1			PROTECTS SIGN STR. F-16-GH	
STA 228+17 TO STA 238+09	LT.					1018						1		W.B. 6TH AVE. APPROACH. SIGN STR. F-16-GH	
STA 241+97 TO STA 247+97	LT.	600		587.5					1		1			W.B. DEPARTING GARRISON STRUCTURE	
STA 242+62 TO STA 247+97	RT.	535		475	498			1				1		E.B. GARRISON STRUCTURE APPROACH	
STA 249+29 TO STA 257+64	LT.	685	150	775	670			1				1		W.B. GARRISON STRUCTURE APPROACH	
STA 249+29 TO STA 300+62	CL.	5133*				5133								MEDIAN BARRIER	
STA 295+30 TO STA 295+60	LT.				50									AT WADSWORTH N.W. QUADRANT	
STA 298+94 TO STA 300+18	RT.			67.5				1			1			E.B. WADSWORTH STRUCTURE APPROACH	
STA 299+32 TO STA 300+18	LT.			67.5					1		1			W.B. WADSWORTH STRUCTURE DEPARTURE	
STA 302+50 TO STA 305+00	CL.	250*				250								MEDIAN BARRIER	
STA 302+45 TO STA 303+31	RT.			67.5	243				1		1			E.B. WADSWORTH STRUCTURE DEPARTURE	
STA 302+45 TO STA 303+69	LT.			67.5	243			1						W.B. WADSWORTH STRUCTURE APPROACH	
<b>SHEET TOTALS</b>		14540	380	3245	2149	13,178		7	6	5	4	8	6	7	2
<b>PROJECT TOTALS</b>		14540	380	3245	2149	13,178	13567	7	6	5	4	8	6	7	2

GALVANIZED  
 GUARDRAIL TYPE 3 DOUBLE (INCLUDES CHAIN LINK FENCE)

Computer File Information	
Creation Date:	05/21/99 Initials: AK
Last Modification Date:	11/02/99 Initials: AK
Full Path:	C:\PROJECTS\12023\GUARD_TAB
Drawing File Name:	GUARD_TAB.DWG
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Sheet Revisions	

Colorado Department of Transportation  
 4201 E. Arkansas Ave.  
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 Denver, CO 80222  
 Phone: 303-984-5260 FAX: 303-984-5299  
 Region 6 DEW

As Constructed
No Revisions:
Revised: 11/10/01
Void:

TABULATION OF GUARDRAIL	
Designer:	
Detailer:	
Sheet Subset:	
Subset Sheets:	

Project No./Code	NH 0062-011
	12023
Sheet Number	17

TO ESTABLISH GEOMETRIC CONTROL FOR THE CONSTRUCTION OF THIS PROJECT, THE DEPARTMENT HAS PROVIDED THE FOLLOWING INFORMATION:

- Format\*
- Horizontal Control \_\_\_\_\_
  - Vertical Control \_\_\_\_\_
  - Roadway Alignment \_\_\_\_\_
  - Original Terrain Data \_\_\_\_\_
  - Other: \_\_\_\_\_

\*Specify the information format, ie., plan sheet, computer disk, computer printout, or other.  
The information marked is either contained on the plans or is available from the Engineer.

TYPE OF PROJECT

- Landscaping
- Signalization
- Safety Improvement
- Asphalt Overlay
- Concrete Overlay
- Minor Widening
- Major Reconstruction
- New Roadway Construction
- Bridge Replacement
- Bridge Widening
- New Bridge
- Other: \_\_\_\_\_

SURVEY WORK TO BE PERFORMED BY OTHERS: \_\_\_\_\_

WORK PERFORMED BY THE CONTRACTOR'S SURVEYOR UNDER ITEM 625:

- Establish and Maintain Project Centerline or Engineer Approved Offset Line(s)
- Verification and Maintenance of Horizontal and Vertical Control
- Verify or Determine existing grades and alignments
- Verify or Determine existing topography
- Clearing and Grubbing Limits
- Removal Limits
- Excavation and Embankment
  - Excavation
    - Unclassified
    - Stripping
    - Muck
    - Rock
    - Borrow
    - Other: \_\_\_\_\_
  - Embankment
  - Site Grading
  - Erosion Control (Perm)
  - Other: \_\_\_\_\_
- As Staked Earthwork Quantities
- Landscaping
  - Top Soil
  - Seeding
  - Mulching
  - Planting
  - Other: \_\_\_\_\_
- Erosion Control
  - Seeding (Temp)
  - Silt Fences
  - Straw Bales
  - Temporary Berm
  - Riprap (Temp)
  - Other (Temp Diversion, Temp Slope Drain, Bush Barrier, Check Dam, Other: \_\_\_\_\_)

SLOPE STAKING	GRID	GRADE STAKES	SPECIAL INTERVAL
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-

- Roadway Bases
  - Untreated Subgrade
  - Treated Subgrade
  - Aggregate Base Course
  - Other: \_\_\_\_\_
- Pavements
  - PMBB - Plant Mix Bituminous Base
  - HBP - Hot Bituminous Pavement
  - Concrete
  - Other: \_\_\_\_\_
- Roadway Elements
  - Curb and Gutter
  - Drop inlets - alignment and grades
  - Retaining Walls
  - Guard Rail
  - Sidewalk
  - Other: \_\_\_\_\_
- Riprap (Perm)
- Slope and Ditch Paving
- Minor Structures
  - Structure Excavation limits
  - Culverts
  - Culverts w/ Headwalls and Wingwalls
  - Concrete Box Culverts w/ Headwalls and Wingwalls
  - Pipes
    - Sanitary Sewer
    - Storm Sewer
    - Water
    - Irrigation
    - Miscellaneous
  - Manholes
  - Inlets
  - Other: \_\_\_\_\_
- Major Structures - Overhead Signs, Concrete Box Culverts, Bridges - and all other structures assigned a structure number
  - Structure Excavation limits
  - Concrete Box Culverts w/ Headwalls and Wingwalls
  - Piling locations and cut off elevations
  - Caisson locations and elevations
  - Floating locations, alignment, and elevations
  - Abutment/Pier locations, alignment, and elevations
  - Wingwall skew angles/offsets
  - Structural concrete form locations
  - Substructure survey (Required by Specification 601.12)
  - Bridge expansion joint(s) alignment and grade (longitudinal and transverse)
  - Deck grades at Girder 10th or "n" th point locations and elevations
  - Slope and Ditch Paving
  - Other: \_\_\_\_\_
- Fencing
  - Temporary
  - Permanent
  - Sound Barriers
  - Other: \_\_\_\_\_
- Delineators
  - Temporary
  - Permanent
- Lighting and Traffic Control Devices (Perm)
  - Signal pole locations and elevations
  - Light pole locations and elevations
  - Signs
  - Field verify sign post locations, elevations, and lengths before fabrication.
  - Other: \_\_\_\_\_
- Pavement Marking
  - Striping (Temp)
  - Striping (Perm)
  - Symbols
  - Other: \_\_\_\_\_

GRADE STAKES	GRID	SPECIAL INTERVAL	SPECIAL OFFSET
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-

- Temporary Lighting and Construction Traffic Control Devices
  - Signal pole locations and elevations (Temp)
  - Light pole locations and elevations (Temp)
  - Signs (Temp)
  - Other: \_\_\_\_\_
- Easement (Temp)(Staking)

WORK PERFORMED BY THE CONTRACTOR'S SURVEYOR UNDER ITEM 629:

- Monumentation
    - Control
    - Right of Way (Temp) (Staking)
    - Right of Way
    - Land corners, Aliquot corners
    - Easement (Temp)(Staking)
    - Easement (Perm)
    - Reference the specified existing monuments: \*\* \_\_\_\_\_
    - Relocate the specified existing monuments: \*\* \_\_\_\_\_
    - Locate monuments. It is estimated \_\_\_\_\_ hours are required.
- \*\* A Tabulation of Survey Monuments may be provided on the plans.

GENERAL NOTES:

All work shall be done in accordance with the latest edition of the entire CDOT Survey Manual including all revisions to date:  
- Chapter 5 - Construction Surveying, revised 02/07/96.

Adequate information for establishing lines, grades, and locations for all work items have been specified on the plans. Any additional information required to stake the item or element shall be generated by the Contractor's surveyor.

The Contractor's surveyor shall provide an estimate of the man-hours necessary to complete the work items indicated on this sheet. A copy of this sheet, with the estimated man-hours written on the blank line to the left of the specified items, shall be submitted with the Survey Schedule to the Engineer 3 days prior to the Presurvey Conference.

The following surveying notebooks are required:

- Alignment Notebook
- Benchmark Notebook
- Control Survey/Monumentation Notebook
- Minor Structure Notebook
- Major Structure Notebook
- Slope Staking Notebook
- Grade Notebook
- Other Notebook(s): \_\_\_\_\_


Stakes and Monuments which are damaged or destroyed by the progress of construction shall be replaced by the Contractor at no additional cost to the Department.

The Contractor shall furnish an As Staked earthwork quantity to the Engineer prior to completion of twenty percent (20%) of the planned earthwork in any phase as per the CDOT Survey Manual.  
A printed copy of the As Staked earthwork data and a computer disk in the specified format shall be submitted to the Engineer.  
The Contractor shall field verify original ground cross sections at maximum 160 m (500 ft) intervals.

Prior to beginning work on any subsequent operation, such as placing base course or paving, the Contractor shall certify in writing to the Engineer that the final grade is within the specified tolerance.

The Contractor shall perform all field surveying and calculations necessary to tie plan grades into field grades.

The Contractor shall coordinate construction staking on the project with any utility work.

Computer File Information		Sheet Revisions		Colorado Department of Transportation		As Constructed		Survey Tabulation		Project No./Code			
Creation Date:	06/13/94 Initials: SC	(R-X)		 2000 S. Holly St. Room 185 Denver, CO 80222 Phone: (303)984-5260 FAX: (303)984-5299		No Revisions: 1/10/04		Issued by: Staff Construction & Materials Branch Construction Operations Section Revised: 04/15/96		NH 0062-011 12023			
Last Modification Date:	11/03/99 Initials: BWD	( )				Revised:							
Full Path:	c:\PROJECTS\12023\	( )				Void:		Sheet Subset: Survey		Subset Sheets:		Sheet Number 18	
Drawing File Name:	Suta12sp.dwg	( )				Region 6 Design DEW							
Acad Ver.	R14 Scale: 1:1 Units: English	( )											

NOTES:

PLACEMENT OF TOPSOIL, SEEDING AND MULCHING WILL NOT BE DONE IN A SINGLE OPERATION, BUT SHALL BE COMPLETED AFTER EACH CONSTRUCTION PHASE.

WHEN DISTURBED AREA EXCEEDS LIMITS REFERENCED IN THE STANDARD SPECIAL PROVISION 208, DURING THE SUMMER WHEN SEEDING IS NOT ALLOWED, APPLY 1.5 TONS/ACRE OF CERTIFIED WEED FREE FORAGE, MECHANICALLY CRIMPED INTO THE SOIL.

PRIOR TO WINTER SHUTDOWN ALL COMPLETED SLOPES SHALL BE TOPSOILED, SEEDED AND MULCHED. INCOMPLETE SLOPES SHALL BE MULCHED WITH 1.5 TONS/ACRE OF CERTIFIED WEED FREE FORAGE, MECHANICALLY CRIMPED INTO THE TOPSOIL IN COMBINATION WITH AN ORGANIC MULCH TACKIFIER PER SPECIAL PROVISION 213.

SOIL PREPARATION, FERTILIZING, SEEDING, MULCHING (CERTIFIED WEED FREE), AND MULCH TACKIFIER FOR AN ESTIMATED 0.5 ACRES WILL BE REQUIRED WITHIN THE RIGHT-OF-WAY LIMITS ON ALL DISTURBED AREAS NOT SURFACED. THE FOLLOWING TYPES AND RATES SHALL BE USED:

COMMON NAME	BOTANICAL NAME	LBS. PLS/ACRES
BLUE GRAMA V. N.M. NATIVE	BOUTELOUA GRACILIS	3.0
WESTERN WHEATGRASS V. ARRIBA	PASCOPYRUM SMITHII	7.0
LITTLE BLUESTEM	SCHIZACHYRIUM SCOPARIUM	2.0
BUFFALO GRASS (TREATED)	BUCHIOE DACTYLOIDES	5.0
SIDE OATS GRAMA V. VAUGHN	BOUTELOUA CURTIPENDULA	2.0
PRAIRIE CONE FLOWER	RATIBIDA COLUMNARIS	0.2
GAILARDIA	GAILLARDIA ARISTATA	1.0
BLUE FLAX	LINUM LEWISII	0.5
TOTAL		20.7

SEEDING APPLICATION: DRILL SEED 0.25"-0.50" INTO TOPSOIL. IN AREAS INACCESSIBLE TO A DRILL, HAND BROADCAST AT DOUBLE THE RATE AND RAKE TO A DEPTH 0.25"-0.50" INTO THE TOPSOIL.


MULCHING APPLICATION: 1 1/2 TONS/ACRE OF NATIVE HAY (CERTIFIED WEED FREE) MECHANICALLY CRIMPED INTO TOPSOIL IN COMBINATION WITH AN ORGANIC MULCH TACKIFIER PER SPECIAL PROVISION 213.

DISTURBED SURFACES SHALL BE LEFT IN A ROUGHENED CONDITION AT ALL TIMES DURING CONSTRUCTION.

FOR INFORMATION ONLY		
COMMERCIAL FERTILIZER	ANALYSIS (%)	LBS./ACRE AVAILABLE
NITROGEN	18	45
PHOSPHOROUS	46	115
POTASSIUM	0	

PROJECT TOTALS:

PAY ITEM	DESCRIPTION	QUANTITY	UNIT
208	EROSION BALES (WEED FREE)	<del>40</del> 0	EACH
208	SEDIMENT REMOVAL AND DISPOSAL	<del>1</del> 0	LS
212	SEEDING (NATIVE)	2	ACRE
213	MULCHING (WEED FREE HAY)	2	ACRE
213	MULCH TACKIFIER	800	LB
607	FENCE (TEMPORARY)	<del>1450</del> 1271	L.F.

Computer File Information		Sheet Revisions		Colorado Department of Transportation		As Constructed		SEEDING PLAN		Project No./Code		
Creation Date:	10/15/99 Initials: DHE	(R-X) mm/dd/yy	xxxxx	xxx	 Room 310 2000 South Holly Street Denver, CO 80222 Phone: (303) 984-5260 FAX: (303) 984-5299	No Revisions:	mm/dd/yy	SEEDING PLAN		NH 0062-011		
Last Modification Date:	11/01/99 Initials: BWD	(R-X) mm/dd/yy	xxxxx	xxx		Revised: 11/19/01	mm/dd/yy			Designer:	Structure Numbers	12023
Full Path:	C:\PROJECTS\12023\	(R-X) mm/dd/yy	xxxxx	xxx		Void:	mm/dd/yy	Detailer:	Sheet Subset: Roadway	Subset Sheets:	Sheet Number 19	
Drawing File Name:	12023SWMP.DWG	(R-X) mm/dd/yy	xxxxx	xxx								
Acad Ver. R14	Scale: 1:1 Units: None	(R-X) mm/dd/yy	xxxxx	xxx		R-6	DEW					

INDEX	NOTE NO.	LOCATION OFFSET	INLET - EACH					H (MEASURED) FEET	▲ ELEVATIONS		PIPE SEWER										MISCELLANEOUS											
			PLUG STRUCTURE	MODIFY INLET	VANE GRATE		VANE GRATE (DOUBLE)		TYPE C	RIM	INVERT	LINE		% GRADE	REINFORCED CONCRETE PIPE		REINFORCED CONCRETE PIPE ELLIPTICAL		REINFORCED CONCRETE END SECTION			REINFORCED CONCRETE END SECTION ELLIPTICAL		CORRUGATED STEEL PIPE		PIPE COVER	STRUCTURE EXCAVATION	STRUCTURE EXCAVATION	STRUCTURE BACKFILL (CLASS 1)	EMBANKMENT (CIP)	RIPRAP (6 INCH)	RIPRAP (9 INCH)
					EACH	EACH						H (PAY)	H (PAY)		H (PAY)	LOWER	UPPER	LOWER	UPPER	18"		23" X 14"	18"	23" X 14"	24"							
		STA. 181+30 RT.						4.50	5642.61	5638.11	5635.72	5638.11		3.0	67.8			1						2.00	3.83	18.38	14.56	134		0.8		
		STA. 185+00 C.L.	✓																												CAP EXISTING INLET	
		STA. 190+75 C.L.	✓																												CAP EXISTING INLET	
		STA. 200+00 C.L.	✓																												CAP EXISTING INLET	
		STA. 209+50 60' RT.																													EXTEND EXISTING 24" PIPE	
		STA. 217+00 C.L.	✓																												CAP EXISTING INLET (TYPE C)	
		STA. 226+50 C.L.	✓																												CAP EXISTING INLET (TYPE C)	
		STA. 230+00 C.L.	✓																												CAP EXISTING INLET (TYPE C)	
		STA. 230+00 56' LT.							5537	*																					(6 FOOT WIDE)	
		STA. 237+00 C.L.	✓																												CAP EXISTING INLET (TYPE C)	
		STA. 237+00 55' LT.							5522.44	*																					(6 FOOT WIDE)	
		STA. 242+50 C.L.	✓																												CAP EXISTING INLET (TYPE C)	
		STA. 243+25 50' LT.							<del>5510.24</del>	*																					(6 FOOT WIDE)	
		STA. 243+25 50' RT.							5509.56	*																					(NEAR GARRISON ST.) (3 FOOT WIDE) (CONNECT TO EXISTING 24" PIPE)	
		STA. 256+00 C.L.	✓																												CAP EXISTING INLET (TYPE C)	
		STA. 256+00 45' RT.							5496.44																						(6 FOOT WIDE)	
		STA. 256+00 60' LT.							5495.94	*																					(6 FOOT WIDE)	
		STA. 261+00 48' LT.						3.75	5489.31	5485.56	5485.41	5485.56		0.91	27.0			1					1.39	4.31	14.31	11.34	4	0.2		SEE EVERETT CROSS SECTION (6 FOOT WIDE)		
		STA. 263+00 C.L.	✓																												CAP EXISTING INLET (TYPE 13)	
		SHEET TOTALS	10			1	2																									

▲ ELEVATIONS APPROXIMATE ONLY. ACTUAL ELEVATIONS TO BE DETERMINED DURING CONSTRUCTION.

⊕ QUANTITY CARRIED TO SUMMARY OF EARTHWORK QUANTITIES

! FOR INFORMATION ONLY. QUANTITY INCLUDED IN COST OF THE PIPE AS PER PROJECT SPECIAL PROVISION

\* INVERT ELEVATION TO MATCH EXISTING INVERT.

CONTRACTOR WILL BE REQUIRED TO CLEAN MEDIAN INLETS BEFORE CAPPING. COST OF CLEANING WILL NOT BE PAID FOR SEPARATELY BUT WILL BE INCLUDED IN THE COST OF PLUG STRUCTURE PAY ITEM.

Computer File Information			
Creation Date:	03/19/99	Initials:	AS
Last Modification Date:	11/02/99	Initials:	AK
Full Path:	C:\PROJECTS\12023\		
Drawing File Name:	STORMTAB.DWG/SHEET1		
Acad Ver.	R14	Scale:	NTS
		Units:	ENGLISH

Sheet Revisions	

Colorado Department of Transportation  
  
 2000 South Holly St.  
 Room 185  
 Denver, Co 80222  
 Phone: (303)984-5260 FAX: (303)984-5299  
 Region 6 Design DEW

As Constructed
No Revisions:
Revised: 11/10/99
Void:

TABULATION OF STORM DRAIN

Designer:	Structure Numbers:
Detailer:	
Sheet Subset:	Subset Sheets: 1 of 2

Project No./Code	NH 0062-011
	12023
Sheet Number	20

INDEX	NOTE NO.	LOCATION OFFSET	INLET - EACH					H (MEASURED) FEET	▲ ELEVATIONS		PIPE SEWER										MISCELLANEOUS							
			PLUG STRUCTURE	MODIFY INLET	VANE GRATE		TYPE C		RIM	INVERT	▲ INVERT ELEVATIONS		% GRADE	REINFORCED CONCRETE PIPE		REINFORCED CONCRETE END SECTION	REINFORCED CONCRETE END SECTION ELLIPTICAL		CORRUGATED STEEL PIPE			H" PIPE COVER	STRUCTURE EXCAVATION	STRUCTURE EXCAVATION	STRUCTURE BACKFILL (CLASS 1)	EMBANKMENT (CIP)	RIPRAP (6" INCH)	RIPRAP (9" INCH)
					EACH	EACH					H (PAY)	H (PAY)		LOWER	UPPER		LOWER	UPPER	18"	23" X 14"								
		STA. 263+15 48' RT.					3.75	5485.75	5482.00	5481.48	5482.00			1.23	34.7			1				1.4	3.83	18.38	14.56	4	0.7	SEE ESTES CROSS SECTION (6 FOOT WIDE)
		STA. 263+00 48' LT.		1																								
		STA. 269+00 48' RT.					3.75	5477.35	5473.60	5472.75	5473.60			2.07	33.9			1				1.49	3.00	17.97	14.24	3	0.8	SEE DOVER ST. CROSS SECTION (6 FOOT WIDE)
		STA. 269+00 48' LT.					<del>3.42</del>	<del>5477.35</del>	<del>5473.93</del>	<del>5473.74</del>	<del>5473.93</del>			<del>0.50</del>	<del>29.6</del>			<del>1</del>				<del>1.0</del>	<del>1.21</del>	<del>15.67</del>	<del>12.42</del>	<del>1</del>	<del>0.4</del>	SEE CODY CT. CROSS SECTION (6 FOOT WIDE)
		STA. 272+00 C.L.	1																								CAP EXISTING INLET	
		STA. 273+00 C.L.	1																								CAP EXISTING INLET	
		STA. 280+90 C.L.	1																								CAP EXISTING INLET	
		STA. 281+00 55' LT.		2																								
		STA. 289+00 C.L.																									CAP EXISTING INLET	
		STA. 289+00 40' RT.						5438.44																			(6 FOOT WIDE)	
		STA. 289+00 52' LT.						5438.44																			(6 FOOT WIDE) CONNECT TO EXISTING INLET	
		272LT		1																								
		273+00LT		1																								
		242+75R																										
		SHEET TOTALS	43	3-27											68.6	29.6	2	1				8.04	52.02	41.22	8	1.9		
		PROJECT TOTALS	413	3-2	+ 2										163.4	162	29.6	3	5	1		16.18	84.71	67.12	146	2.1	0.8	

▲ ELEVATIONS APPROXIMATE ONLY. ACTUAL ELEVATIONS TO BE DETERMINED DURING CONSTRUCTION.

⊕ QUANTITY CARRIED TO SUMMARY OF EARTHWORK QUANTITIES

CONTRACTOR WILL BE REQUIRED TO CLEAN MEDIAN INLETS BEFORE CAPPING. COST OF CLEANING WILL NOT BE PAID FOR SEPARATELY BUT WILL BE INCLUDED IN THE COST OF PLUG STRUCTURE PAY ITEM.

# FOR INFORMATION ONLY. QUANTITY INCLUDED IN COST OF THE PIPE AS PER PROJECT SPECIAL PROVISION

\* INVERT ELEVATION TO MATCH EXISTING INVERT.

Computer File Information			
Creation Date:	03/19/99	Initials:	AS
Last Modification Date:	11/02/99	Initials:	AK
Full Path:	C:\PROJECTS\12023\		
Drawing File Name:	STORMTAB.DWG/SHEET2		
Acad Ver.	R14	Scale:	NTS
		Units:	ENGLISH

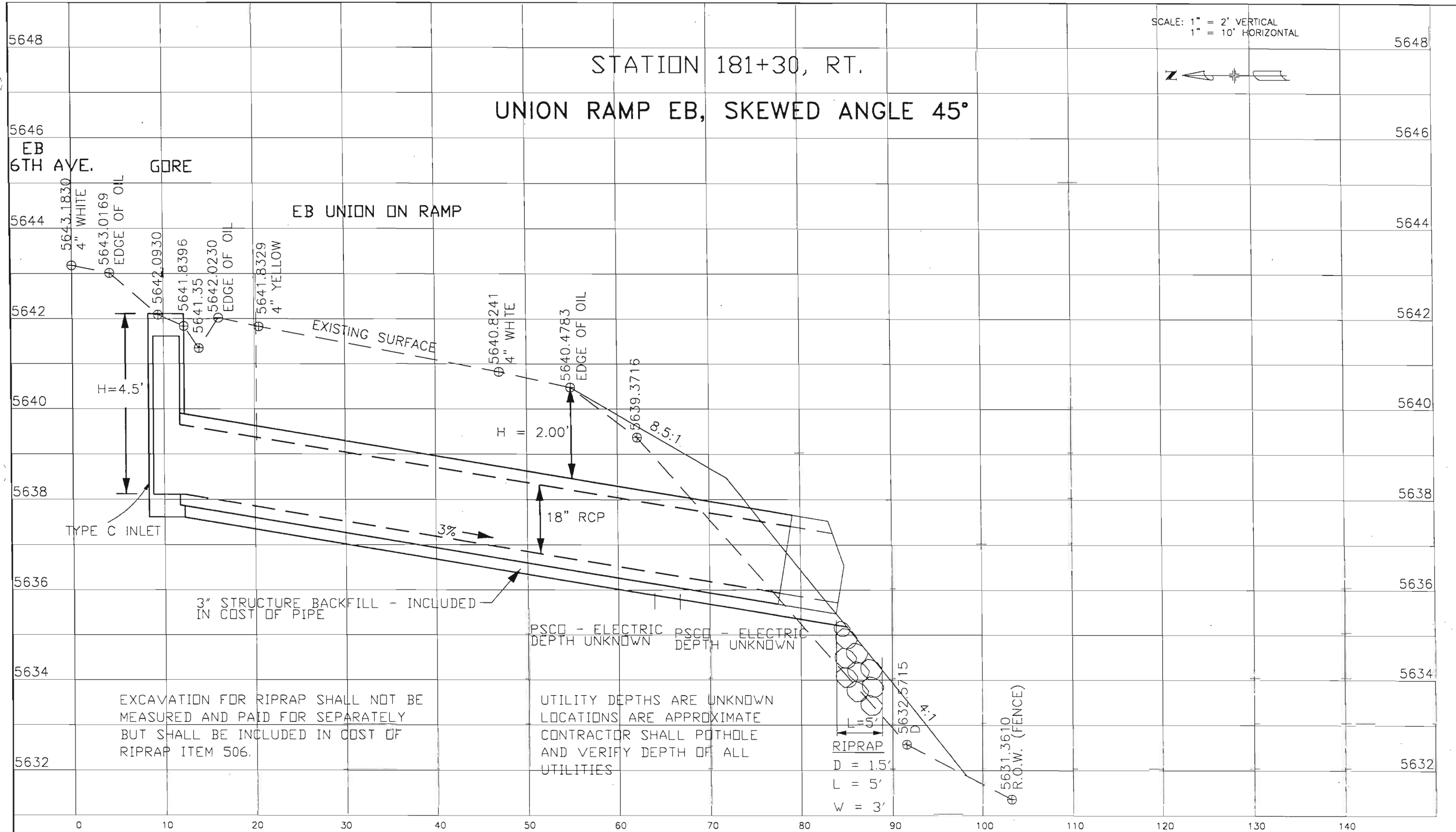
Sheet Revisions	

Colorado Department of Transportation  
 2000 South Holly St.  
 Room 185  
 Denver, Co 80222  
 Phone: (303)984-5260 FAX: (303)984-5299  
 Region 6 Design DEW

As Constructed	
No Revisions:	
Revised:	11/9/01
Void:	

TABULATION OF STORM DRAIN			
Designer:		Structure Numbers:	
Detailer:		Subset Sheets:	2 of 2

Project No./Code	
NH 0062-011	
12023	
Sheet Number	21



SCALE: 1" = 2' VERTICAL  
1" = 10' HORIZONTAL



STATION 181+30, RT.

UNION RAMP EB, SKEWED ANGLE 45°

EB 6TH AVE. GORE

EB UNION ON RAMP

5643.1830  
4" WHITE  
EDGE OF OIL

5643.0169  
4" WHITE  
EDGE OF OIL

5642.0930

5641.8396

5641.35  
EDGE OF OIL

5642.0230  
EDGE OF OIL

5641.8329  
4" YELLOW

5640.8241  
4" WHITE

5640.4783  
EDGE OF OIL

5639.3716

8.5:1

H=4.5'

H = 2.00'

TYPE C INLET

3%

18" RCP

3" STRUCTURE BACKFILL - INCLUDED  
IN COST OF PIPE

PSCB - ELECTRIC  
DEPTH UNKNOWN

PSCB - ELECTRIC  
DEPTH UNKNOWN

EXCAVATION FOR RIPRAP SHALL NOT BE  
MEASURED AND PAID FOR SEPARATELY  
BUT SHALL BE INCLUDED IN COST OF  
RIPRAP ITEM 506.

UTILITY DEPTHS ARE UNKNOWN  
LOCATIONS ARE APPROXIMATE  
CONTRACTOR SHALL POHOLE  
AND VERIFY DEPTH OF ALL  
UTILITIES

RIPRAP  
D = 1.5'  
L = 5'  
W = 3'

5632.5715  
D = 1.4'

5631.3610  
R.O.W. (FENCE)

Computer File Information	
Creation Date:	02/10/99 Initials: BWD
Last Modification Date:	11/03/99 Initials: AK
Full Path:	C:\PROJECTS\12023
Drawing File Name:	EXSskew_UNION.DWG
Acad Ver. R14	Scale: (1"=2'V)(1"=10'H) Units: ENGLISH

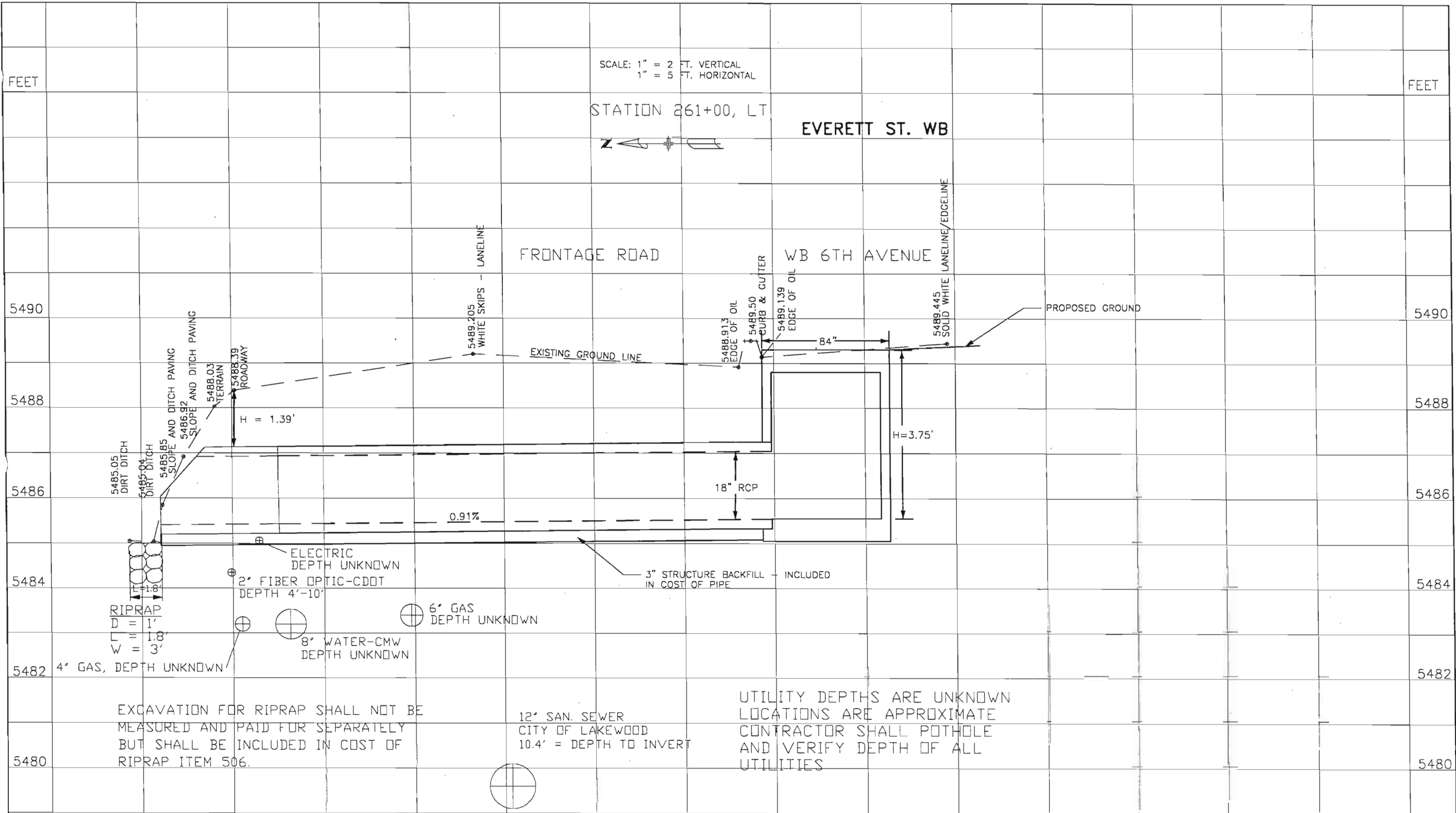
Sheet Revisions	

Colorado Department of Transportation  
2000 South Holly St.  
Room 185  
Denver, Colorado 80222  
Phone: (303) 984-5260 Fax: (303) 984-5299  
Region 6 Design DEW

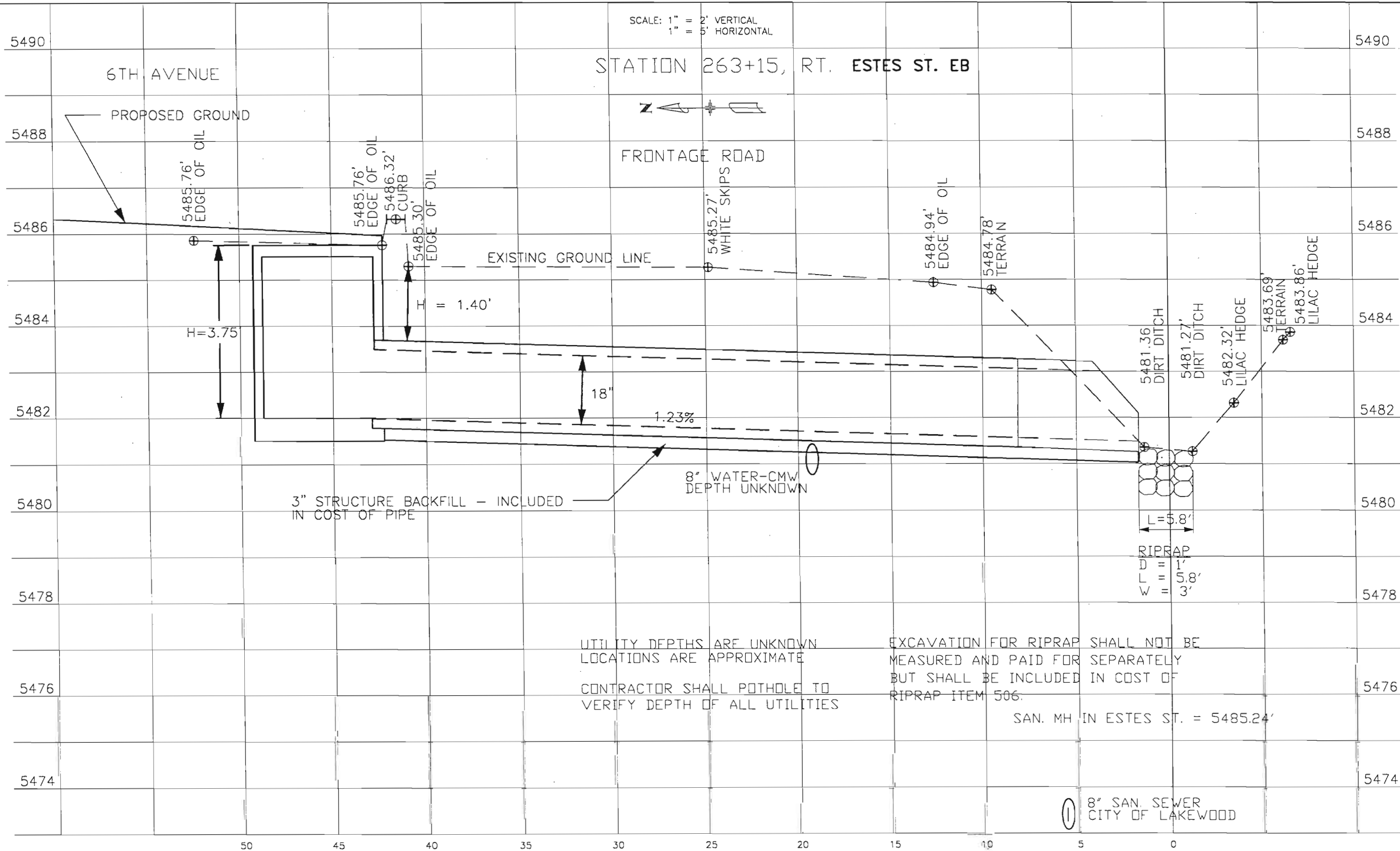
As Constructed
No Revisions: 3/19/01
Revised:
Void:

STORM DRAIN CROSS SECTION AT UNION RAMP EB- SKEWED		
Designer:	B.W.D.	Structure Numbers
Detailer:	B.W. DeSarro	
Sheet Subset:	ROADWAY	Subset Sheets:

Project No./Code	NH 0062-011
	12023
Sheet Number	22

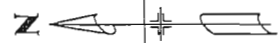


<b>Computer File Information</b> Creation Date: 02/10/99 Initials: BWD Last Modification Date: 11/03/99 Initials: AK Full Path: C:\PROJECTS\12023\SURVEY\DWGS Drawing File Name: EXS_EVERETT.DWG Acad Ver. R14 Scale: (1"=2'V)(1"=5'H) Units: ENGLISH		<b>Sheet Revisions</b> <table border="1"> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>										Colorado Department of Transportation  2000 South Holly St. Room 185 Denver, Colorado 80222 Phone: (303)984-5260 Fax: (303)984-5299 Region 6 Design DEW		<b>As Constructed</b> No Revisions: 1/19/01 Revised: Void:		<b>STORM DRAIN CROSS SECTION AT EVERETT ST. WB</b> Designer: B.W.D. Structure Numbers Detailer: B.W. DeSarro Sheet Subset: ROADWAY Subset Sheets:		Project No./Code NH 0062-011 12023 Sheet Number <b>23</b>	



SCALE: 1" = 2' VERTICAL  
1" = 5' HORIZONTAL

STATION 263+15, RT. ESTES ST. EB



UTILITY DEPTHS ARE UNKNOWN  
LOCATIONS ARE APPROXIMATE  
CONTRACTOR SHALL POTHOLE TO  
VERIFY DEPTH OF ALL UTILITIES

EXCAVATION FOR RIPRAP SHALL NOT BE  
MEASURED AND PAID FOR SEPARATELY  
BUT SHALL BE INCLUDED IN COST OF  
RIPRAP ITEM 506.

SAN. MH IN ESTES ST. = 5485.24'

8" SAN. SEWER  
CITY OF LAKEWOOD

Computer File Information:

Creation Date:	02/10/99	Initials:	BWD
Last Modification Date:	11/03/99	Initials:	AK
Full Path:	C:\PROJECTS\12023		
Drawing File Name:	EXS_ESTES_new.DWG		
Acad Ver.	R14	Scale:	(1"=2'V)(1"=5'H) Units: ENGLISH

Sheet Revisions


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2000 South Holly St.  
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Denver, Colorado 80222  
Phone: (303)984-5260 Fax: (303)984-5299  
Region 6 Design DEW

As Constructed

No Revisions:	1/1/14
Revised:	
Void:	

STORM DRAIN CROSS SECTION AT  
ESTES ST. EB

Designer:	B.W.D.	Structure Numbers	
Detailer:	B.W. DeSarro		
Sheet Subset:	ROADWAY	Subset Sheets:	

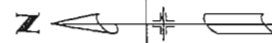
Project No./Code

NH 0062-011
12023
Sheet Number 24



SCALE: 1" = 2' VERTICAL  
1" = 5' HORIZONTAL

STATION 269+00, RT. DOVER ST. EB



6TH AVENUE

FRONTAGE ROAD

PROPOSED GROUND

5477.18' EDGE OF OIL  
5477.66' TOP OF 8" CONCRETE

5476.54' EDGE OF OIL

5476.38' WHITE SKIPS, LANELINE

EXISTING GROUND LINE

5476.00' EDGE OF OIL

5475.97' TERRAIN

H=3.75'

H=1.27'

18"

2.07%

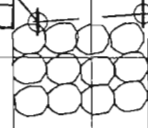
3" STRUCTURE BACKFILL - INCLUDED IN COST OF PIPE

10" WATER-CMW DEPTH UNKNOWN

1.25" GAS DEPTH UNKNOWN

5472.37' DIRT DITCH

5472.46' DIRT DITCH



L=6.7'  
D=1'  
L=6.7'  
W=3'

UTILITY DEPTHS ARE UNKNOWN  
LOCATIONS ARE APPROXIMATE  
CONTRACTOR SHALL POTHOLE  
AND VERIFY DEPTHS OF ALL  
UTILITIES

EXCAVATION FOR RIPRAP SHALL NOT BE  
MEASURED AND PAID FOR SEPARATELY  
BUT SHALL BE INCLUDED IN COST OF  
RIPRAP ITEM 506.

SAN. MH IN DOVER ST. = 5476.28'  
(MH IS 46' WEST OF HERE)

8" SAN. SEWER  
CITY OF LAKEWOOD  
DEPTH ~ 5459.5

5480  
5478  
5476  
5474  
5472  
5470  
5468  
5466  
5464

5480  
5478  
5476  
5474  
5472  
5470  
5468  
5466  
5464

50 45 40 35 30 25 20 15 10 5 0

Computer File Information	
Creation Date:	02/10/99 Initials: BWD
Last Modification Date:	11/03/99 Initials: AK
Full Path:	C:\PROJECTS\12023\SURVEY\DWGS
Drawing File Name:	EXS_DOVER.DWG
Acad Ver. R14	Scale: (1"=2'V)(1"=5'H) Units: ENGLISH

Sheet Revisions	

Colorado Department of Transportation  
2000 South Holly St.  
Room 185  
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Phone: (303)984-5260 Fax: (303)984-5299  
Region 6 Design DEW

As Constructed	
No Revisions:	1/1/01
Revised:	
Void:	

STORM DRAIN CROSS SECTION AT DOVER ST. EB	
Designer:	B.W.D. Structure Numbers
Detailer:	B.W. DeSarro
Sheet Subset:	ROADWAY Subset Sheets:

Project No./Code	
NH 0062-011	
12023	
Sheet Number	25

5484

5484

SCALE: 1" = 2' VERTICAL  
1" = 5' HORIZONTAL

STATION 269+00, LT. CODY CT. WB



5482

5482

FRONTAGE ROAD

6TH AVENUE

5480

5480

SKIPS, WHITE LANELINE

5476.62' EDGE OF OIL  
5477.59' TOP OF 8" WIDE CURB  
5477.18' EDGE OF OIL

PROPOSED GROUND

5478

5478

EXISTING GROUND LINE

5476

5476

5475.85' TERRAIN  
5476.03' EDGE OF OIL

H = 1.00'

5473.33' DIRT DITCH  
5473.46' DIRT DITCH

5474

5474

14"

0.50%

H = 3.42'

5472

5472

ELECTRIC DEPTH UNKNOWN

6" GAS DEPTH UNKNOWN

4" GAS DEPTH UNKNOWN

3" STRUCTURE BACKFILL - INCLUDED IN COST OF PIPE

2" FIBER OPTIC - CDDT  
4' - 10' DEEP

RIPRAP  
D = 1'  
L = 3.7'  
W = 3'

8" WATER-CMW DEPTH UNKNOWN

5470

5470

EXCAVATION FOR RIPRAP SHALL NOT BE MEASURED AND PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN COST OF RIPRAP ITEM 506.

UTILITY DEPTHS ARE UNKNOWN LOCATIONS ARE APPROXIMATE CONTRACTOR SHALL POTHOLE AND VERIFY DEPTHS OF ALL UTILITIES

5468

5468

12" SAN. SEWER CITY OF LAKEWOOD

0 5 10 15 20 25 30 35 40 45

Computer File Information	
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Last Modification Date:	11/03/99 Initials: AK
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Acad Ver.	R14 Scale: (1"=2'V)(1"=5'H) Units: ENGLISH

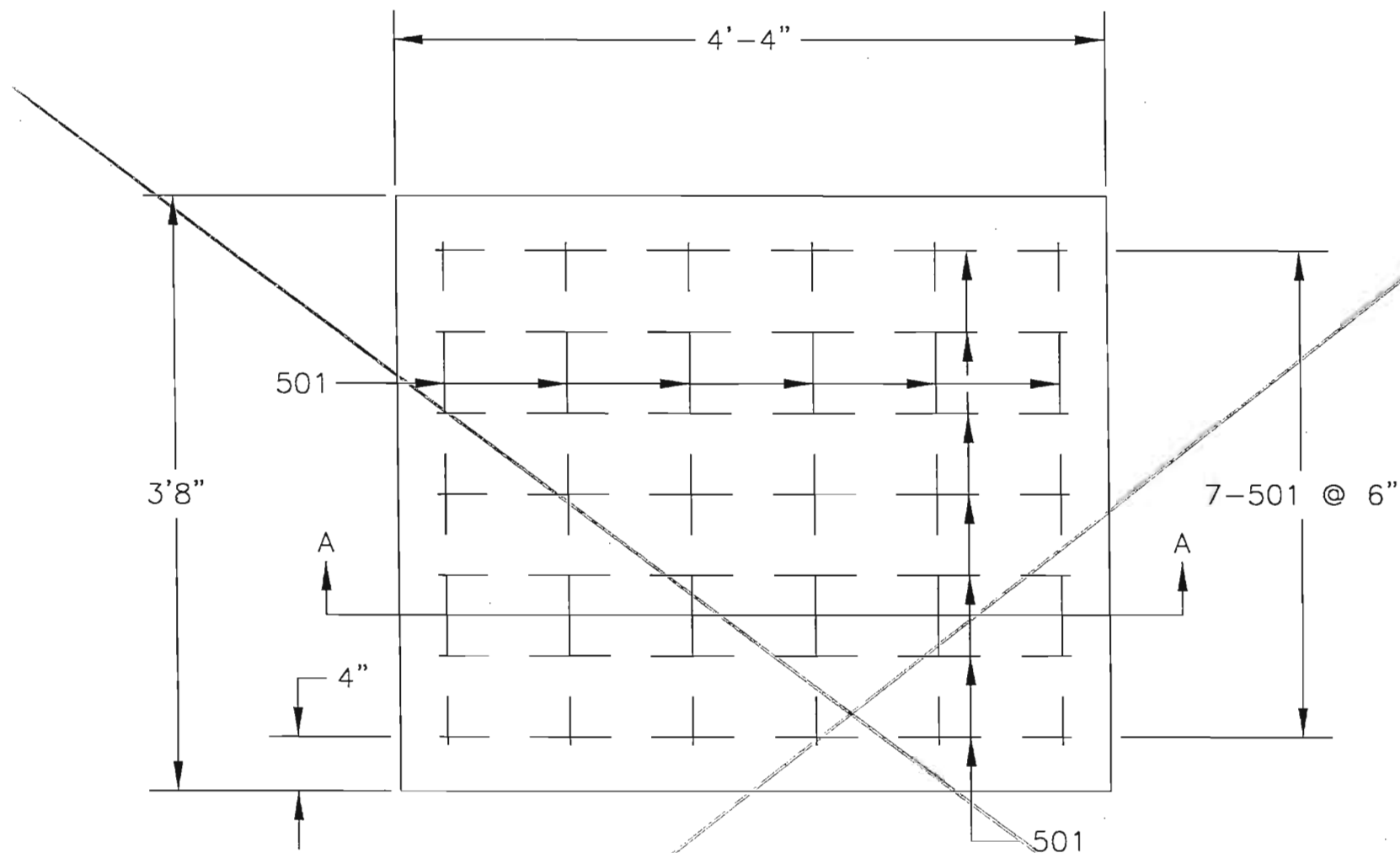
Sheet Revisions	

Colorado Department of Transportation  
 2000 South Holly-St.  
 Room 185  
 Denver, Colorado 80222  
 Phone: (303) 984-5260 Fax: (303) 984-5299  
 Region 6 Design DEW

As Constructed
No Revisions: <i>1/1/01</i>
Revised:
Void:

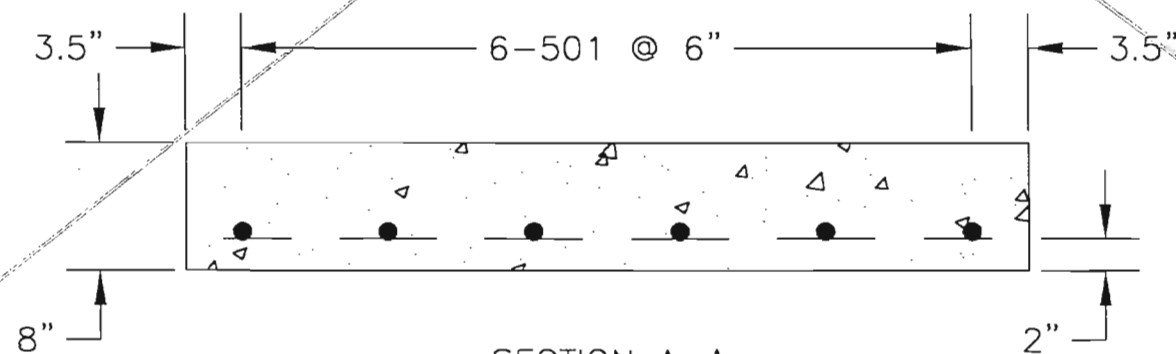
STORM DRAIN CROSS SECTION AT CODY CT. WB	
Designer:	B.W.D.
Detailer:	B.W. DeSarro
Sheet Subset:	ROADWAY
Structure Numbers	
Subset Sheets:	

Project No./Code	NH 0062-011
	12023
Sheet Number	26



1" steel Pipe Buses  
to use

PLAN



SECTION A-A

DETAIL OF INLET CAP  
(TO BE PAID FOR AS PLUG STRUCTURE)

Computer File Information			
Creation Date:	03/23/99	Initials:	AS
Last Modification Date:	03/23/99	Initials:	AS
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Drawing File Name:	INLETCAP.DWG		
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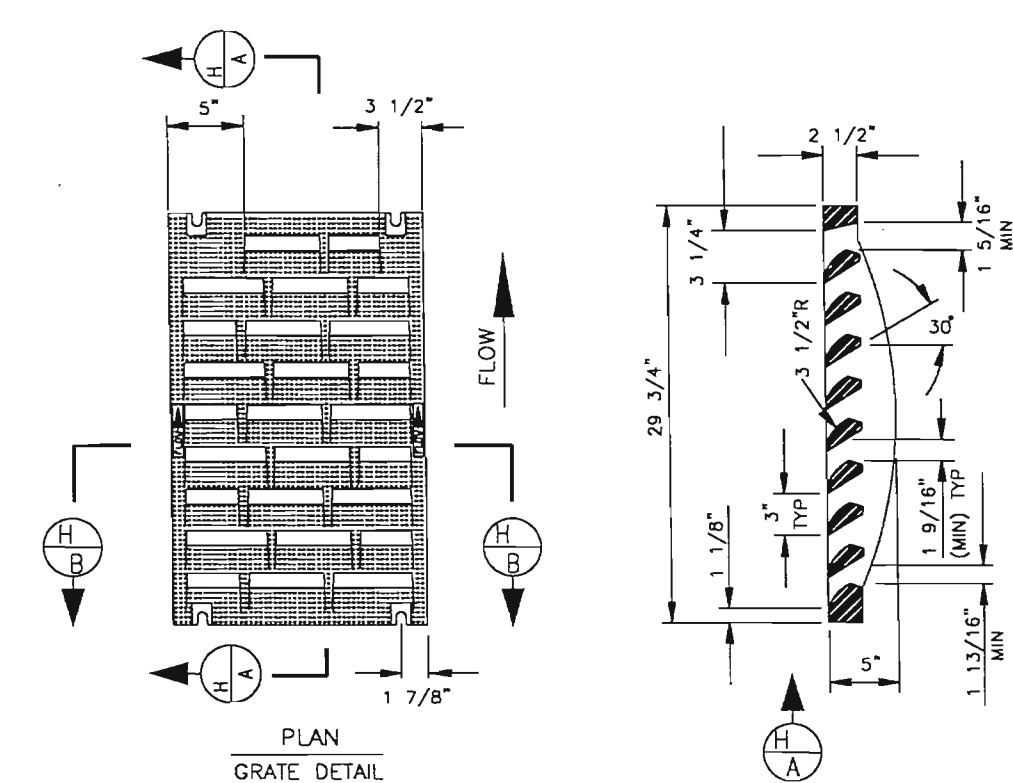
Sheet Revisions			

Colorado Department of Transportation  
 Address: 2000 S. Holly St., Denver, Co 80222  
 Phone: 303-757-9879 FAX: 303-757-9053  
 Region Number 6 GCH

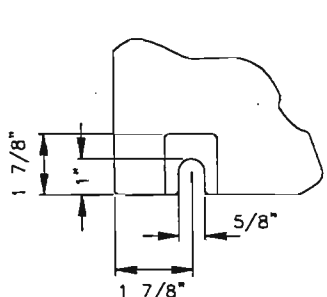
As Constructed
No Revisions:
Revised: 11/1/02
Void:

DETAIL OF INLET CAP			
Designer:	Structure Numbers	Sheet Subset:	Subset Sheets:

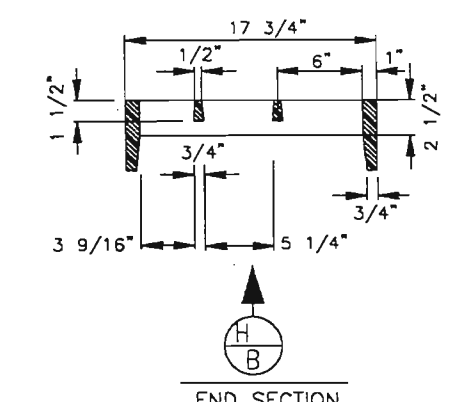
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NH 0062-011	
12023	
Sheet Number	27



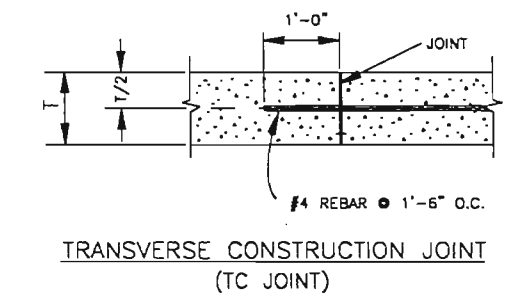
PLAN  
GRATE DETAIL



BOLT SLOT DETAIL  
TYP. PER CORNER

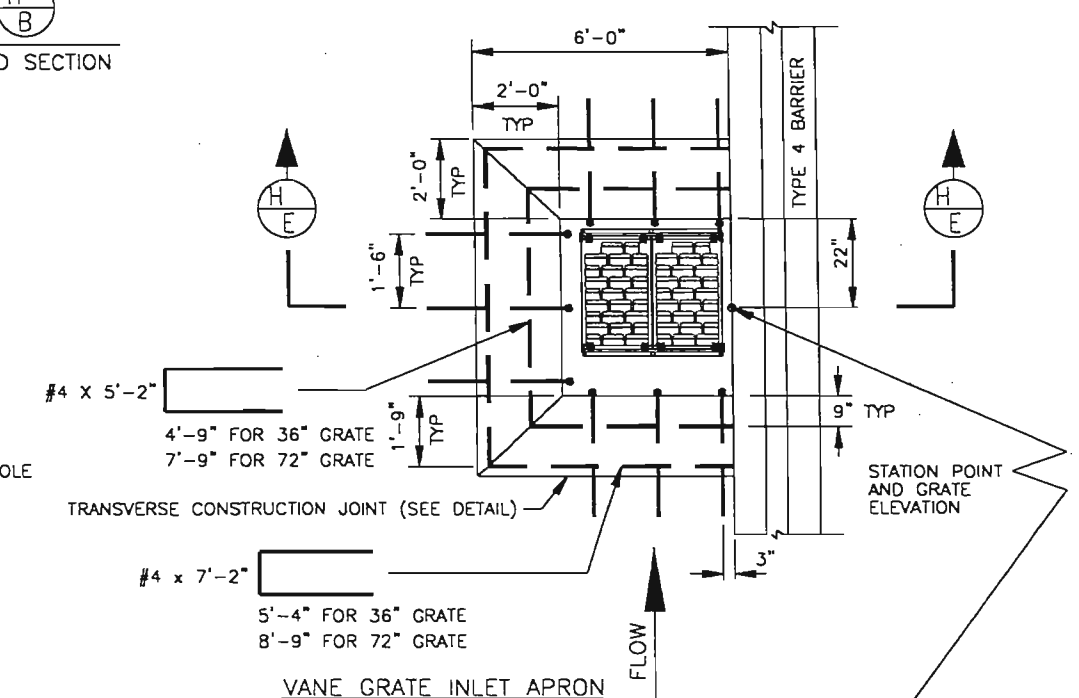


END SECTION

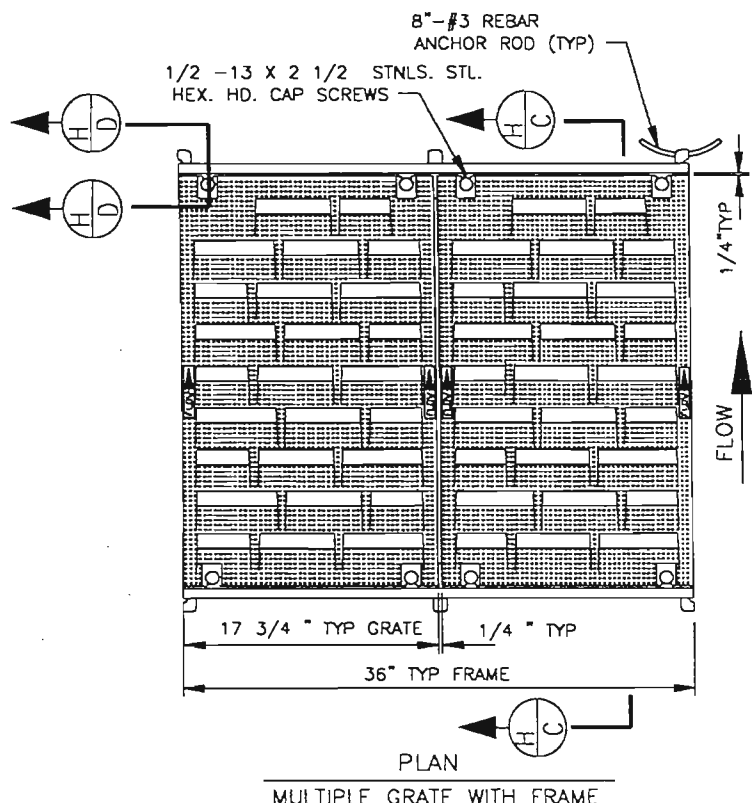


TRANSVERSE CONSTRUCTION JOINT  
(TC JOINT)

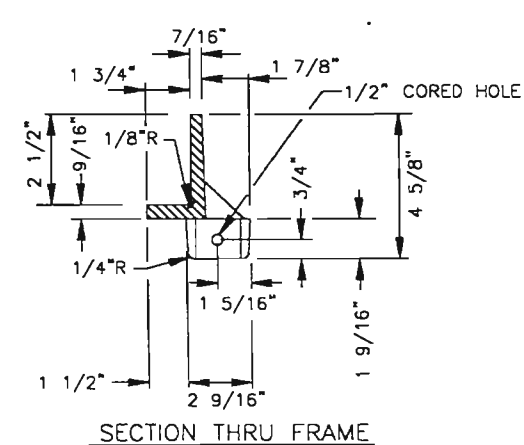
**GRATE AND FRAME SPECIFICATIONS**  
 FREE OPEN AREA: 190 SQUARE INCHES/GRATE  
 MATERIAL: CAST GRAY IRON, CLASS 35, ASTM A48-83,  
 AASHTO M105-82  
 FINISH: NO PAINT  
 WEIGHT: GRATE 170#/EA; FRAME 29#/EA  
 MANUFACTURER: NEENAH FOUNDRY CO. (OR EQUIVALENT)  
 CATALOG NO. R-4999-L9 (GRATE)  
 FRAME TYPE X



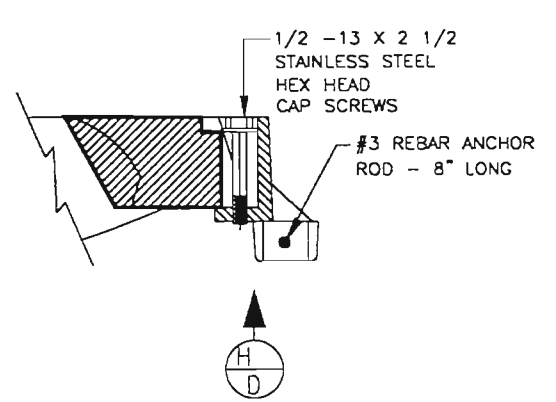
TRANSVERSE CONSTRUCTION JOINT (SEE DETAIL)  
 VANE GRATE INLET APRON



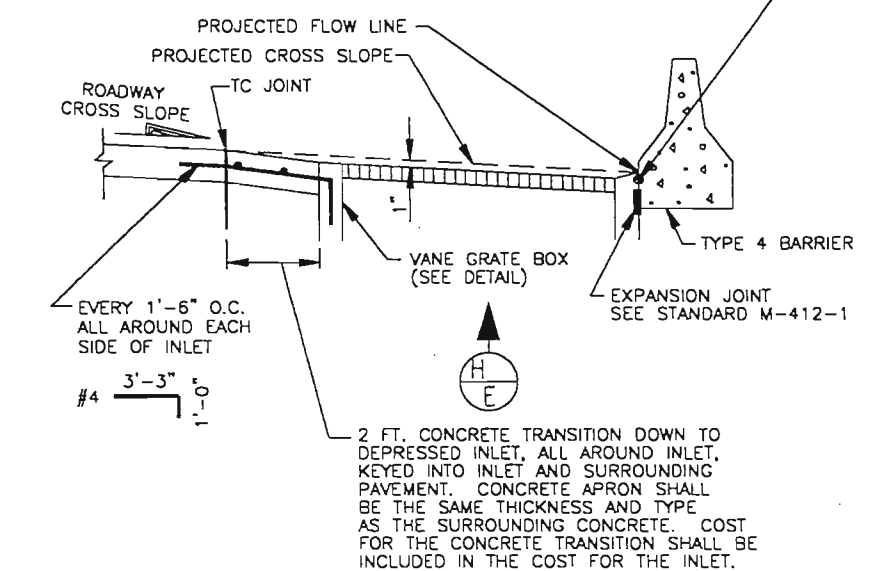
PLAN  
MULTIPLE GRATE WITH FRAME



SECTION THRU FRAME

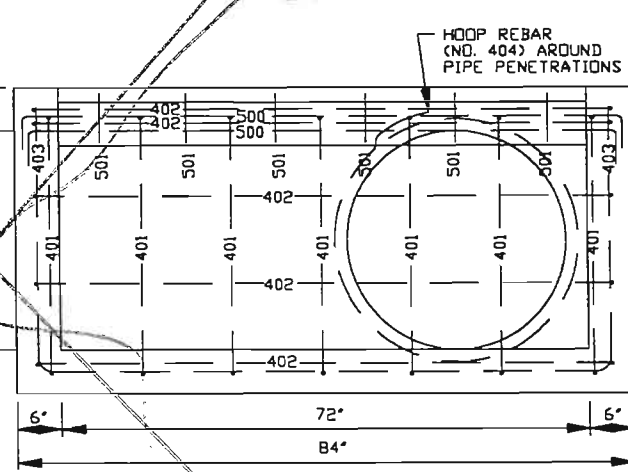
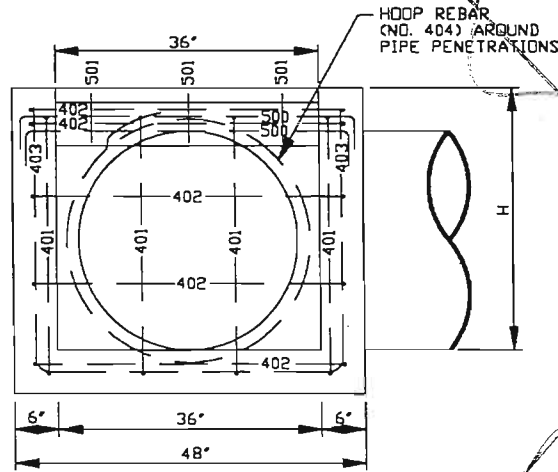
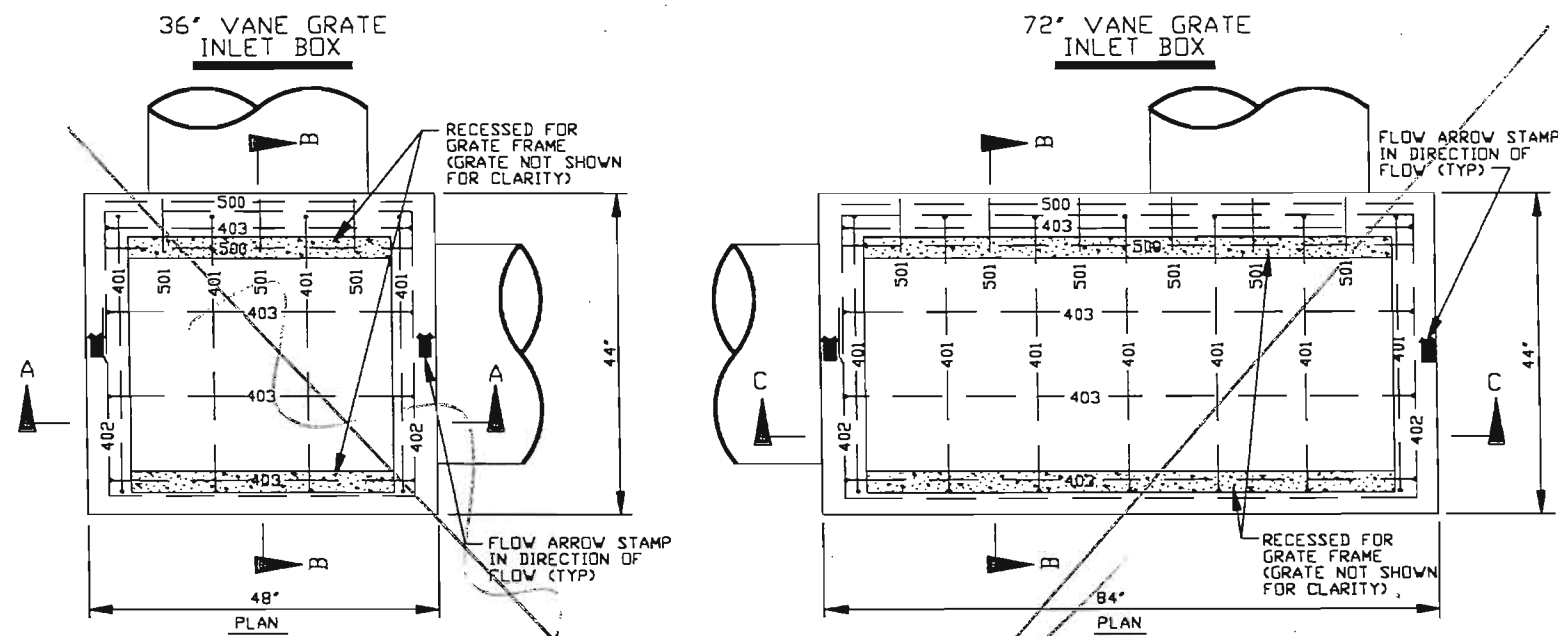


H D



H E

<b>Computer File Information</b> Creation Date: 10\16\96 Initials: Last Modification Date: 10\08\98 Initials: SBL Full Path: C:\PROJECTS\12023 Drawing File Name: English Vane Grate.dwg Acod Ver. R13 Scale: PLOT 1:2 Units: ENGLISH Vport Scale: 1: 110		<b>Sheet Revisions</b> <table border="1"> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>								Colorado Department of Transportation  4201 EAST ARKANSAS AVE Room 415 Denver, CO 80222 Phone: 303-757-9359 FAX: 303-757-9868 Region 6 Hydraulics SBL		As Constructed No Revisions: 1/1/01 Revised: Void:		<b>Vane Grate Inlet With Frame And Concrete Apron</b> Project No./Code NH 0062-011 12023 Subset Sheets: 1 of 2 Sheet Number 28	



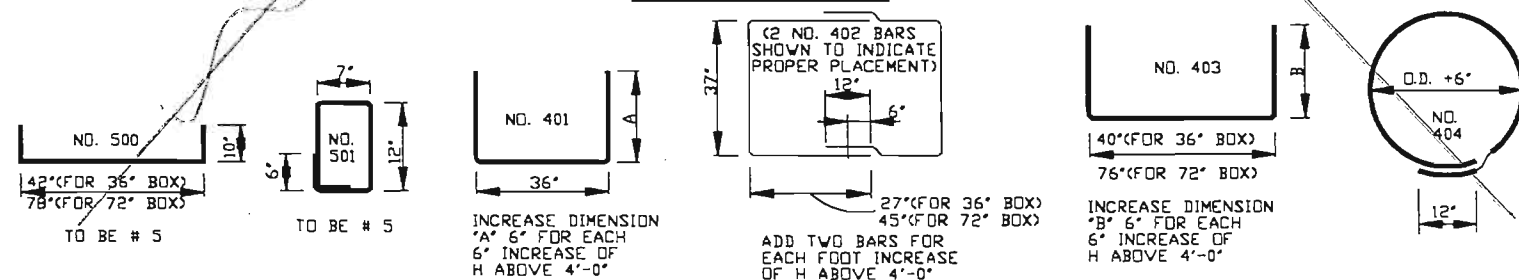
BAR LIST FOR H = 4'-0"

MARK	NO. REQ'D	HT. 'A'	HT. 'B'	LENGTH (EACH)
500	4			5'-2"
501	3			4'-2"
401	4	3'-10"		10'-8"
402	10			7'-7"
403	4		4'-0"	11'-4"
404	2			10'-5"

BAR LIST FOR H = 4'-0"

MARK	NO. REQ'D	HT. 'A'	HT. 'B'	LENGTH (EACH)
500	4			8'-2"
501	6			4'-2"
401	7	3'-10"		10'-8"
402	10			10'-7"
403	4		4'-0"	14'-4"
404	2			10'-5"

BENDING DIAGRAM



QUANTITIES FOR ONE INLET

H	NO. STEPS REQ'D	36"		72"	
		CONC. CU YD	STEEL LBS	CONC. CU YD	STEEL LBS
4'-0"	1	1.3	157	2.1	233
4'-6"	2	1.5	163	2.3	240
5'-0"	2	1.6	178	2.4	262
5'-6"	2	1.7	184	2.6	269
6'-0"	3	1.8	199	2.8	290
6'-6"	3	1.9	204	3.0	298
7'-0"	3	2.1	220	3.2	319
7'-6"	4	2.2	225	3.3	326
8'-0"	4	2.3	240	3.5	349
8'-6"	4	2.4	246	3.7	356
9'-0"	5	2.5	262	3.9	377
9'-6"	5	2.7	266	4.1	385
10'-0"	5	2.8	283	4.2	406
10'-6"	6	2.9	287	4.4	413
11'-0"	6	3.0	303	4.6	435
11'-6"	6	3.1	308	4.8	442

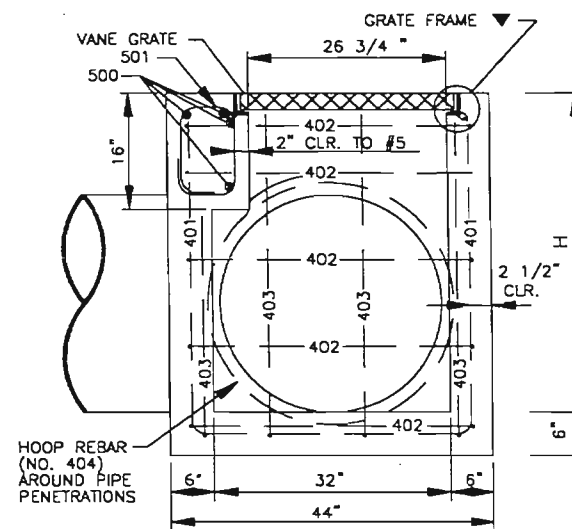
NOTE:

- CONCRETE QUANTITIES INCLUDES VOLUME OCCUPIED BY PIPES.
- REINFORCING STEEL QUANTITIES ASSUMES 2-NO. 404 HOOPS, FOR 24" PIPE.

VANE GRATE INLET BOX

GENERAL NOTES:

- ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS APPLICABLE TO THE PROJECT.
- ALL CONCRETE SHALL BE CLASS A OR B. EXPOSED SURFACES SHALL RECEIVE A CLASS 1 FINISH.
- STEPS OR LADDER WILL BE REQUIRED WHEN INLET "H" EXCEEDS 3'-6" AND SHALL BE INCLUDED IN THE COST OF THE BOX. FOR DETAIL OF INLET STEP, SEE M-STANDARD "STEPS FOR MANHOLE AND INLETS".
- ALL REINFORCING BARS SHALL BE DEFORMED, OF GRADE 60, AND SHALL BE TAGGED WITH THE STATION NUMBER AND BAR DESIGNATION.
- ALL EDGE DISTANCES NOT MARKED "CLEAR" ARE TO - OF BAR.
- SEE PLANS FOR SIZE AND LOCATION OF CONDUIT.
- ALL BARS TO BE #4 UNLESS SHOWN OTHERWISE CUT OR BEND AROUND PIPES AS REQ'D
- INLET MAYBE CAST-IN-PLACE OR PRECAST.
- GRATE TO BE INSTALLED DURING CONSTRUCTION OF BOX WITH THE VANE GRATE BOLTED IN PLACE TO THE FRAME, AND IN ACCORDANCE WITH VANE GRATE SPECIFICATIONS. (SEE VANE GRATE/FRAE PLANS)
- THE INVERT OF THE INLET BOX SHALL BE SLOPED TO DRAIN TO AVOID SEDIMENT ACCUMULATION.
- THE CONTRACTOR SHALL STAMP FLOW ARROWS INTO THE TOP SURFACE OF THE INLET BOX SIDEWALLS TO INDICATE THE DIRECTION OF GUTTER FLOW. THESE STAMPED ARROWS SHALL BE SIX (6) INCHES LONG, ONE (1) INCH HIGH AND THREE-EIGHTS (3/8) INCH DEEP. FOR INLETS IN SUMP CONDITIONS, THE STAMPED FLOW ARROWS SHALL INDICATE THE PREDOMINATE DIRECTION OF STORM RUNOFF.



Computer File Information

Creation Date:	10\04\96	Initials:	
Last Modification Date:	10\07\98	Initials:	HRB
Full Path:	C:\PROJECTS\12023		
Drawing File Name:	English VG Box Details.dwg		
Acad Ver.	R13	Scale:	PLOT 1:2
Units:	ENGLISH	Vport Scale:	1: 110

Sheet Revisions

No.	Description

Colorado Department of Transportation

4201 EAST ARKANSAS AVE  
Room 415  
Denver, CO 80222  
Phone: 303-757-9359

Staff Hydraulics

As Constructed

No Revisions:	1/19/01
Revised:	
Void:	

Vane Grate Inlet Box Details  
36" And 72"

Subset Sheets: 2 of 2

Project No./Code

NH 0062-011
12023
Sheet Number 29

# GENERAL NOTES

EXPANSION JOINT MATERIAL SHALL MEET AASHTO SPECIFICATION M-213.

THE FINAL FINISH FOR THE SURFACES OF THE TYPE 7 BRIDGE RAIL AND TYPE 7 GUARDRAIL SHALL BE CLASS 2.

GRADE 60 REINFORCING STEEL IS REQUIRED.

ALL REINFORCING STEEL SHALL BE EPOXY COATED UNLESS OTHERWISE NOTED.

THE FOLLOWING TABLE GIVES THE MINIMUM LAP SPLICE LENGTH FOR EPOXY COATED REINFORCING BARS PLACED IN ACCORDANCE WITH SUBSECTION 602.06. THESE SPLICE LENGTHS SHALL BE INCREASED BY 25% FOR BARS SPACED AT LESS THAN 6" ON CENTER.

BAR SIZE	#4	#5
SPLICE LENGTH FOR CLASS D CONCRETE	1'-3"	1'-6"

THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE STABILITY OF THE STRUCTURE DURING CONSTRUCTION.

E.F. = EACH FACE  
F.F. = FAR FACE  
N.F. = NEAR FACE

CERTAIN DIMENSIONS CONTAINED IN THESE PLANS ARE CALCULATED FROM THE "AS CONSTRUCTED PLANS". THESE DIMENSIONS MAY BE ADJUSTED TO MEET THE EXISTING STRUCTURE. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS IN THE FIELD BEFORE ORDERING OR FABRICATING ANY MATERIAL.

THE GROUT USED FOR PATCHING COLUMNS SHALL BE A MORTAR MIX, PROPORTIONED BY VOLUME:

- A. ONE PART PORTLAND CEMENT
  - B. TWO TO THREE PARTS FINE AGGREGATE, CONFORMING TO THE REQUIREMENTS OF ASTM C 144.
  - C. A LATEX ADMIXTURE THAT CONFORMS TO THE REQUIREMENTS OF ASTM C 1059, TYPE II (NON-REDISPERSIBLE). A MINIMUM OF 12% LATEX SOLIDS BY WEIGHT OF CEMENT SHALL BE ADDED TO THE MORTAR MIX.
  - D. ENOUGH WATER TO PROVIDE A PLASTIC WORKABLE MIX.
- APPLY CONCRETE SEALER PRIOR TO PATCHING OF COLUMNS.

CONCRETE PATCHING MATERIAL (DECK AND JOINTS)

- 1. DAYTON SUPERIOR HD-50
- 2. SIKASET ROADWAY PATCH, BY SIKA
- 3. MASTER BUILDERS EMOCO T430

APPLIED IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS.

RELOCATE STREET LIGHT FEEDS TO ACCOMMODATE NEW CONSTRUCTION.

## DESIGN DATA

AASHTO, 16th EDITION WITH 97 AND 98 INTERIMS

REINFORCED CONCRETE:

CLASS D CONCRETE:  $f'_c = 1,800$  psi  
 $f_c = 4,500$  psi

REINFORCING STEEL:  $f_s = 24,000$  psi  
 $f_y = 60,000$  psi

## SUMMARY OF QUANTITIES

ITEM NO.	DESCRIPTION	UNIT	F-16-ER	F-16-0	F-16-EP	TOTAL
202	REMOVAL OF ASPHALT MAT (PLANING)(SPECIAL)	SY	1310	2237	2072	5625
202	REMOVAL OF BRIDGE RAILING	LF	411	593	524	1528
210	REBUILD PORTIONS OF PRESENT STRUCTURE	EACH	5			5
403	HOT BITUMINOUS PAVEMENT(GR S)(ASPHALT)(109) (PG 76-28)	TON	144.10	482	220	846.1
420	GEOTEXTILE (PAVING)	SY	1325	2237	2077	5639
515	WATERPROOFING (MEMBRANE)	SY		2237	2077	4314
515	CONCRETE SEALER (CALCIUM NITRITE)	SY	174	614	60	848
518	SAWING AND SEALING BRIDGE JOINTS	LF	192	224	232	648
601	CONCRETE (PATCHING)	SF	125	126	0	251
601	CONCRETE (PATCHING)	CY	4748	2043	4869	8598
601	CONCRETE (PATCHING)	CY	480	0	0	480
601	CONCRETE (PATCHING)	SF	40	50	50	140
606	GUARDRAIL TYPE 7 (STYLE CC)	LF	132	189	170	491
606	BRIDGE RAIL TYPE 7R	LF	264	460	340	1064
607	FENCE CHAIN LINK (SPECIAL)(36 INCH)	LF	264	380	340	984

- ① INCLUDES REMOVAL OF PORTIONS OF EXISTING CURBS
- ② CONCRETE PATCHING FOR DECK
- ③ CONCRETE PATCHING FOR JOINTS (SEE DWG. NO. B2)
- ④ CONCRETE PATCHING FOR COLUMNS
- ⑤ ASPHALT CEMENT BINDER SHALL BE EITHER PERFORMANCE GRADED BINDERS 58-22 OR 58-28 IN ACCORDANCE WITH THE REQUIREMENTS OF SUBSECTION 702.01. ASPHALT CEMENT BINDER WILL NOT BE MEASURED AND PAID FOR SEPARATELY, BUT SHALL BE INCLUDED IN ITEM NO. 420 GEOTEXTILE (PAVING).

AS CONSTRUCTED

NO REVISIONS  REVISED  VOID

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
III	COLORADO	NH 0062-011	30

REVISIONS	

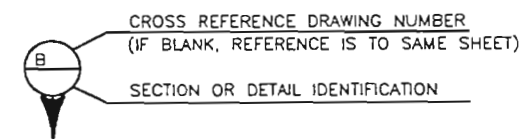
## INDEX OF DRAWINGS

- DWG. NO. B1 GENERAL INFORMATION - SUMMARY OF QUANTITIES
- DWG. NO. B2 REPAIR DETAILS - F-16-ER
- DWG. NO. B3 BEARING REPAIR DETAILS - F-16-ER
- DWG. NO. B4 GENERAL LAYOUT - F-16-ER
- DWG. NO. B5 DETAILS - F-16-0 --- F-16-EP
- DWG. NO. B6 DETAILS
- DWG. NO. B7 BRIDGE RAIL TYPE 7R
- DWG. NO. B8 FENCE CHAIN LINK

## BRIDGE DESCRIPTION

F-16-0, F-16-EP:  
REPLACE RAIL, ASPHALT OVERLAY

F-16-ER:  
REPAIR BEARINGS, REPLACE RAIL, ASPHALT OVERLAY



COLORADO DEPARTMENT OF TRANSPORTATION			
GENERAL INFORMATION SUMMARY OF QUANTITIES			
Station 222+01.5, F-16-EP; 248+63.65, F-17-ER; 301+32.3 bk = 301+30.6 ah, F-16-0			
Near Lakewood		Sec. Varies T 4S	R 69W
Designer G. Davydov	Structure	F-16-ER, F-16-0	
Detailer E. Hadley	Numbers	F-16-EP	
Drawing Number B1		of 8	Drawings

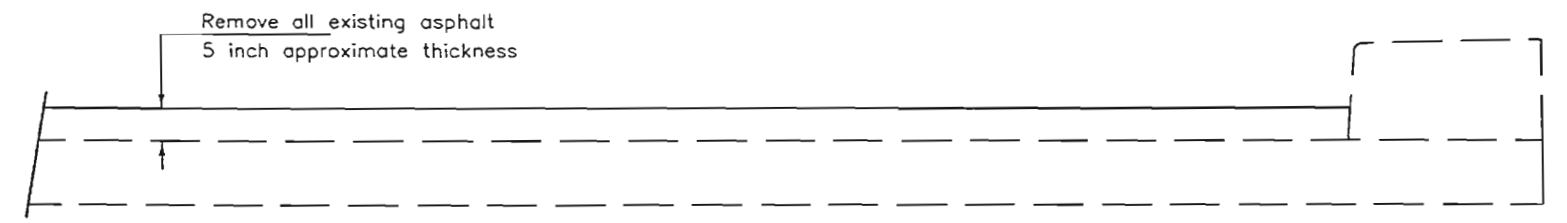
Revision Dates	(Preliminary Stage Only)
7-92 9-93 3-94 12-95	

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GHD			
EHH			
Checked By	Checked By		
Design		DATE	
INITIAL	DATE	B/99	B/99
GHD			
MAN		10/99	
Designed By	Designed By		
Checked By	Checked By		

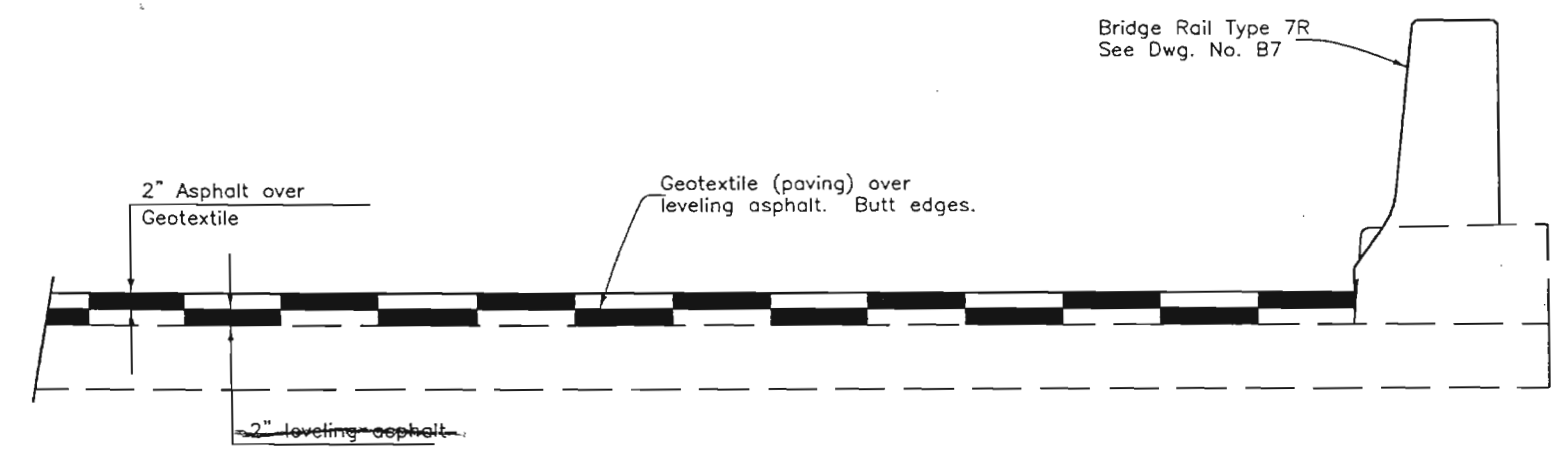
11/02/1995 \EVE:D:\GARRISON\FROM FIELD\15UMOUAN.DWG

AS CONSTRUCTED			FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
NO REVISIONS	REVISED	VOID	III	COLORADO	NH 0062-011	31

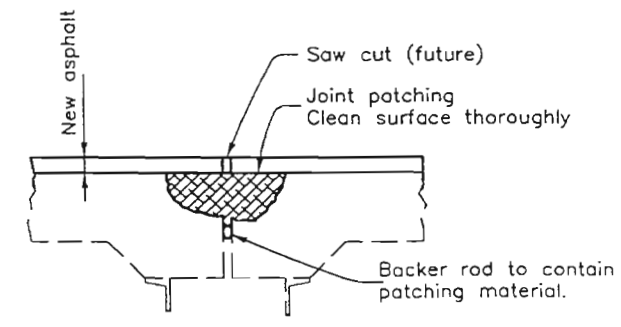
REVISIONS	



**SLAB REMOVAL DETAIL**



**SLAB OVERLAY DETAIL**



**DETAIL AT EXPANSION JOINT**

**COLORADO  
DEPARTMENT OF TRANSPORTATION**

**REPAIR DETAILS**

Designer G. Davidov	Structure	F-16-ER
Detailer E. Hadley	Numbers	
Drawing Number B2	of 8	Drawings

Revision Dates	(Preliminary Stage Only)

Design		Quantities	
INITIAL	DATE	INITIAL	DATE
CHD	8/99	GHD	8/99
MAN	10/99	EHH	8/99
Designed By	Checked By	Quantities By	Checked By

11/02/1999 \\EYE-D:\CARRISON\FROM FIELD\02REPDET.DWG

AS CONSTRUCTED		
NO REVISIONS	REVISED	VOID
11/10		

FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
III	COLORADO	NH 0062-011	32

REVISIONS	

**GENERAL NOTES**

NOTE: WHERE REPAIR IS REQUIRED ON BOTH SIDES OF A PIER CAP ALONG A SINGLE GIRDER LINE, PLACE BEARING ASSEMBLY ON BOTH SIDES AS SHOWN IN THE SECTION.

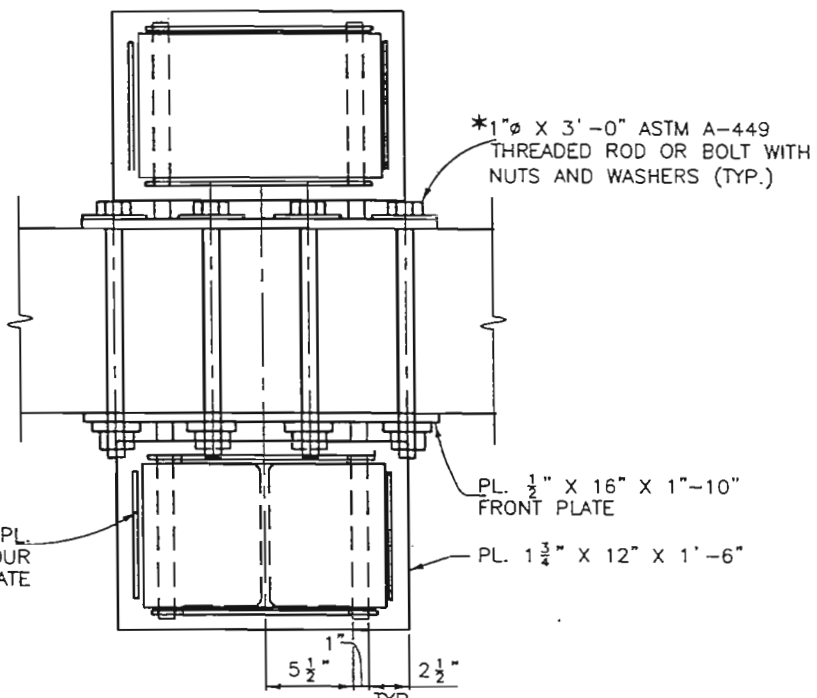
THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS PRIOR TO ORDERING MATERIALS.

\* INDICATED ITEMS SHALL BE SUPPLIED BY THE CONTRACTOR AND PAID FOR IN ITEM NO. 210 REBUILD PORTIONS OF PRESENT STRUCTURE.

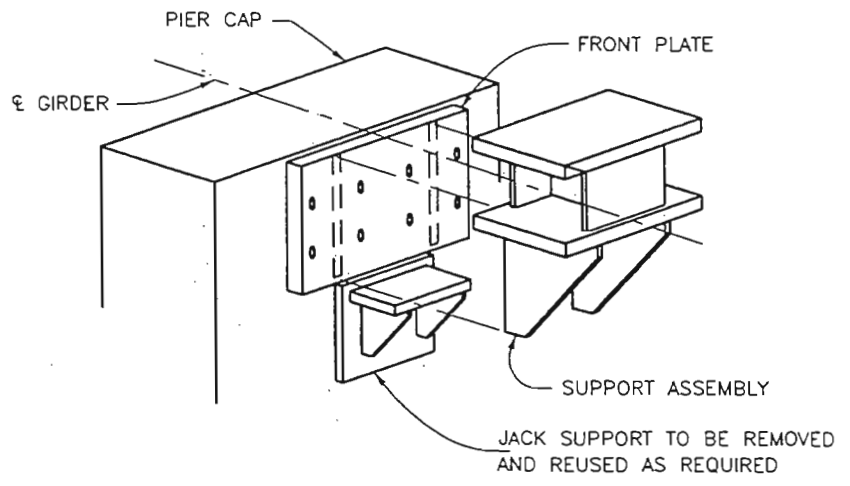
BALANCE OF SUPPORT ASSEMBLY SHALL BE STATE FURNISHED MATERIAL. CDOT WILL DELIVER THESE ITEMS TO THE PROJECT SITE.

**SUGGESTED CONSTRUCTION PROCEDURE**

1. LOCATE AND MARK CENTERLINE OF THE GIRDER ON THE PIER CAP.
2. MARK LOCATION OF BOLT HOLES ON PIER CAP, SEE ELEVATION VIEW AND SECTION.
3. DRILL HOLES IN PIER CAP AND PLACE BOLTS.
4. CUT HOLES IN PLYWOOD FORM TO MATCH BOLT HOLES IN PIER CAP.
5. REMOVE LOOSE CONCRETE AND CLEAN REINFORCING STEEL.
6. BOLT THE FORM IN PLACE AND RESTORE THE PIER CAP TO ITS ORIGINAL SECTION USING AN APPROVED GROUT.
7. ALLOW CURING TIME AS RECOMMENDED BY THE MANUFACTURER BEFORE REMOVING THE FORM.
8. USING THE FORM FOR A PATTERN, CUT THE BOLT HOLES IN THE FRONT PLATE.
9. ATTACH PLATES AND TIGHTEN BOLTS. (100 LB-FT. TORQUE).
10. RAISE THE SUPPORT ASSEMBLY UNTIL THE ELASTOMERIC PAD IS COMPRESSED 1/16" (200 psi x PAD AREA = JACKING FORCE).
11. FIELD WELD THE SUPPORT ASSEMBLY TO THE FRONT PLATE.

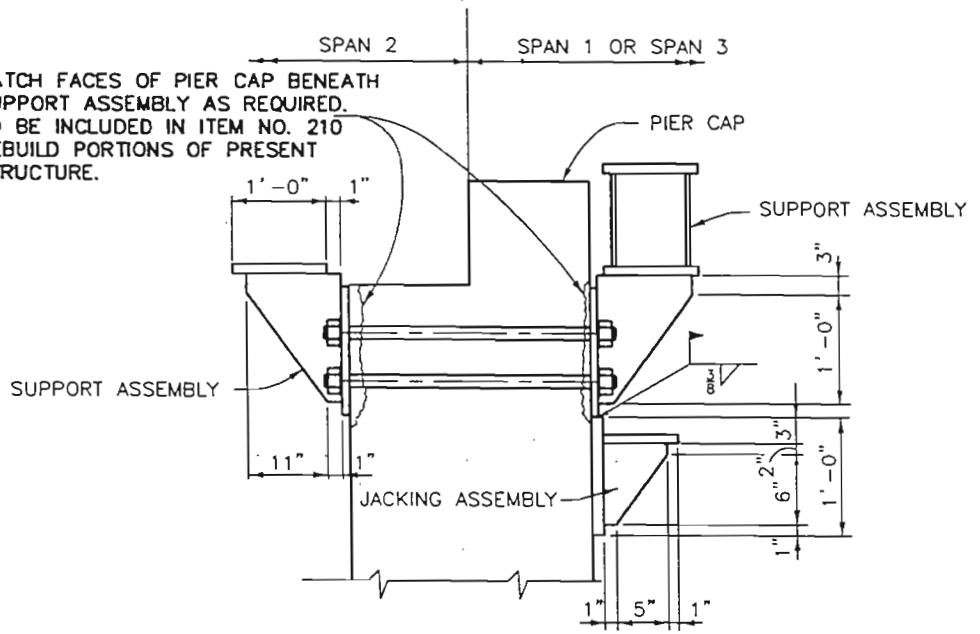


**PLAN**

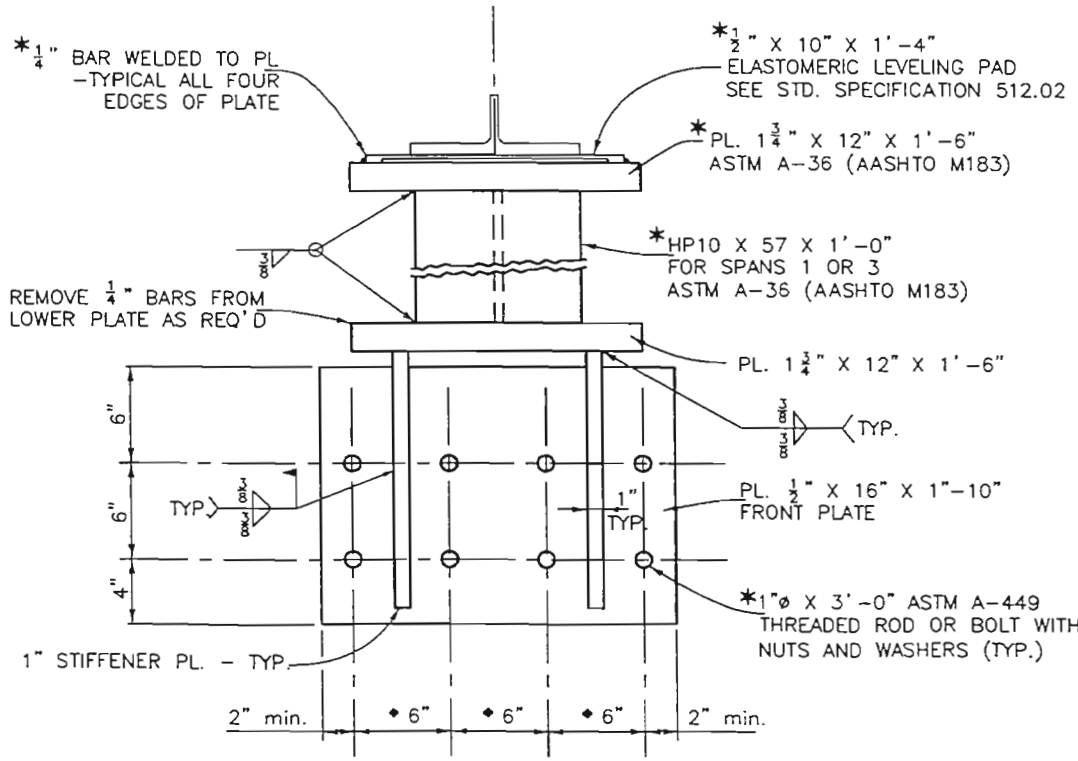


**ISOMETRIC VIEW**

PATCH FACES OF PIER CAP BENEATH SUPPORT ASSEMBLY AS REQUIRED. TO BE INCLUDED IN ITEM NO. 210 REBUILD PORTIONS OF PRESENT STRUCTURE.

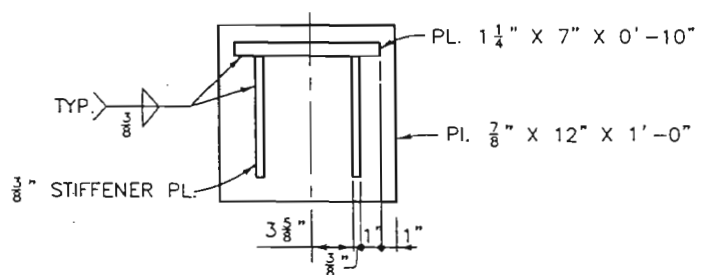


**SECTION**



**ELEVATION VIEW**  
(FRONT VIEW SUPPORT ASSEMBLY)

♦ Adjust dimensions to avoid existing reinforcing steel and anchor bolts as approved by the Engineer.



**JACKING SUPPORT**

Quantities		DATE	
INITIAL	DATE	INITIAL	DATE
GHD	8/99	GHD	8/99
EHH	8/99	EHH	8/99
Checked By		Checked By	
EHH		EHH	
Design		DATE	
INITIAL	DATE	INITIAL	DATE
GHD	8/99	GHD	8/99
MAN	10/99	MAN	10/99
Checked By		Checked By	
MAN		MAN	

11/02/1999 .\EYE:\D\CARRISON\FROM FIELD\03GIRSUP.DWG

**COLORADO DEPARTMENT OF TRANSPORTATION**

**BEARING REPAIR DETAILS**

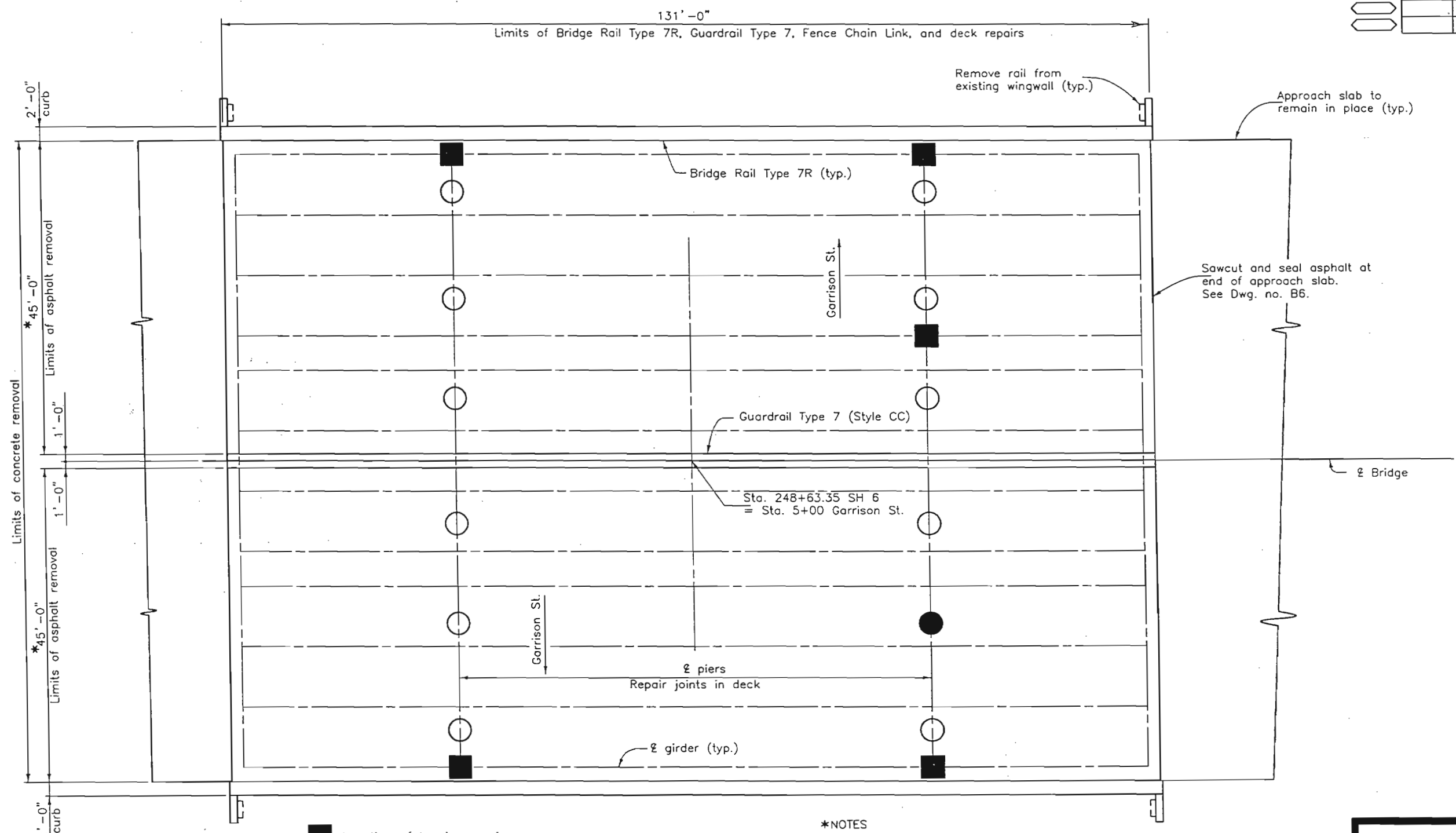
Designer G. DAVYDOV	Structure F-16-ER
Detailer E. HADLEY	Numbers
Drawing Number B3	of 8 Drawings



REVISIONS	

Design		Quantity	
INITIAL	DATE	INITIAL	DATE

11/02/1999  
 .EYE:\GARRISON\FROM FIELD\0404DETAIL.DWG



- Location of bearing repairs
- Location of columns
- Location of columns requiring repair

- \*NOTES**
1. Remove all existing asphalt (approximately 5 inches) by milling.
  2. Sandblast the area.
  3. Patch all potholes.
  4. Place 2 inches leveling asphalt.
  5. Place geotextile on entire deck, and 3 inches up face of rails, Butt (do not overlap) edges.
  6. Place 2 inches of additional asphalt on top of geotextile.

**GENERAL LAYOUT**

<b>COLORADO DEPARTMENT OF TRANSPORTATION</b>		
<b>GENERAL LAYOUT F-16-ER</b>		
Designer G. Davydov	Structure	F-16-ER
Detailer G. Davydov	Numbers	
Drawing Number B4	of 8	Drawings
Revision Dates (Preliminary Stage Only)		

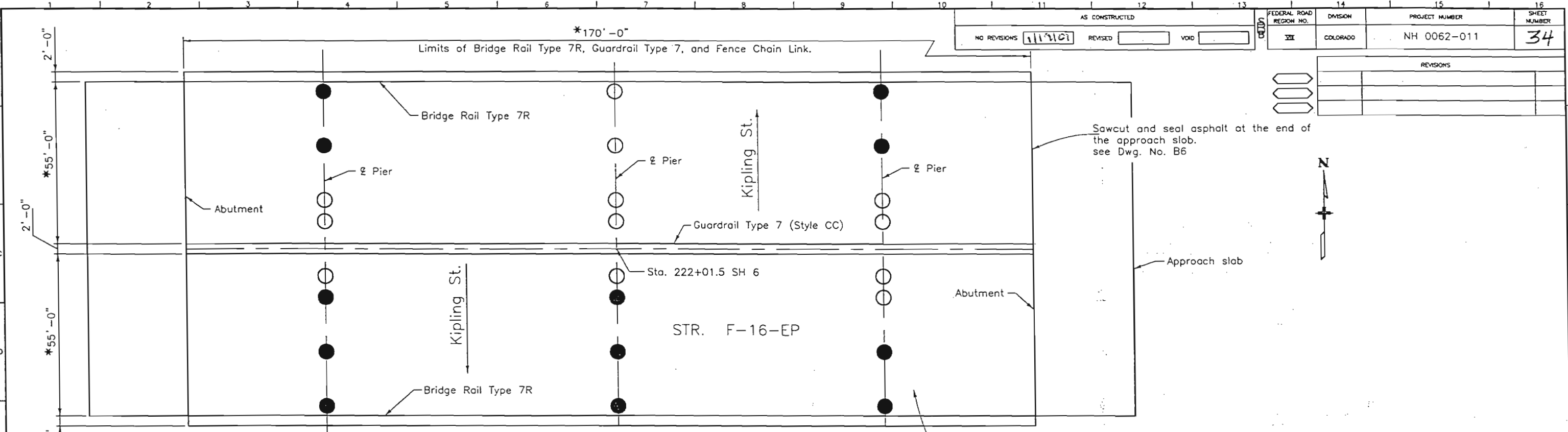
Design		Quantities	
INITIAL	DATE	INITIAL	DATE
CHD	8/99	CHD	8/99
MAN	10/99	CHD	8/99
Checked By	Checked By	Checked By	Checked By

11/02/1999 J:\EVE\GARRISON\FROM FIELD\05DETAIL-1.DWG

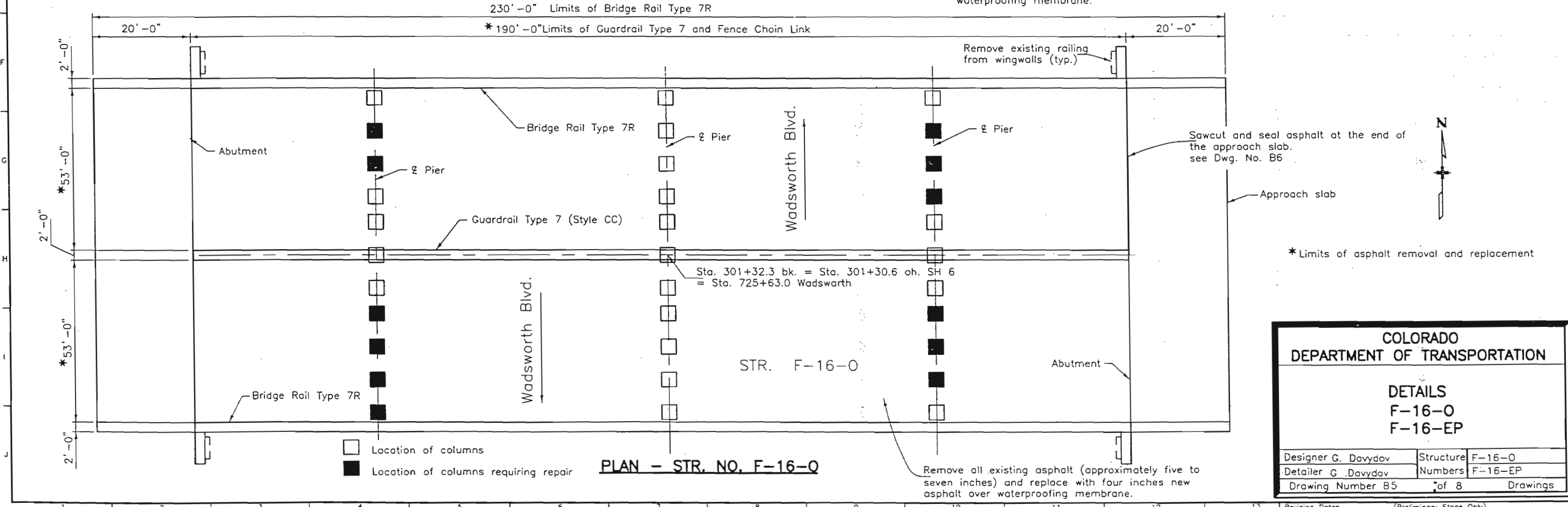
NO REVISIONS	11/9/01	REVISED		VOID	
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FEDERAL ROAD REGION NO.	DIVISION	PROJECT NUMBER	SHEET NUMBER
XIII	COLORADO	NH 0062-011	34

REVISIONS	



Remove all existing asphalt (approximately two to three inches) and replace with two inches new asphalt over waterproofing membrane.



Remove all existing asphalt (approximately five to seven inches) and replace with four inches new asphalt over waterproofing membrane.

\* Limits of asphalt removal and replacement

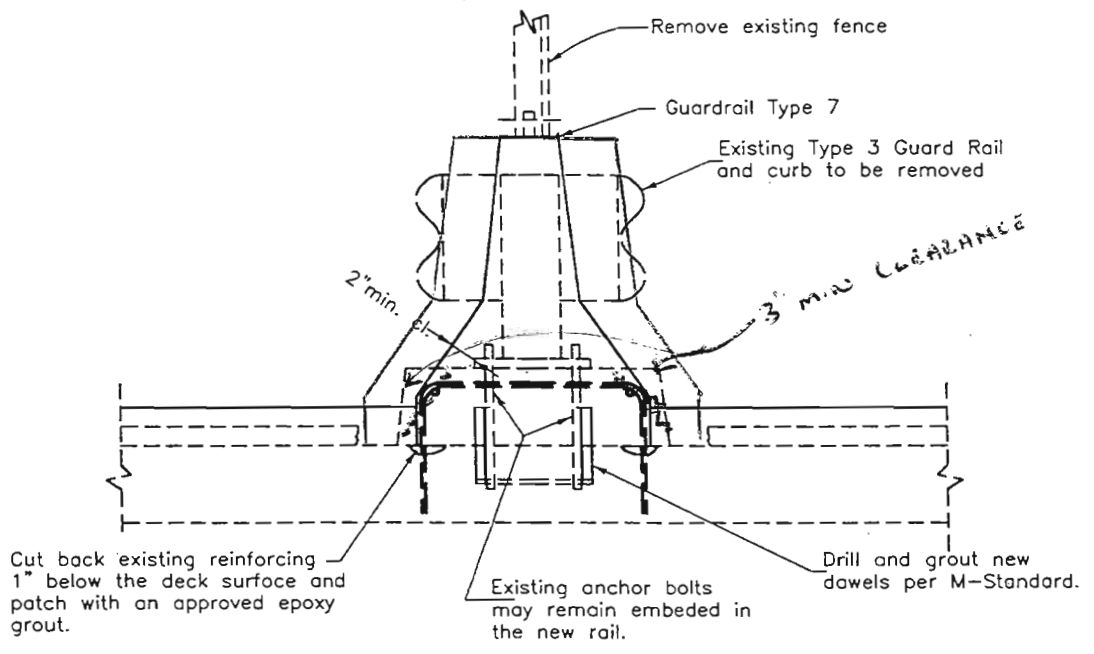
**COLORADO DEPARTMENT OF TRANSPORTATION**

**DETAILS**  
F-16-0  
F-16-EP

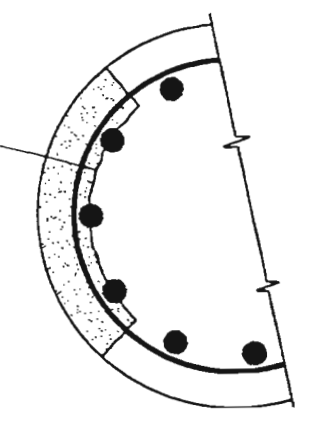
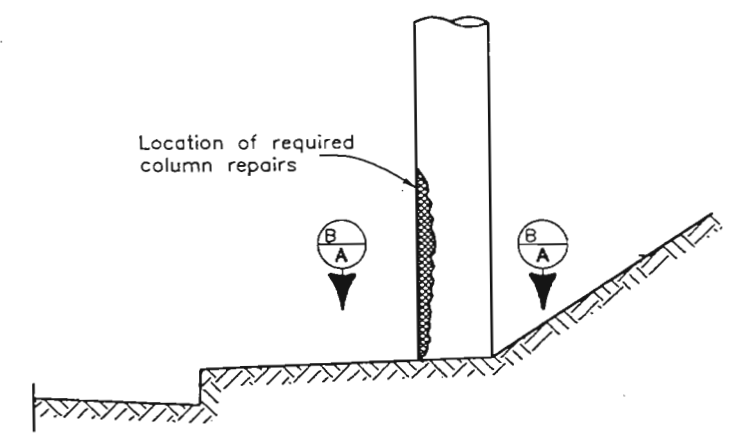
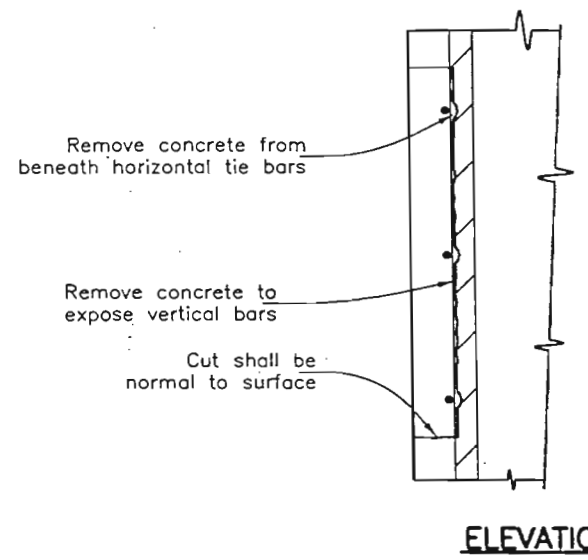
Designer G. Davydov	Structure	F-16-0
Detailer G. Davydov	Numbers	F-16-EP
Drawing Number B5	of 8	Drawings

Revision Dates (Preliminary Stage Only)

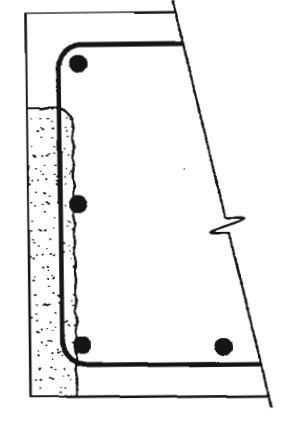
REVISIONS	



**GUARDRAIL TYPE 7**  
For more details see Standard M-606-13



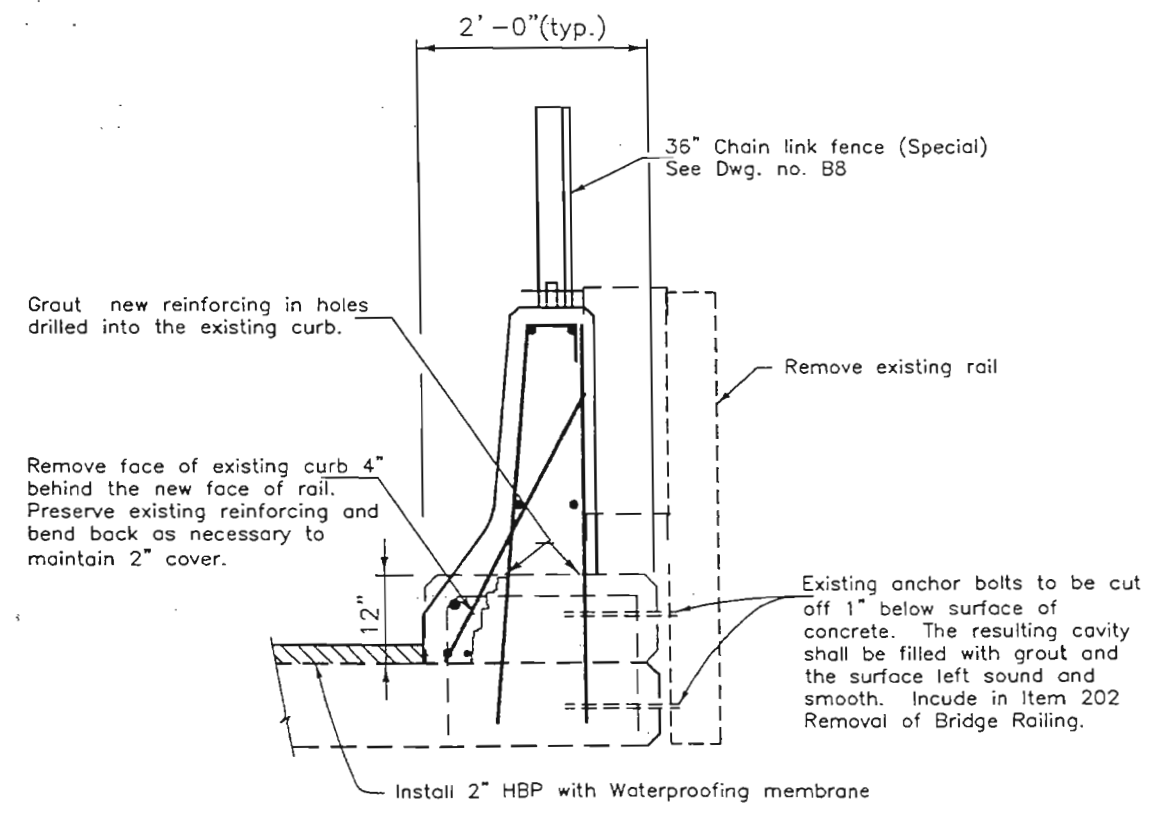
Str. No. F-16-EP  
Str. No. F-16-ER



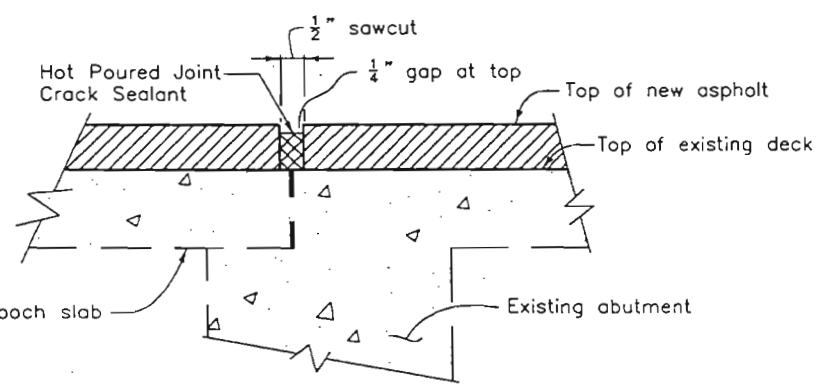
Str. No. F-16-0

**COLUMN REPAIR DETAILS**  
General details only shown.  
Extent of repair to be determined by the Engineer.  
To be paid as Item No. 601 Concrete. (Patching.)

Quantities		Design	
INITIAL	DATE	INITIAL	DATE
GHD	8/99	GHD	8/99
EHH	8/99	MAN	10/99



**BRIDGE RAIL TYPE 7R**  
Remove existing asphalt mat



**DETAIL AT BACKFACE OF ABUTMENT**

**COLORADO DEPARTMENT OF TRANSPORTATION**

**DETAILS**

Designer G. Davydov	Structure	F-16-EP, F-16-0
Detailer G. Davydov	Numbers	F-16-ER
Drawing Number B6	of 8	Drawings

11/02/1999 .EYE:D.GARRISON\FROM FIELD\06DETAIL-2.DWG

REVISIONS		

**NOTES:**

All bridge rail concrete shall be Class D.

Longitudinal reinforcement shall stop at all expansion joints unless noted otherwise.

Bridge rail shall be constructed plumb.

Bridge rail concrete (Class D) and bridge rail reinforcement shall be included in Item No. 606, Bridge Rail Type 7R.

For Guardrail Type 7, see Std. M-606-13 for details.

For Guardrail Type 3, see Std. M-606-1 and M-601-13 for details of transition and attachment to concrete barrier. See Std. M-606-1 for details of Guardrail.

The surface of the rail shall be tested with a 10 foot straightedge laid along the surface in the longitudinal direction. Deviation of the concrete surface from the straightedge shall be less than  $\frac{1}{4}$ " plus allowance for roadway horizontal and vertical curvature, if any.

**DESIGN DATA**

Reinforced Concrete:

Class D Concrete:  $f_c = 1,800$  psi,  $n = 8$

Reinforcing Steel:  $f_s = 24,000$  psi

**INFORMATION ONLY**

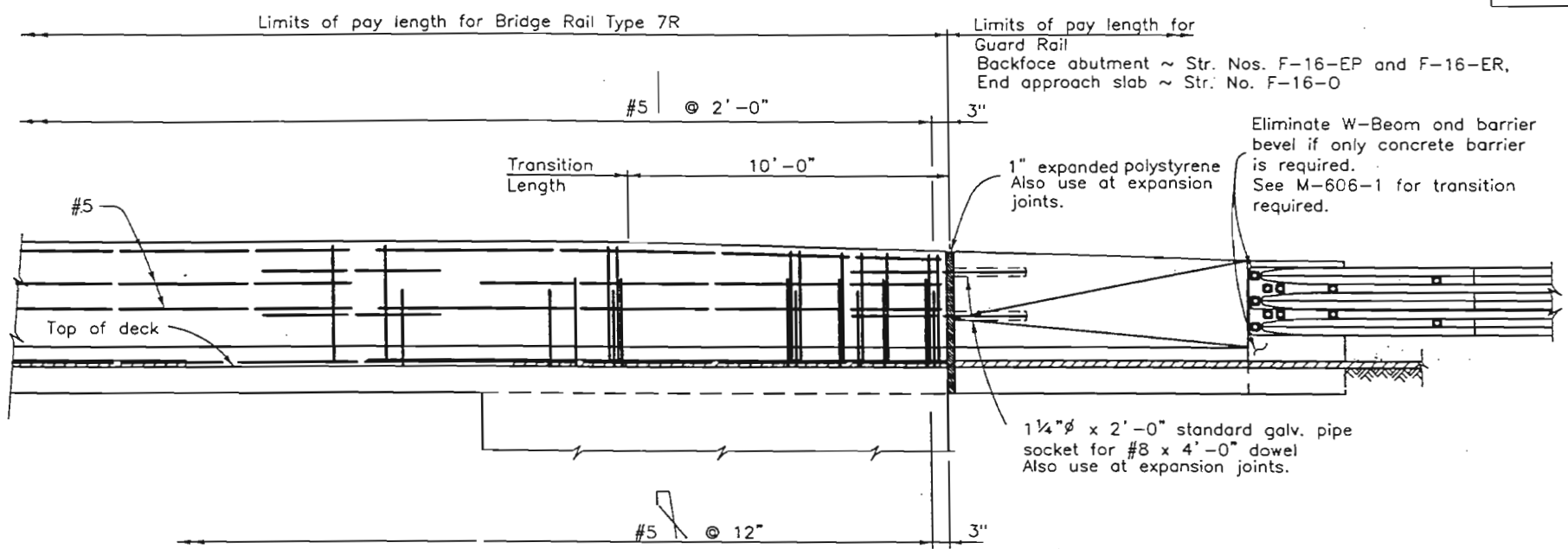
Description	Unit	Per Lin. Ft.
Concrete Class D	Cu. Yd.	0.08
Reinforcing Steel (Epoxy)	Lb.	16.5

**COLORADO  
DEPARTMENT OF TRANSPORTATION**

**BRIDGE RAIL TYPE 7R**

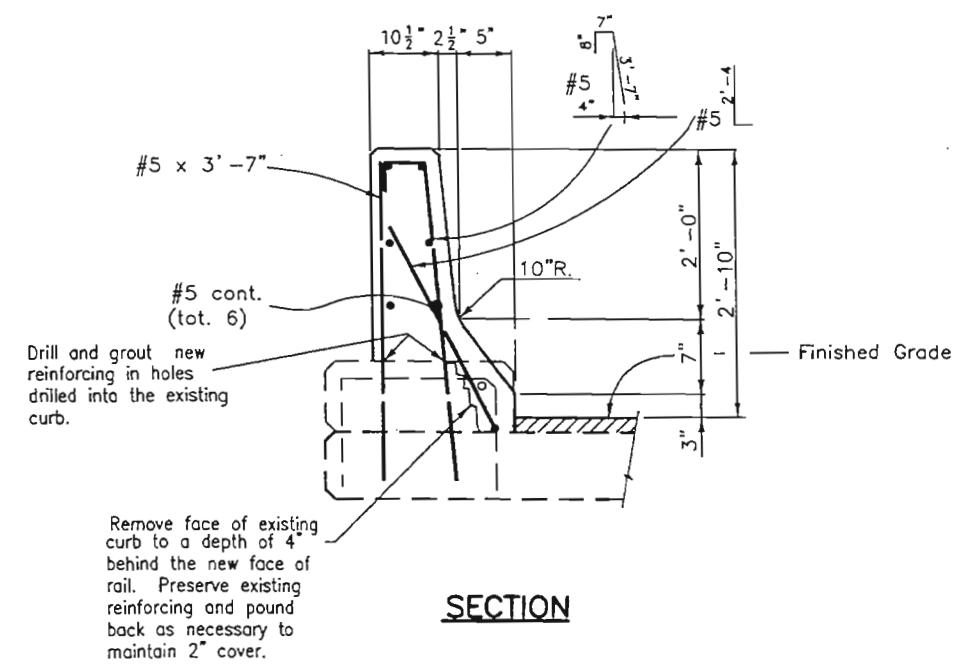
Designer G.DAVYDOV	Structure F-16-0,F-16-ER
Detailer G.DAVYDOV	Numbers F-16-EP
Drawing Number B 7	of 8 Drawings

Revision Dates	(Preliminary Stage Only)
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**ELEVATION**

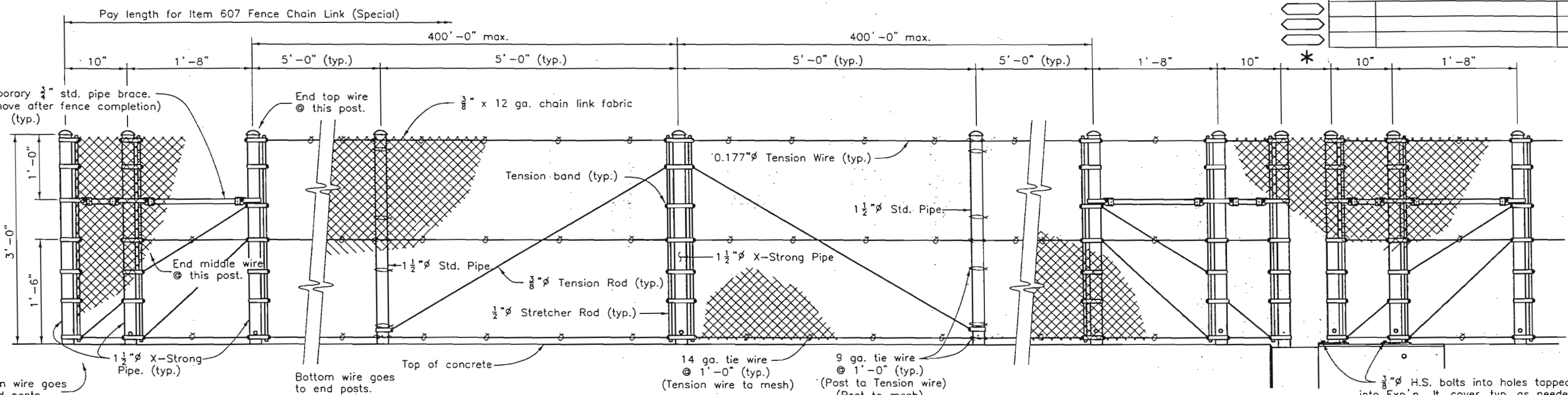
**TRANSITION TO CONNECT  
BRIDGE RAIL TYPE 7R  
TO GUARD RAIL**



**SECTION**

Design		Date		Initial		Date		Initial		Date	
Designed By	GHD	7/99	7/99	Checked By	GHD	7/99	7/99	Checked By	EHH	7/99	7/99
Checked By	MAN	10/99	9/99	Checked By	EHH	9/99	9/99	Checked By	EHH	9/99	9/99

11/02/1999 HADLEY:D:\GARRISON\FROM FIELD\07RAIL7R.DWG



Quantities		DATE	
INITIAL	DATE	INITIAL	DATE
QHD	8/99	QHD	8/99
EHH	8/99	EHH	8/99
Checked By		Checked By	
Design		DATE	
INITIAL	DATE	INITIAL	DATE
QHD	8/99	QHD	8/99
MAN	10/99	MAN	10/99
Checked By		Checked By	

**END POSTS      LINE POST      BRACE POST (spa. @ 400' max.)      LINE POST      END POSTS AT EXPANSION DEVICE**

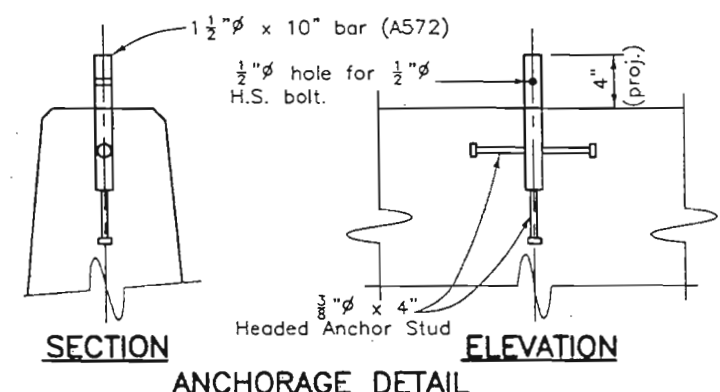
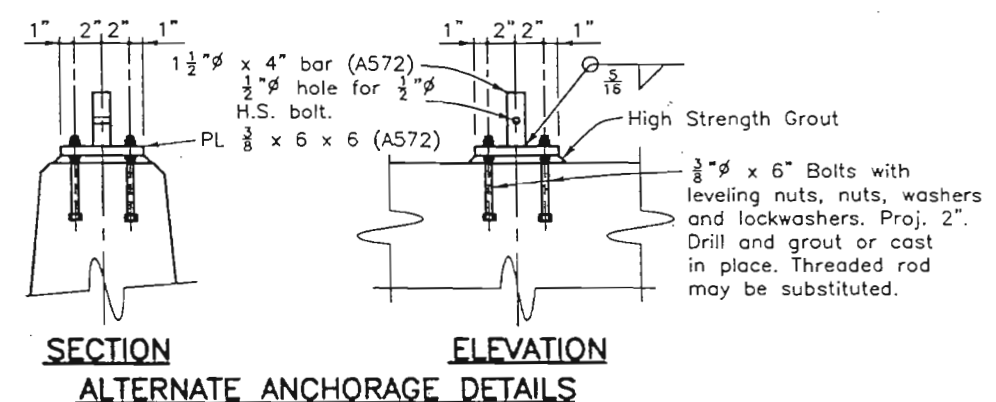
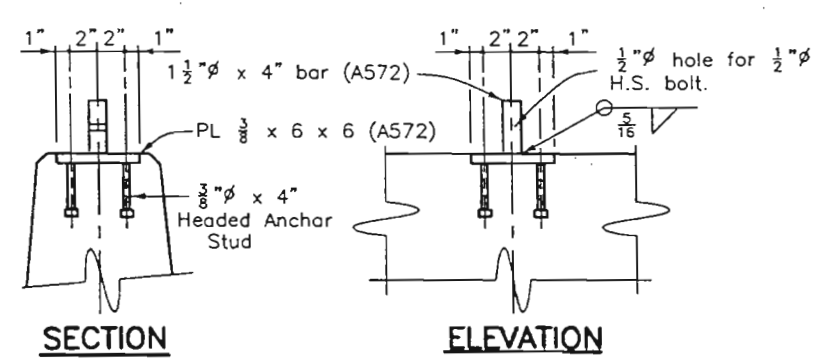
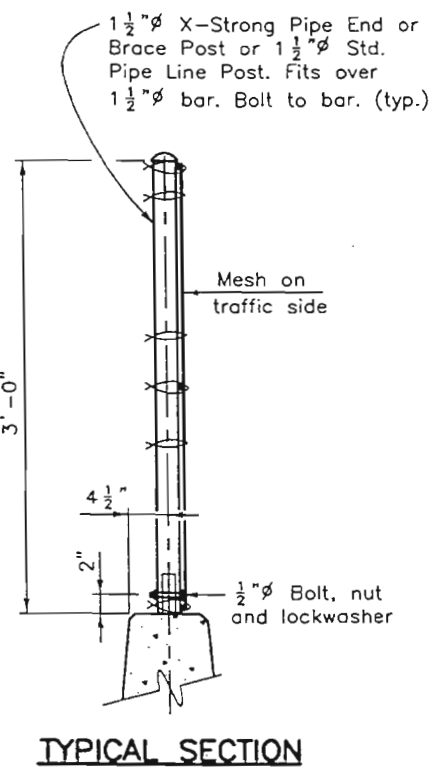
- NOTES**
- \* For Steel Bridges: Use 1/2 of rated joint motion +6", 8" min. If not known, rated motion may be assumed to be 1 1/4" per 100' contributing to motion.
  - \* For Concrete Bridges: Use 1/4 of rated joint motion +6", 8" min. If not known, rated motion may be assumed to be 1 1/4" per 100' contributing to motion.
  - \* \* exceeds 10" run mesh over gap with enough slack for 1/2 rated expansion motion.

Anchorage assembly shall be galvanized after fabrication. If Vinyl Coating is specified, the fence assembly shall be Galvanized and Vinyl Coated after fabrication. Anchorage shall only be galvanized after fabrication. Tension Rods and Wires shall have turnbuckles. Post shall be vertical. Pipe shall conform to ASTM A53 Type E or S, Grade B.

Standard Color Vinyl Coatings over Galvanized Wire	Munsell Color System No. (as per ASTM)
Black	1.8PB 1.26/0.5

**DESIGN DATA**

Total Tension = 5400 lbs.  
 Test with: Max. Midbay deflection = 1 1/4" for Lateral Load of 160 lbs. on 1 ft<sup>2</sup>, 1'-6" up @ center of bay.  
 Live Load: wind load = 32 psf or snow impact load = 96 plf @ 1'-6" up  
 Structural Steel: Pipe f<sub>y</sub> = 35,000 psi  
 ASTM A572 (GR 50) f<sub>y</sub> = 50,000 psi

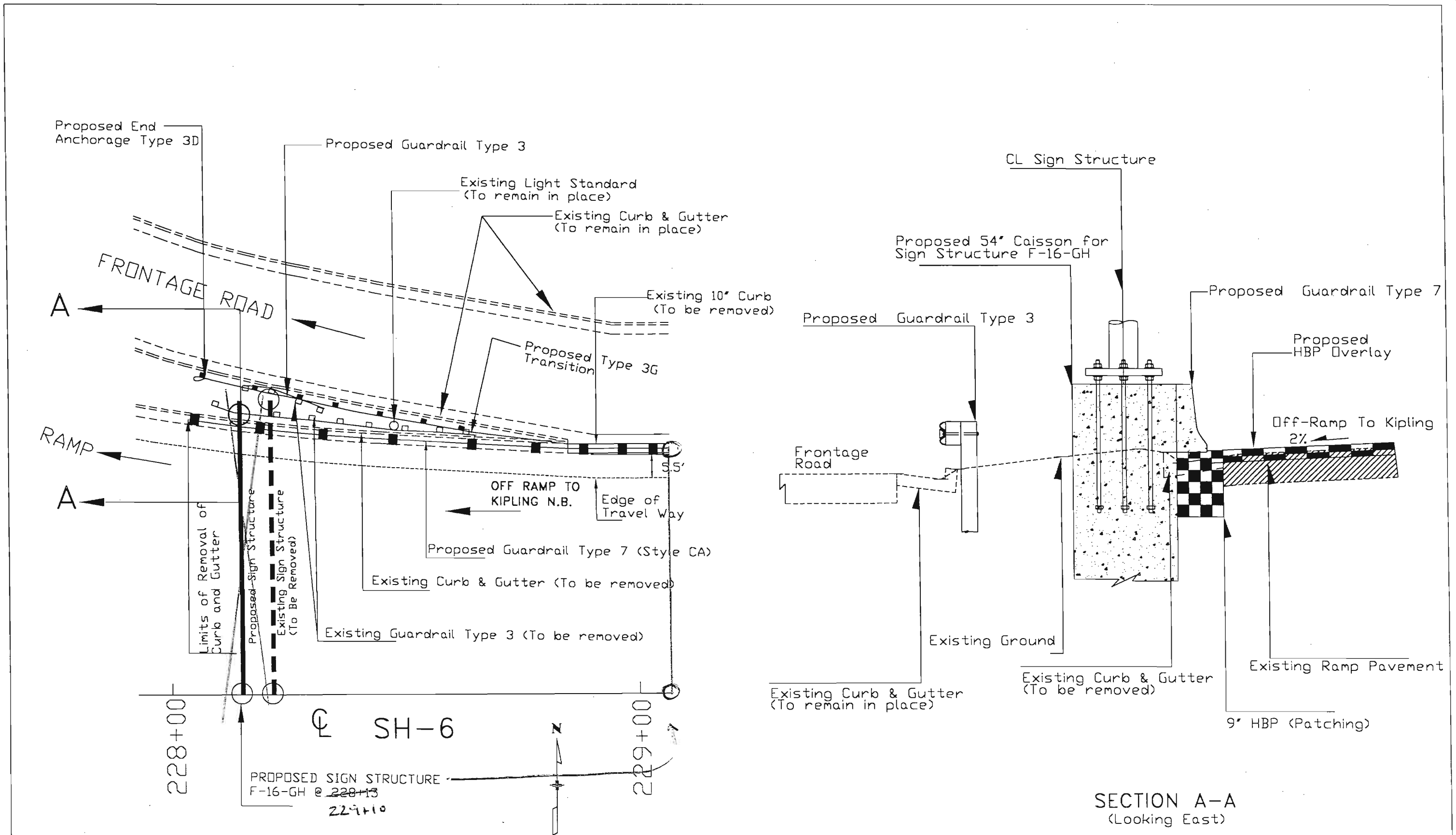


**COLORADO DEPARTMENT OF TRANSPORTATION**

**FENCE CHAIN LINK (SPECIAL) (36 INCH)**

Designer G.Davydov	Structure F-16-0, F-16-EF
Detailer G.Davydov	Numbers F-16-ER
Drawing Number B8	of 8 Drawings


Revision Dates	(Preliminary Stage Only)
8-99	



Computer File Information	
Creation Date:	09/02/99 Initials: DE
Last Modification Date:	11/03/99 Initials: BWD
Full Path:	C:\PROJECTS\12023
Drawing File Name:	F-16-GH.dwg
Acad Ver.	R14 Scale: ~1"=20' Units: ENGLISH

Sheet Revisions	

Colorado Department of Transportation



2000 SOUTH HOLLY ST.  
ROOM 185  
DENVER, CO 80222  
Phone: (303) 757-9879 FAX: (303) 757-9053

Region 6 GCH

As Constructed
No Revisions:
Revised: 11/9/01
Void:

DETAIL OF GUARDRAIL @SIGN STRUCTURE F-16-GH	
Designer:	Structure Numbers
Detailer:	
Sheet Subset:	Subset Sheets:

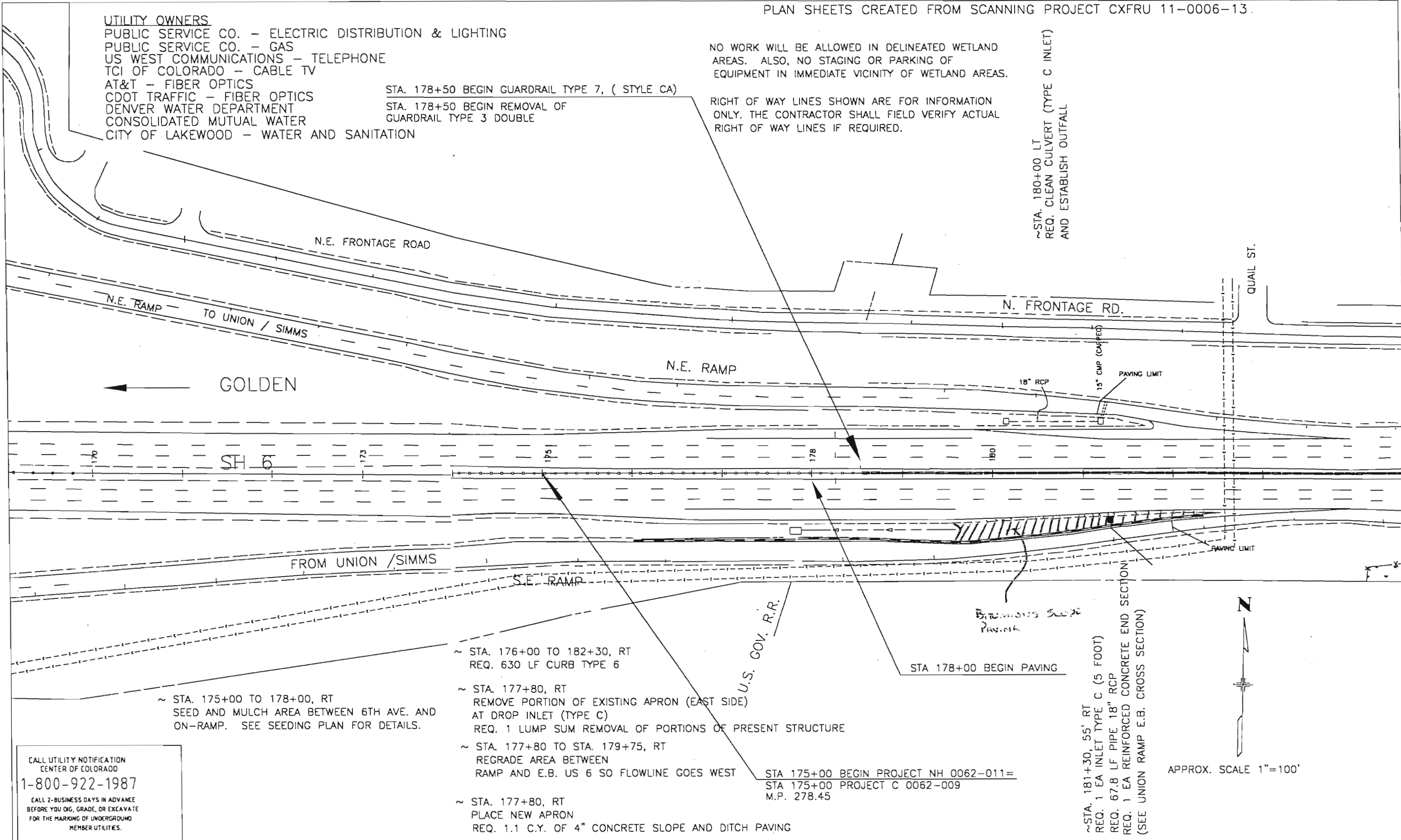
Project No./Code	NH 0062-011
	12023
Sheet Number	38

**UTILITY OWNERS**  
 PUBLIC SERVICE CO. - ELECTRIC DISTRIBUTION & LIGHTING  
 PUBLIC SERVICE CO. - GAS  
 US WEST COMMUNICATIONS - TELEPHONE  
 TCI OF COLORADO - CABLE TV  
 AT&T - FIBER OPTICS  
 CDOT TRAFFIC - FIBER OPTICS  
 DENVER WATER DEPARTMENT  
 CONSOLIDATED MUTUAL WATER  
 CITY OF LAKEWOOD - WATER AND SANITATION

NO WORK WILL BE ALLOWED IN DELINEATED WETLAND AREAS. ALSO, NO STAGING OR PARKING OF EQUIPMENT IN IMMEDIATE VICINITY OF WETLAND AREAS.

RIGHT OF WAY LINES SHOWN ARE FOR INFORMATION ONLY. THE CONTRACTOR SHALL FIELD VERIFY ACTUAL RIGHT OF WAY LINES IF REQUIRED.

~STA. 180+00 LT  
 REQ. CLEAN CULVERT (TYPE C INLET)  
 AND ESTABLISH OUTFALL



~ STA. 175+00 TO 178+00, RT  
 SEED AND MULCH AREA BETWEEN 6TH AVE. AND ON-RAMP. SEE SEEDING PLAN FOR DETAILS.

- ~ STA. 176+00 TO 182+30, RT  
 REQ. 630 LF CURB TYPE 6
- ~ STA. 177+80, RT  
 REMOVE PORTION OF EXISTING APRON (EAST SIDE) AT DROP INLET (TYPE C)  
 REQ. 1 LUMP SUM REMOVAL OF PORTIONS OF PRESENT STRUCTURE
- ~ STA. 177+80 TO STA. 179+75, RT  
 REGRADE AREA BETWEEN RAMP AND E.B. US 6 SO FLOWLINE GOES WEST
- ~ STA. 177+80, RT  
 PLACE NEW APRON  
 REQ. 1.1 C.Y. OF 4" CONCRETE SLOPE AND DITCH PAVING

STA 175+00 BEGIN PROJECT NH 0062-011=  
 STA 175+00 PROJECT C 0062-009  
 M.P. 278.45

~STA. 181+30, 55' RT  
 REQ. 1 EA INLET TYPE C (5 FOOT)  
 REQ. 67.8 LF PIPE 18" RCP  
 REQ. 1 EA REINFORCED CONCRETE END SECTION  
 (SEE UNION RAMP E.B. CROSS SECTION)

CALL UTILITY NOTIFICATION  
 CENTER OF COLORADO  
**1-800-922-1987**  
 CALL 2-BUSINESS DAYS IN ADVANCE  
 BEFORE YOU DIG, GRADE, OR EXCAVATE  
 FOR THE MARKING OF UNDERGROUND  
 MEMBER UTILITIES.

Computer File Information	
Creation Date:	03/15/99 Initials: AS
Last Modification Date:	11/08/99 Initials: AK
Full Path:	C:\PROJECTS\12023\
Drawing File Name:	FINAL_MASTR13.DWG\SHEET1
Acad Ver.	R14 Scale: 1"=100' Units: ENGLISH

Sheet Revisions	

Colorado Department of Transportation  
 2000 SOUTH HOLLY ST.  
 ROOM 185  
 DENVER, CO 80222  
 Phone: (303) 984-5260 FAX: (303) 984-5299

**Region 6** **DEW**

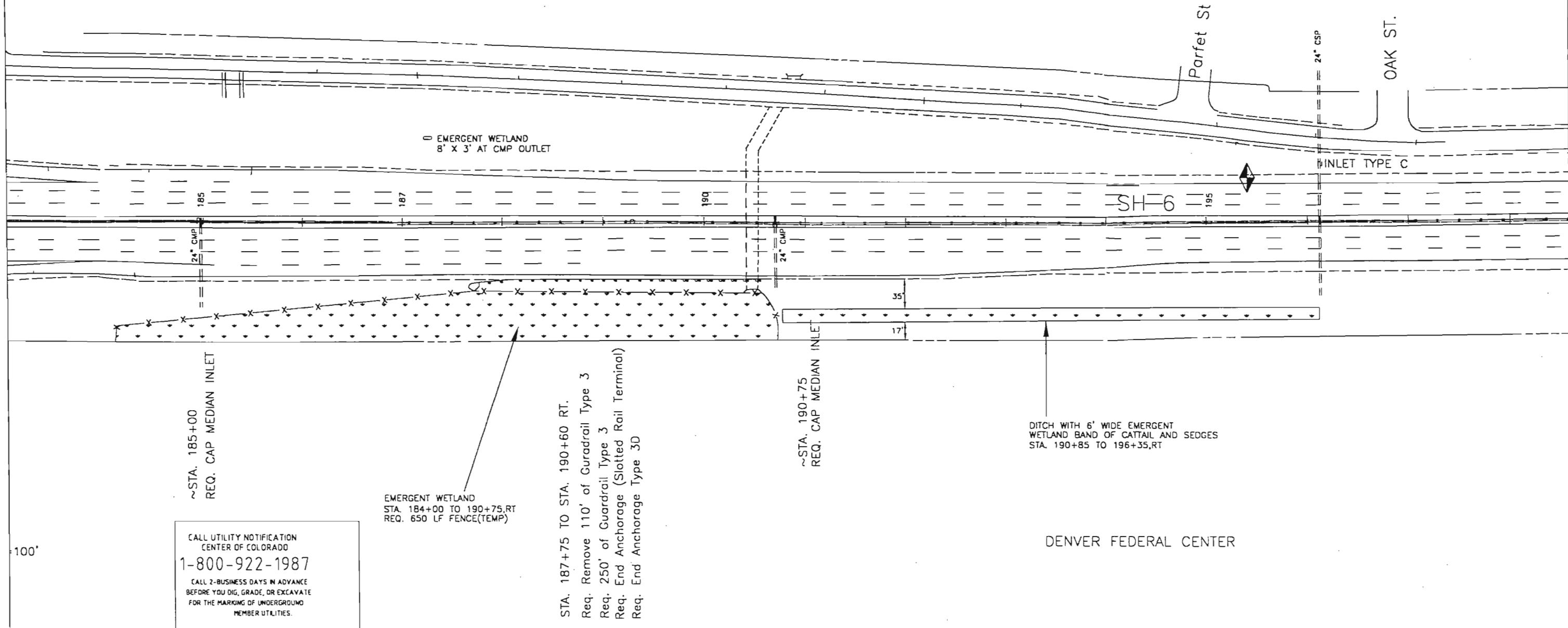
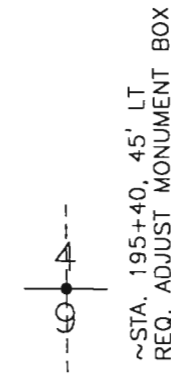
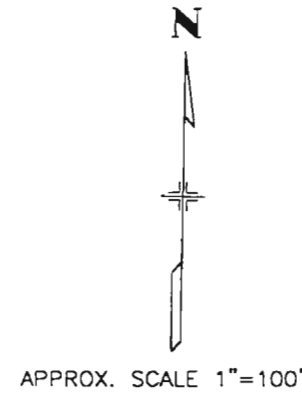
As Constructed	
No Revisions:	
Revised:	11/9/01
Void:	

PLAN SHEET 1	
Designer:	
Detailer:	
Sheet Subset:	
Structure Numbers:	
Subset Sheets:	1 of 10

Project No./Code	
NH 0062-011	
12023	
Sheet Number	39

NO WORK WILL BE ALLOWED IN DELINEATED WETLAND AREAS.  
ALSO, NO STAGING OR PARKING OF EQUIPMENT IN IMMEDIATE VICINITY OF WETLAND AREAS.

RIGHT OF WAY LINES SHOWN ARE FOR INFORMATION ONLY. THE CONTRACTOR SHALL FIELD VERIFY ACTUAL RIGHT OF WAY LINES IF REQUIRED.



CALL UTILITY NOTIFICATION CENTER OF COLORADO  
1-800-922-1987  
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.

Computer File Information	
Creation Date:	03/15/99 Initials: AS
Last Modification Date:	11/08/99 Initials: AK
Full Path:	C:\PROJECTS\12023
Drawing File Name:	FINAL_MASTR13.DWG/SHEET2
Acad Ver.	R14 Scale~1"=100' Units: ENGLISH

Sheet Revisions	

Colorado Department of Transportation  
2000 SOUTH HOLLY ST.  
ROOM 185  
DENVER, CO 80222  
Phone: (303) 984-5260 FAX: (303) 984-5299  
Region 6 DEW

As Constructed
No Revisions: 11/19/01
Revised:
Void:

PLAN SHEET 2	
Designer:	Structure Numbers
Detailer:	
Sheet Subset:	Subset Sheets: 2 of 10

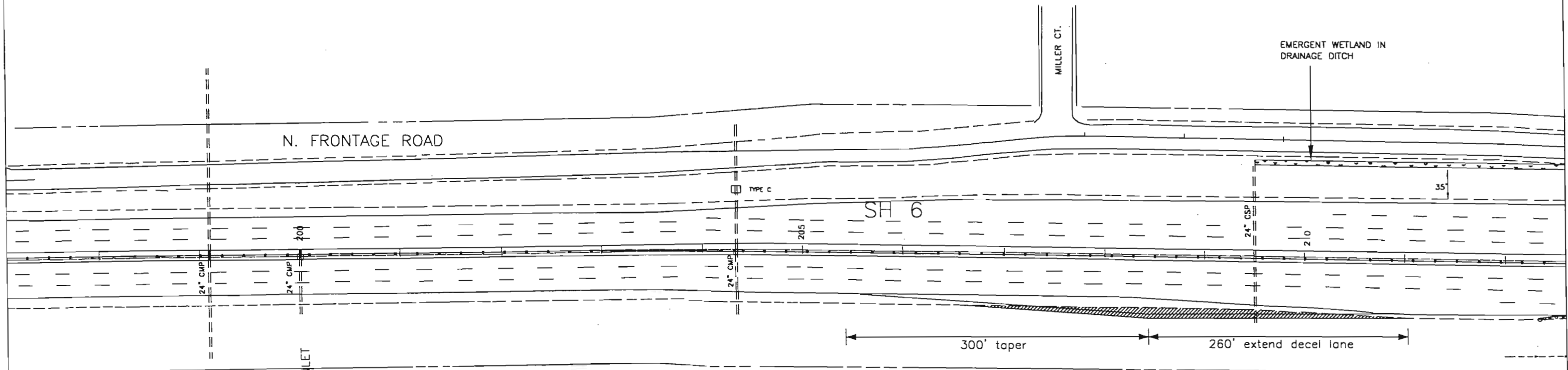
Project No./Code	NH 0062-011
	12023
Sheet Number	40





APPROX. SCALE 1"=100'

NO WORK WILL BE ALLOWED IN DELINEATED WETLAND AREAS.  
ALSO, NO STAGING OR PARKING OF EQUIPMENT IN IMMEDIATE VICINITY OF WETLAND AREAS.



~STA. 200+00  
REQ. CAP MEDIAN INLET

DENVER FEDERAL CENTER

Widened Area

STA. 209+50 RT  
REQ. 4 LF 24" CSP  
EXTEND PIPE AND EXISTING FLOWLINE

STA. 211+40 TO 213+70, CL  
REQ. REMOVAL OF GUARDRAIL (TYPE 4)

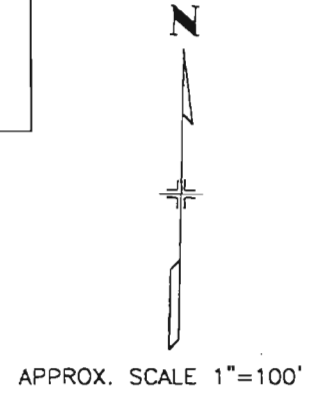
CALL UTILITY NOTIFICATION  
CENTER OF COLORADO  
1-800-922-1987  
CALL 2-BUSINESS DAYS IN ADVANCE  
BEFORE YOU DIG, GRADE, OR EXCAVATE  
FOR THE MARKING OF UNDERGROUND  
MEMBER UTILITIES.

RIGHT OF WAY LINES SHOWN ARE FOR INFORMATION ONLY. THE CONTRACTOR SHALL FIELD VERIFY ACTUAL RIGHT OF WAY LINES IF REQUIRED.

Computer File Information		Sheet Revisions		Colorado Department of Transportation		As Constructed		PLAN SHEET 3		Project No./Code	
Creation Date:	03/15/99 Initials: AS				2000 SOUTH HOLLY ST.	No Revisions:	11/12/01			NH 0062-011	
Last Modification Date:	11/08/99 Initials: AK				ROOM 185	Revised:		Designer:	Structure	12023	
Full Path:	C:\PROJECTS\12023				DENVER, CO 80222	Void:		Detailer:	Numbers		
Drawing File Name:	FINAL_MASTR13.DWG/SHEET3			Region 6	Phone: (303) 984-5260 FAX: (303) 984-5299			Sheet Subset:	Subset Sheets:	3 of 10	Sheet Number
Acad Ver.	R14 Scale: ~1"=100' Units: ENGLISH				DEW						41

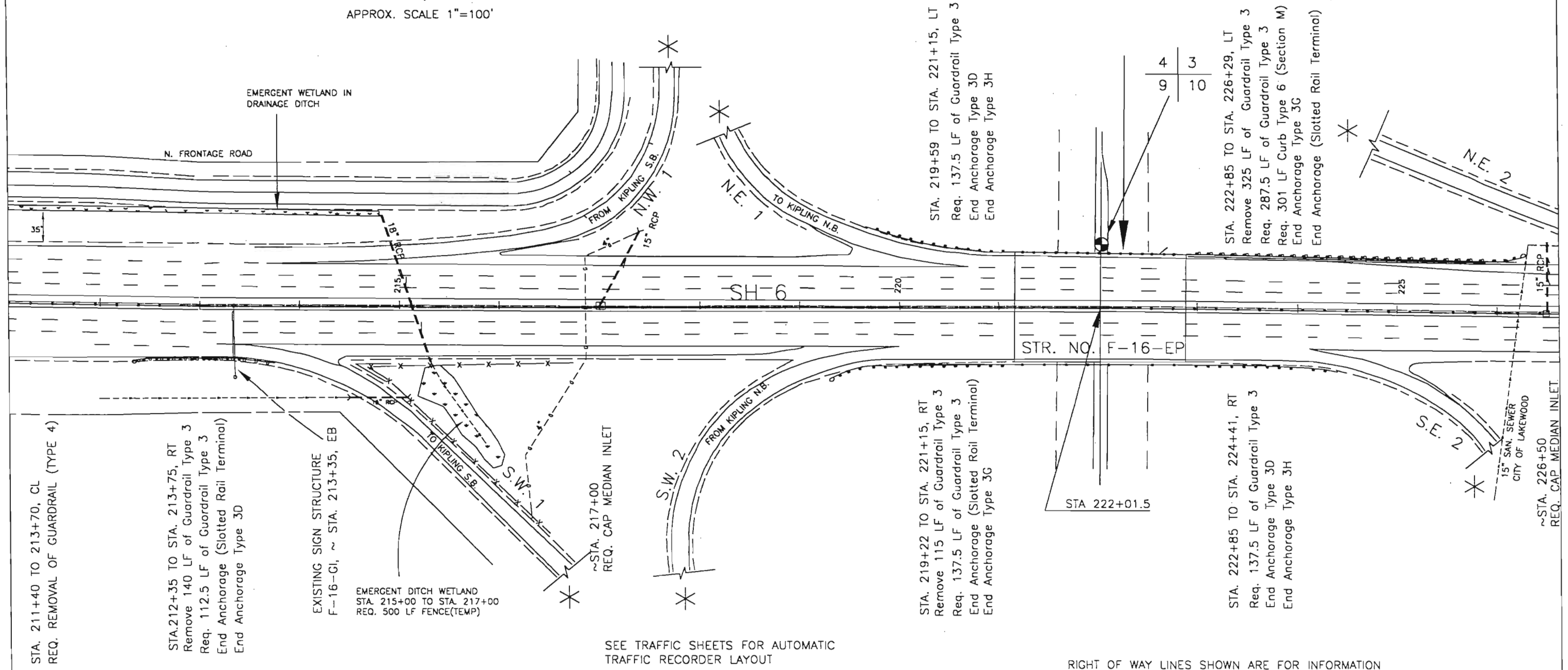
CALL UTILITY NOTIFICATION  
CENTER OF COLORADO  
1-800-922-1987  
CALL 2-BUSINESS DAYS IN ADVANCE  
BEFORE YOU DIG, GRADE, OR EXCAVATE  
FOR THE MARKING OF UNDERGROUND  
MEMBER UTILITIES.

NO WORK WILL BE ALLOWED IN DELINEATED WETLAND AREAS.  
ALSO, NO STAGING OR PARKING OF EQUIPMENT IN IMMEDIATE  
VICINITY OF WETLAND AREAS.



\* CONTINUE PAVING TO THE EDGE  
OF THE OUTSIDE TRAVEL LANE @ KIPLING

KIPLING STREET  
(SH 391)



SEE TRAFFIC SHEETS FOR AUTOMATIC  
TRAFFIC RECORDER LAYOUT

RIGHT OF WAY LINES SHOWN ARE FOR INFORMATION  
ONLY. THE CONTRACTOR SHALL FIELD VERIFY ACTUAL  
RIGHT OF WAY LINES IF REQUIRED.

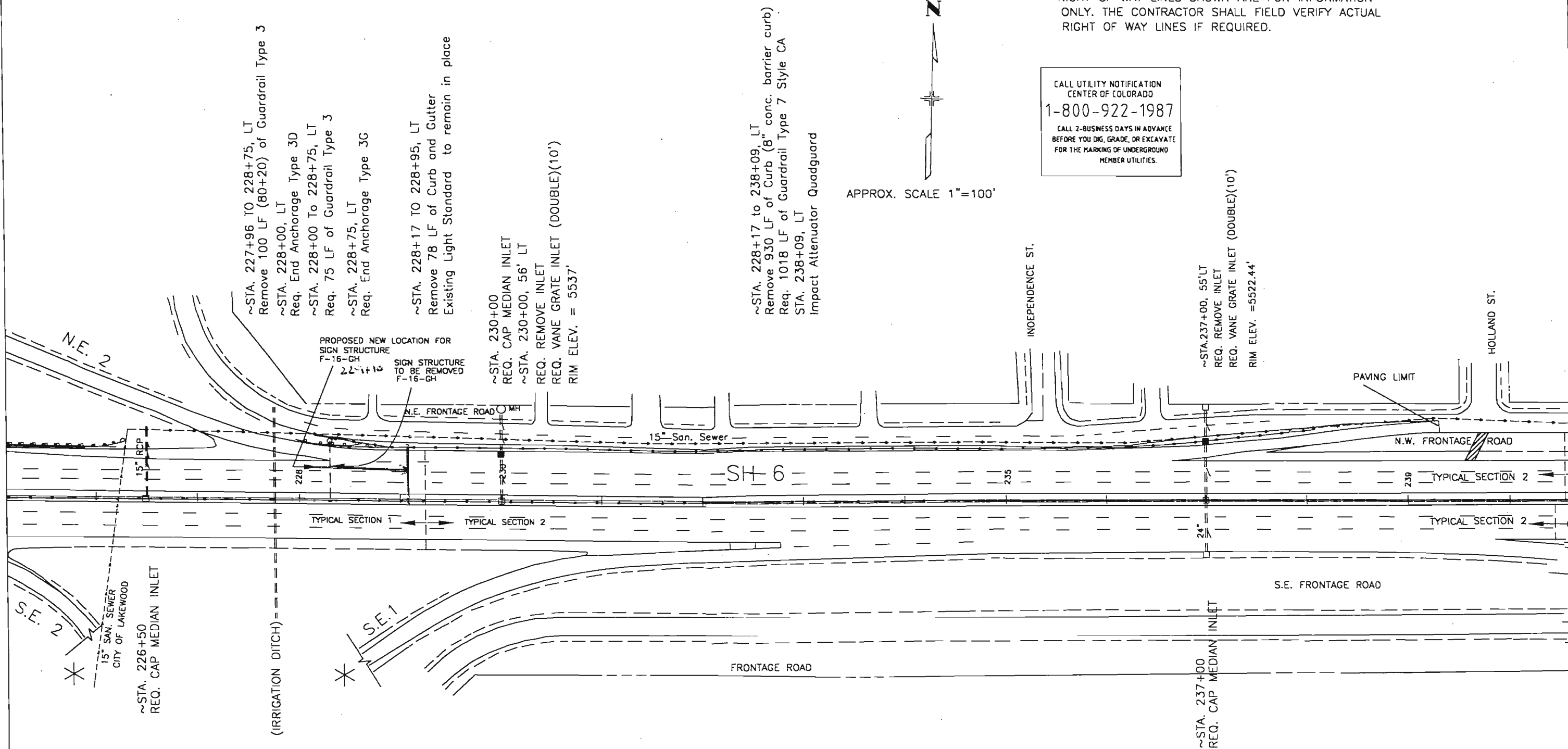
Computer File Information		Sheet Revisions		Colorado Department of Transportation		As Constructed		PLAN SHEET 4		Project No./Code	
Creation Date:	03/15/99	Initials:	AS			2000 SOUTH HOLLY ST. ROOM 185 DENVER, CO 80222 Phone: (303) 984-5260 FAX: (303) 984-5299		No Revisions: 1/19/01		NH 0062-011	
Last Modification Date:	11/08/99	Initials:	AK			Region 6		Revised:		12023	
Full Path:	C:\PROJECTS\12023					DEW		Vaid:		Sheet Number 42	
Drawing File Name:	FINAL_MASTR13.DWG/SHEET4							Designer:		Structure Numbers	
Acad Ver.	R14	Scale:	~1"=100'	Units:	ENGLISH			Detailer:		Subset Sheets: 4 of 10	
								Sheet Subst:			

RIGHT OF WAY LINES SHOWN ARE FOR INFORMATION ONLY. THE CONTRACTOR SHALL FIELD VERIFY ACTUAL RIGHT OF WAY LINES IF REQUIRED.

CALL UTILITY NOTIFICATION CENTER OF COLORADO  
1-800-922-1987  
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.



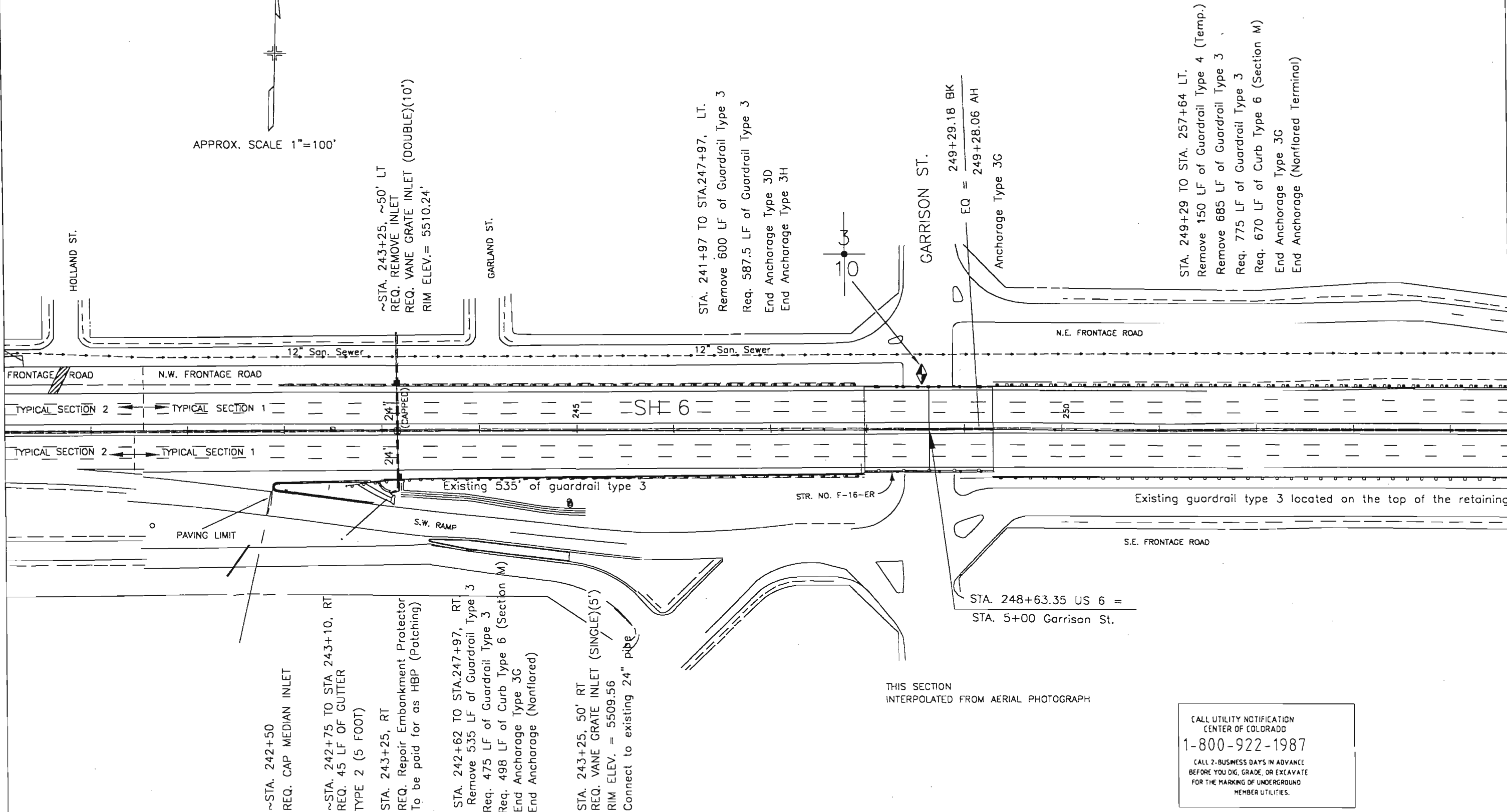
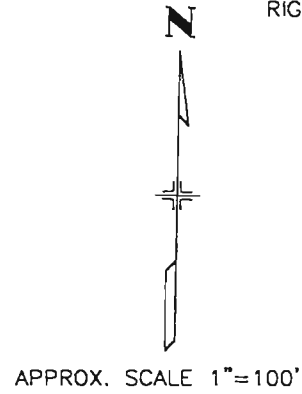
APPROX. SCALE 1"=100'



Sign structure F-16-GH is painted and was originally erected in 1965. There is a high probability that the paint contains lead and/or other heavy metals. Section 250.04 of the Environmental Health and Safety Management Standard Specification shall be followed in the removal and disposal or salvaging (recycling) of the components. Prior to removal, the paint shall be tested by a Health & Safety Officer or Monitoring Technician. If the structure components are to be salvaged or recycled, a Total Lead Test shall be performed. If they are to be disposed of in a landfill, the landfill will require a TCLP, or leachability test. If the paint is determined to contain high levels of lead and/or other heavy metals, and the components are to be torched or cut, a Health and Safety Officer shall prepare a methods statement and either that person or a Monitoring Technician shall be present during structure removal. (This shall not be necessary if unbolting or some other method is used which does not require scraping of paint or paint flakes becoming dislodged.)

Computer File Information		Sheet Revisions		Colorado Department of Transportation		As Constructed		PLAN SHEET 5		Project No./Code	
Creation Date:	03/15/99 Initials: AS			2000 SOUTH HOLLY ST. ROOM 185 DENVER, CO 80222 Phone: (303) 984-5260 FAX: (303) 984-5299 Region 6 DEW	No Revisions:			NH 0062-011			
Last Modification Date:	11/09/99 Initials: BWD				Revised: 11/9/01	Designer:	Structure Numbers	12023			
Full Path:	C:\PROJECTS\12023				Void:	Detailer:	Sheet Subset:	Subset Sheets:	5 of 10	Sheet Number 43	
Drawing File Name:	FINAL_MASTR13.DWG/SHEETS										
Acad Ver.	R14 Scale: 1"=100' Units: ENGLISH										

RIGHT OF WAY LINES SHOWN ARE FOR INFORMATION ONLY. THE CONTRACTOR SHALL FIELD VERIFY ACTUAL RIGHT OF WAY LINES IF REQUIRED.



CALL UTILITY NOTIFICATION  
CENTER OF COLORADO  
1-800-922-1987  
CALL 2-BUSINESS DAYS IN ADVANCE  
BEFORE YOU DIG, GRADE, OR EXCAVATE  
FOR THE MARKING OF UNDERGROUND  
MEMBER UTILITIES.

Computer File Information			
Creation Date:	03/15/99	Initials:	AS
Last Modification Date:	11/08/99	Initials:	AK
Full Path:	C:\PROJECTS\12023		
Drawing File Name:	FINAL_MASTR13.DWG\SHEET6		
Acad Ver.	R14	Scale:	1"=100'
		Units:	ENGLISH

Sheet Revisions			

Colorado Department of Transportation  
2000 SOUTH HOLLY ST.  
ROOM 185  
DENVER, CO 80222  
Phone: (303) 984-5260 FAX: (303) 984-5299

Region 6 DEW

As Constructed	
No Revisions:	11/9/01
Revised:	
Void:	

PLAN SHEET 6			
Designer:		Structure Numbers:	
Detailer:			
Sheet Subset:		Subset Sheets:	6 of 10

Project No./Code	
NH 0062-011	
12023	
Sheet Number	44

CALL UTILITY NOTIFICATION  
CENTER OF COLORADO  
1-800-922-1987  
CALL 2-BUSINESS DAYS IN ADVANCE  
BEFORE YOU DIG, GRADE, OR EXCAVATE  
FOR THE MARKING OF UNDERGROUND  
MEMBER UTILITIES.

RIGHT OF WAY LINES SHOWN ARE FOR INFORMATION  
ONLY. THE CONTRACTOR SHALL FIELD VERIFY ACTUAL  
RIGHT OF WAY LINES IF REQUIRED.

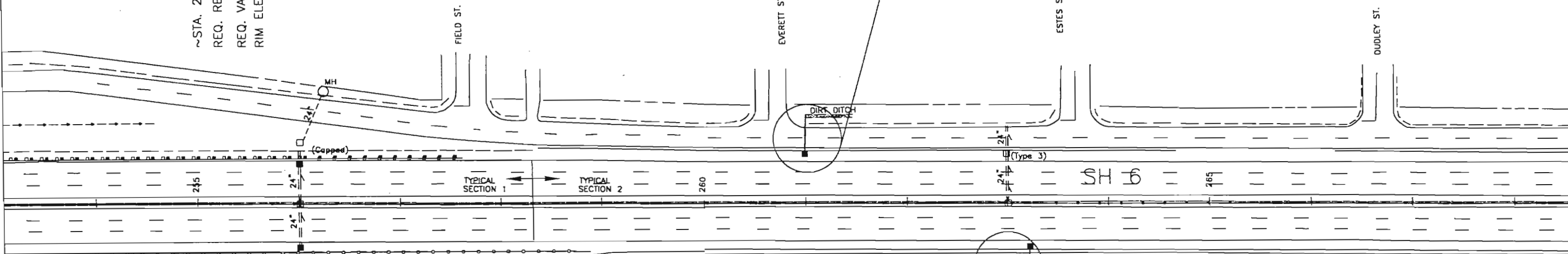
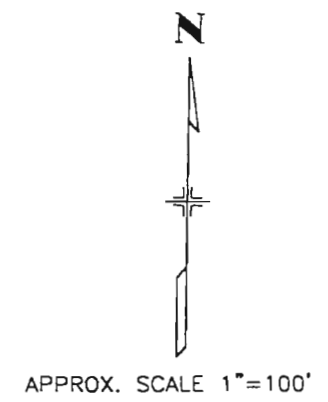
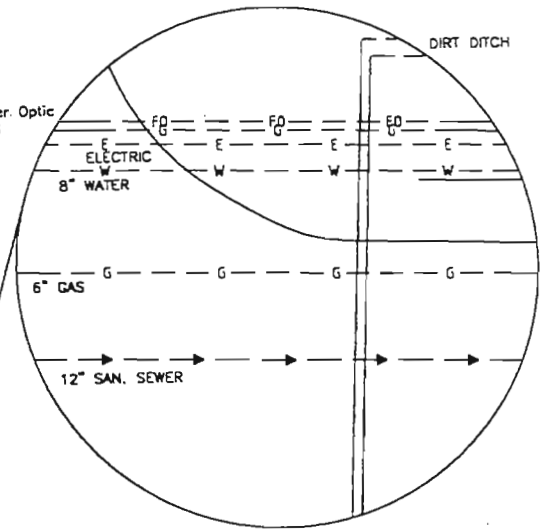
~STA. 256+00, ~ 60' LT  
REQ. REMOVE INLET  
REQ. VANE GRATE INLET(DOUBLE)(10')  
RIM ELEV. = 5495.94

~STA. 261+00, 48' LT.  
REQ. VANE GRATE INLET(DOUBLE)(5')  
REQ. 1 EA REINFORCED CONCRETE END SECTION  
RIM ELEV. = 5489.31'  
(SEE EVERETT ST. CROSS-SECTION)  
REQ. 27 LF 18" RCP

STA. 263+00, 48' LT  
REQ. MODIFY INLET

~STA. 256+00  
REQ. CAP MEDIAN INLET  
(TYPE 13)  
~STA. 263+15, 48' RT  
REQ. REMOVAL OF INLET (CAPPED)  
REQ. VANE GRATE INLET(DOUBLE)(5')  
REQ. 1 EA REINFORCED CONCRETE END SECTION  
RIM ELEV. = 5485.75'  
(SEE ESTES ST. CROSS SECTION)  
Req. 34.7 LF 18" RCP

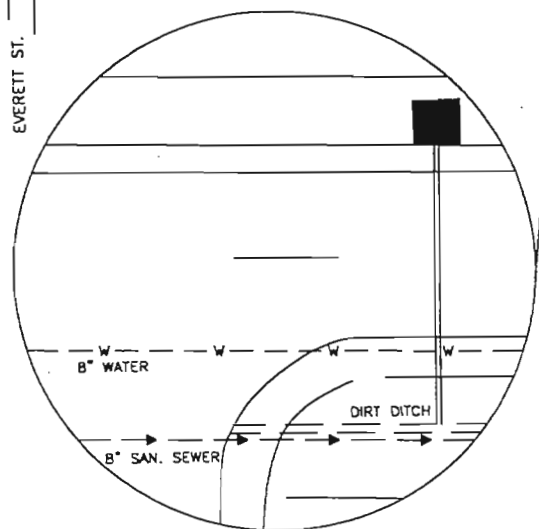
~STA. 269+00, 48' RT  
REQ. VANE GRATE INLET(DOUBLE)(5')



the top of the retaining wall to remain in place


~STA. 256+00  
REQ. CAP MEDIAN INLET  
~STA. 256+00, ~ 45' RT  
REQ. REMOVE INLET  
REQ. VANE GRATE INLET(DOUBLE)(10')  
RIM ELEV. = 5496.44'

Existing 300' of guardrail typ. 4 temp.  
To Remain In Place



Computer File Information	
Creation Date:	03/15/99 Initials: AS
Last Modification Date:	11/08/99 Initials: AK
Full Path:	C:\PROJECTS\12023
Drawing File Name:	FINAL_MASTR13.DWG/SHEET7
Acad Ver.	R14 Scale: ~1"=100' Units: ENGLISH

Sheet Revisions	

Colorado Department of Transportation  
  
 2000 SOUTH HOLLY ST.  
 ROOM 185  
 DENVER, CO 80222  
 Phone: (303) 984-5260 FAX: (303) 984-5299  
 Region 6 DEW

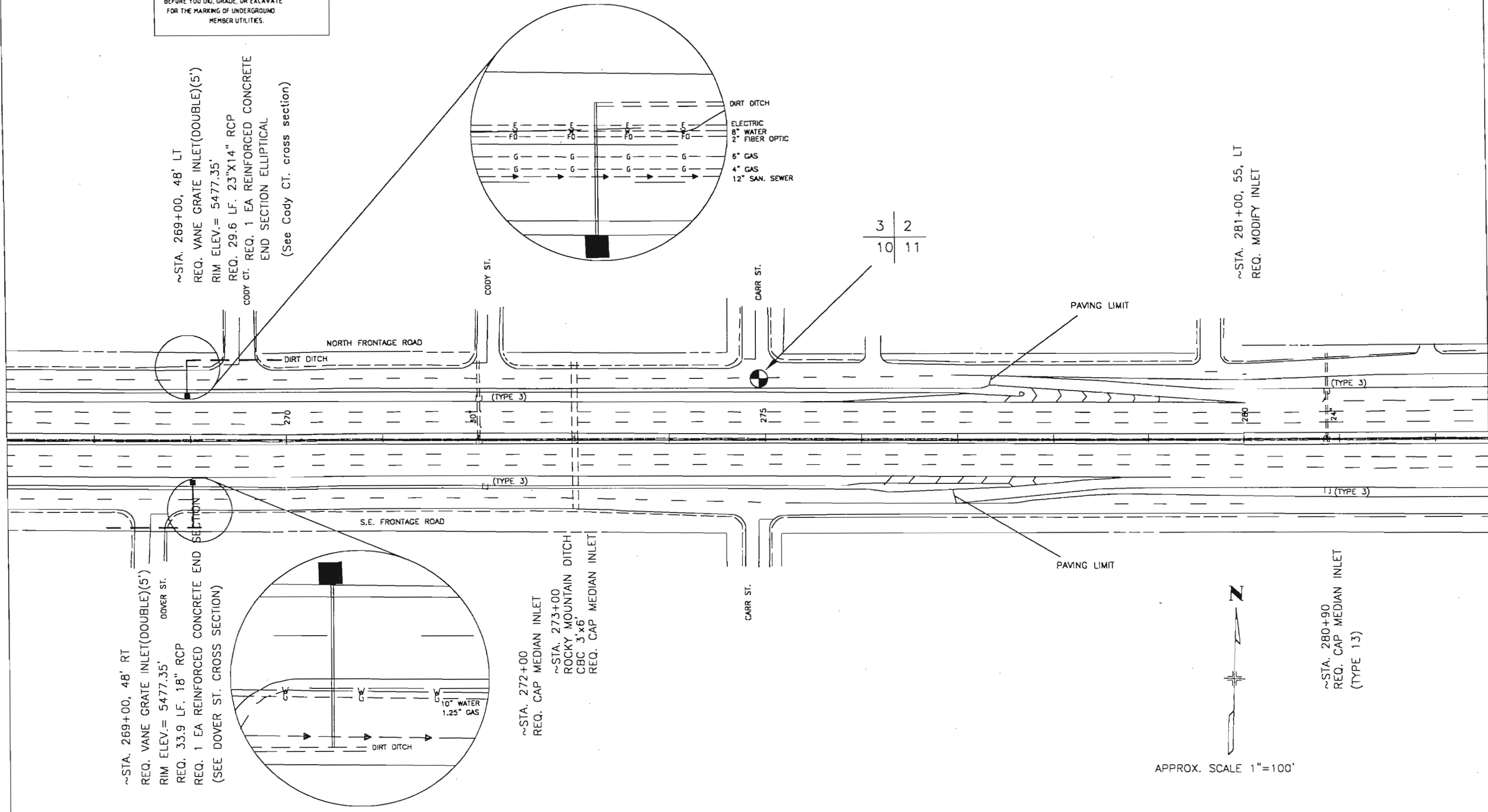
As Constructed	
No Revisions:	11/10/01
Revised:	
Void:	

PLAN SHEET 7		
Designer:	Structure Numbers	
Detailer:		
Sheet Subset:	Subset Sheets:	7 of 10

Project No./Code	
NH 0062-011	
12023	
Sheet Number	45

RIGHT OF WAY LINES SHOWN ARE FOR INFORMATION ONLY. THE CONTRACTOR SHALL FIELD VERIFY ACTUAL RIGHT OF WAY LINES IF REQUIRED.

CALL UTILITY NOTIFICATION  
CENTER OF COLORADO  
1-800-922-1987  
CALL 2-BUSINESS DAYS IN ADVANCE  
BEFORE YOU DIG, GRADE, OR EXCAVATE  
FOR THE MARKING OF UNDERGROUND  
MEMBER UTILITIES.



Computer File Information			
Creation Date:	03/15/99	Initials:	AS
Last Modification Date:	11/08/99	Initials:	AK
Full Path:	C:\PROJECTS\12023\		
Drawing File Name:	FINAL_MASTR13.DWG/SHEET8		
Acad Ver.	R14	Scale:	~1"=100'
		Units:	METRIC

Sheet Revisions	

Colorado Department of Transportation  
2000 SOUTH HOLLY ST.  
ROOM 185  
DENVER, CO 80222  
Phone: (303) 984-5260 FAX: (303) 984-5299

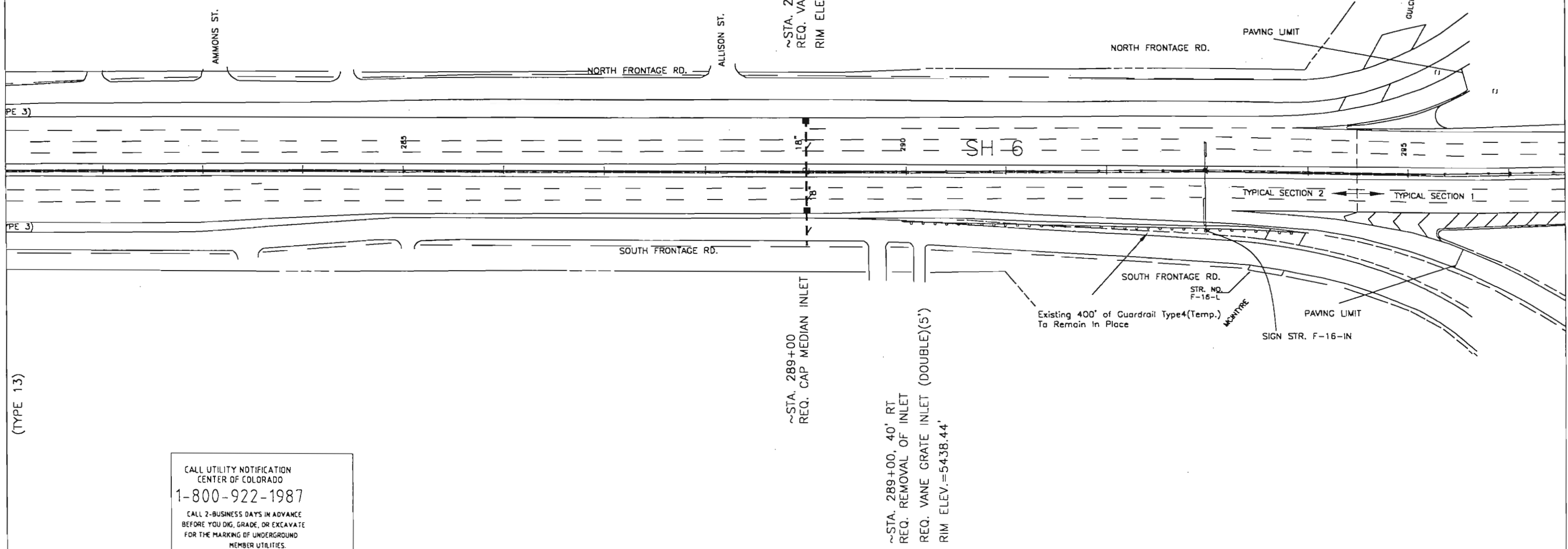
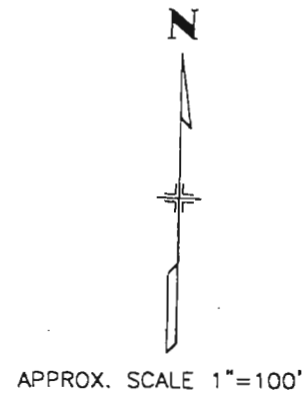
**Region 6**      **DEW**

As Constructed
No Revisions: 11/10/01
Revised:
Void:


<b>PLAN SHEET 8</b>	
Designer:	Structure Numbers:
Detailer:	Subset Sheets:
Sheet Subset:	8 of 10

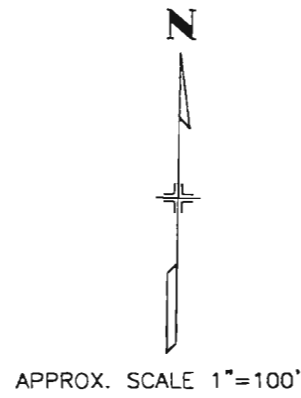
Project No./Code	NH 0062-011
	12023
Sheet Number	46

RIGHT OF WAY LINES SHOWN ARE FOR INFORMATION ONLY. THE CONTRACTOR SHALL FIELD VERIFY ACTUAL RIGHT OF WAY LINES IF REQUIRED.



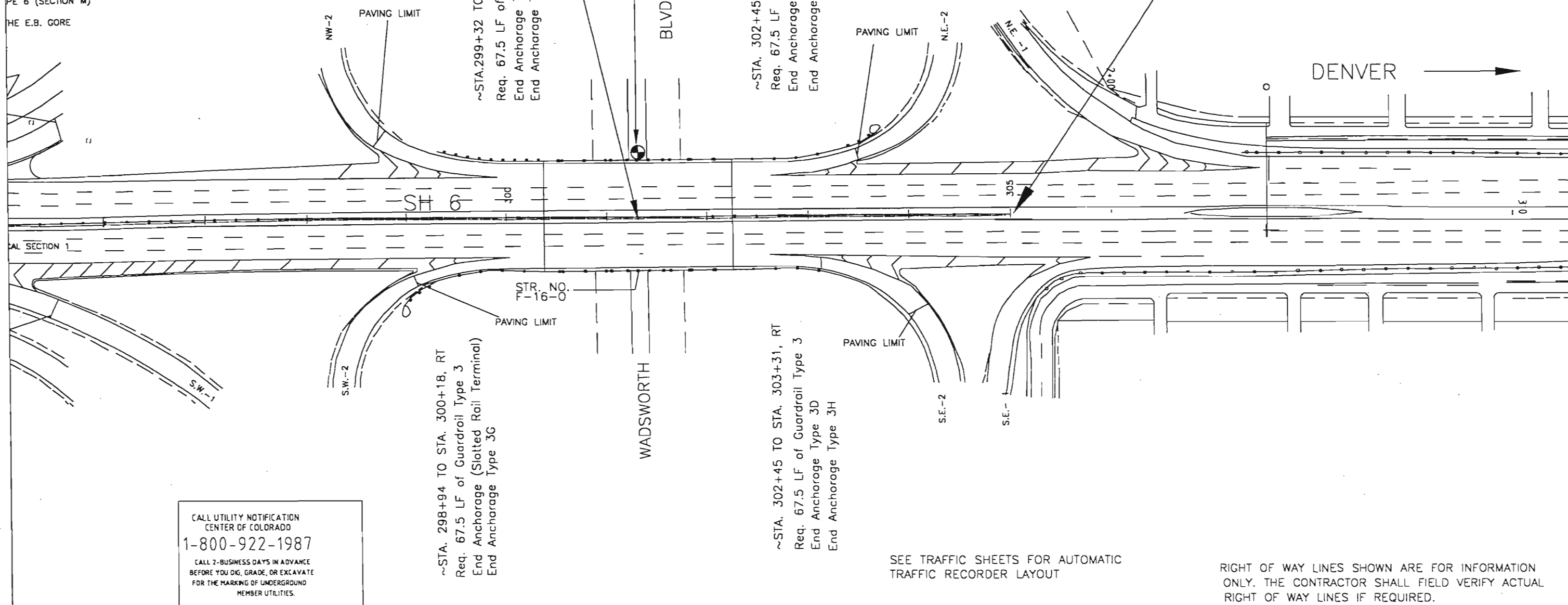
CALL UTILITY NOTIFICATION  
CENTER OF COLORADO  
1-800-922-1987  
CALL 2-BUSINESS DAYS IN ADVANCE  
BEFORE YOU DIG, GRADE, OR EXCAVATE  
FOR THE MARKING OF UNDERGROUND  
MEMBER UTILITIES.

Computer File Information		Sheet Revisions		Colorado Department of Transportation		As Constructed		PLAN SHEET 9		Project No./Code			
Creation Date:	03/15/99 Initials: AS	<input type="checkbox"/>		 2000 SOUTH HOLLY ST. ROOM 185 DENVER, CO 80222 Phone: (303) 984-5260 FAX: (303) 984-5299		No Revisions: 11/19/01		Designer:		NH 0062-011			
Last Modification Date:	11/08/99 Initials: AK	<input type="checkbox"/>				Revised:				Detailer:		12023	
Full Path:	C:\PROJECTS\UNION TO CODY	<input type="checkbox"/>				Void:		Sheet Subset:		Subset Sheets: 9 of 10		Sheet Number 47	
Drawing File Name:	FINAL_MASTR13.DWG/SHEETS9	<input type="checkbox"/>				Region 6		DEW					
Acad Ver.	R14 Scale: 1"=100' Units: ENGLISH	<input type="checkbox"/>											



STA. 305+00 END PROJECT NH 0062-011=  
 STA. 305+00 PROJECT CX 11-0006-17  
 END PAVING  
 END REMOVAL OF GUARDRAIL TYPE 3 DOUBLE  
 END GUARDRAIL TYPE 7 (STYLE CA)  
 M.P. 280.91

+25 LT OF CURB AND GUTTER  
 PE 6 (SECTION M)  
 THE E.B. GORE




CALL UTILITY NOTIFICATION  
 CENTER OF COLORADO  
**1-800-922-1987**  
 CALL 2-BUSINESS DAYS IN ADVANCE  
 BEFORE YOU DIG, GRADE, OR EXCAVATE  
 FOR THE MARKING OF UNDERGROUND  
 MEMBER UTILITIES.

SEE TRAFFIC SHEETS FOR AUTOMATIC  
 TRAFFIC RECORDER LAYOUT

RIGHT OF WAY LINES SHOWN ARE FOR INFORMATION  
 ONLY. THE CONTRACTOR SHALL FIELD VERIFY ACTUAL  
 RIGHT OF WAY LINES IF REQUIRED.

Computer File Information	
Creation Date:	03/15/99 Initials: AS
Last Modification Date:	11/08/99 Initials: AK
Full Path:	C:\PROJECTS\12023\
Drawing File Name:	FINAL_MASTR13.DWG\SHEET10
Acad Ver.	R14 Scale: 1"=100' Units: ENGLISH

Sheet Revisions	

Colorado Department of Transportation  
  
 2000 SOUTH HOLLY ST.  
 ROOM 185  
 DENVER, CO 80222  
 Phone: (303) 984-5260 FAX: (303) 984-5299  
 Region 6 DEW

As Constructed
No Revisions: (11/910)
Revised:
Void:

PLAN SHEET 10	
Designer:	Structure Numbers
Detailer:	
Sheet Subset:	Subset Sheets: 10 of 10

Project No./Code	NH 0062-011
	12023
Sheet Number	48




SUMMARY OF ITS QUANTITIES

ITEM NO.	ITEM DESCRIPTION	UNIT	PROJECT TOTALS
613	2 INCH ELECTRICAL CONDUIT (JACKED)	LIN. FT.	<del>4220</del> 3172
613	2 INCH ELECTRICAL CONDUIT (PLASTIC)	LIN. FT.	<del>140</del> 210
613	PULL BOX (SPECIAL)	EACH	7

ITS GENERAL NOTES

1. ALL AUTOMATIC TRAFFIC RECORDER VEHICLE DETECTOR LOOPS SHALL BE FIELD LOCATED BY CDOT.
2. ALL CONDUIT SHALL BE INSTALLED PER THE PROJECT STANDARDS TO ACCEPT FUTURE FIBER OPTIC CABLE INSTALLATION, CONDUIT RADIUS ENTERING THE PULL BOX SHALL BE AS PER THE PROJECT STANDARDS.
3. FOR QUANTITIES OF LOOP DETECTOR WIRE AT THE AUTOMATIC TRAFFIC RECORDER STATIONS AS PART OF THIS PROJECT, SEE THE LOOP DETECTOR TABULATION SHEET.

Computer File Information		Sheet Revisions		Colorado Department of Transportation		As Constructed		ITS Summary Sheet		Project No./Code	
Creation Date:	09/26/99 Initials: Wjkjr	<input type="checkbox"/>		 Region 6 Traffic and Safety - ITS Unit 2000 South Holly Street Denver, Colorado 80222 Phone: 303 757 9511 FAX: 303 757 9907	No Revisions:		Designer: Wjkjr Detailer: Wjkjr		NH 0062-001		
Last Modification Date:	11/08/99 Initials: BWD	<input type="checkbox"/>			Revised: 11/10/01	Structure Numbers			12023		
Full Path:	D:\DESIGN\PROJ - (Zip Drive)	<input type="checkbox"/>			Void:	Sheet Subset: Tabulations			Subset Sheets: 1 of 1		
Drawing File Name:	6th AVENUE ITS SUMMARY SHEET.DWG	<input type="checkbox"/>			Region 6		AI - DEW		Sheet Number 49		
Acad Ver.	R14 Scale: 100 Units: English	<input type="checkbox"/>									

# ITS Electrical Conduit and Pull Box (Special) Tabulation

LOCATION	STATION	2" Electrical Conduit (Jacked) (Linear Feet)	2" Electrical Conduit (Plastic) (Linear Feet)	X	Pull Box (Special) (Each)	
					Pull Box - Small Size (24" x 36" x 18")	Pull Box - Large Size (36" x 48" x 18")
Pull Box 1 - US 6 On Ramp from Union / Simms	OPP 181+80 EB US 6				1	
US 6 On Ramp from Union / Simms, (Under Ramp)	OPP 180+75 EB US 6	<del>55</del>				
From Pull Box 1 to ATR Loop Pull Box on US 6 On Ramp	OPP 180+75 to OPP 181+80 EB US 6		<del>140</del> <u>210</u>			
From Pull Box 1 to Pull Box 2 - (Under US 6 Mainline)	181+80 EB US 6	<del>270</del>				
Pull Box 2 - US 6 Frontage Road	OPP 181+50 EB US 6					1
From Pull Box 2 to Pull Box 3 - US 6 Frontage Road	OPP 181+50 To OPP 189+25 EB US 6	<del>785</del>				
Pull Box 3 - US 6 Frontage Road	OPP 189+25 EB US 6					1
From Pull Box 3 to Pull Box 4 - (Under US 6 Mainline)	189+25 EB US 6	<del>195</del>				
Pull Box 4 - US 6 Mainline	189+25 EB US 6				1	
From Pull Box 3 to Pull Box 5 - US 6 Frontage Road	OPP 189+25 To OPP 196+80 EB US 6	<del>780</del>				
Pull Box 5 - US 6 Frontage Road	OPP 196+80 EB US 6				1	
From Pull Box 5 to Pull Box 6 - US 6 Frontage Road	OPP 196+80 to OPP 203+80 EB US 6	<del>740</del>				
Pull Box 6 - US 6 Frontage Road	OPP 203+80 EB US 6				1	
From Pull Box 6 to Pull Box 7 - US 6 Frontage Road	OPP 203+80 to OPP 211+30 EB US 6	<del>775</del>				
Pull Box 7 - US 6 Frontage Road	OPP 211+30 EB US 6				1	
From Pull Box 7 to Pull Box 8, (Existing Pull Box) - US 6	OPP 211+30 to 217+20 EB US 6	<del>610</del>				
					5	2
SHEET TOTALS			<del>3976</del> <u>4220</u>	<del>210</del> <u>140</u>		<del>1</del>

For Quantities of Loop Detector Wire at the Automatic Traffic Recorder Stations as part of this project, see the Loop Detector Tabulation sheet in this plan package.

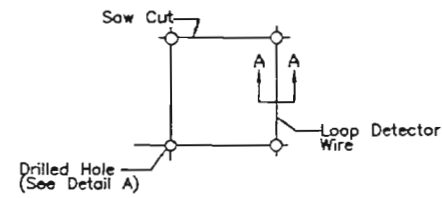
● Quantities carried forward to summary of ITS Quantities Sheet.

Computer File Information		Sheet Revisions		Colorado Department of Transportation		As Constructed		ITS Tabulation Sheet		Project No./Code	
Creation Date:	09/26/99	Initials:	WJKjr			No Revisions:				NH 0062-001	
Last Modification Date:	11/03/99	Initials:	BWD			Revised: <u>11/10/01</u>		Designer:	WJKjr	Structure Numbers:	12023
Full Path:	D:\DESIGN\PROJ - (Zip Drive)					Void:		Detailer: WJKjr		Sheet Number: <u>50</u>	
Drawing File Name:	6TH AVENUE ITS TABULATION.DWG			Region 6				Sheet Subset: Tabulations		Subset Sheets: 1 of 2	
Acad Ver. R14	Scale: 100	Units: English									

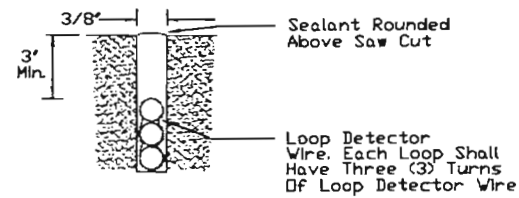
Region 6 Traffic and Safety - ITS Unit  
 2000 South Holly Street  
 Denver, Colorado 80222  
 Phone: 303 757 9511 FAX: 303 757 9907

AI - DEW

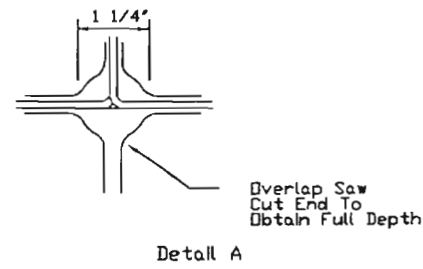
## LOOP GEOMETRICS AND INSTALLATION



Vehicle Detector Loop Detail

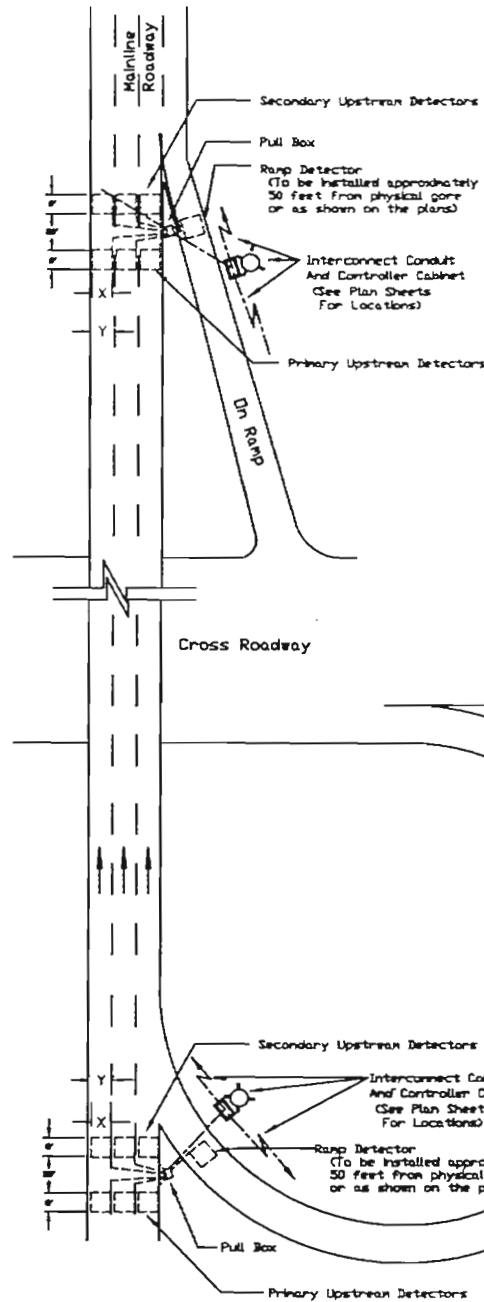


Section A-A



### VEHICLE DETECTOR LOOP SAW CUT DETAILS

(For use with vinyl tubing enclosed loop detector wire)



Pull Box □  
Loop Detector Wire - - - - -

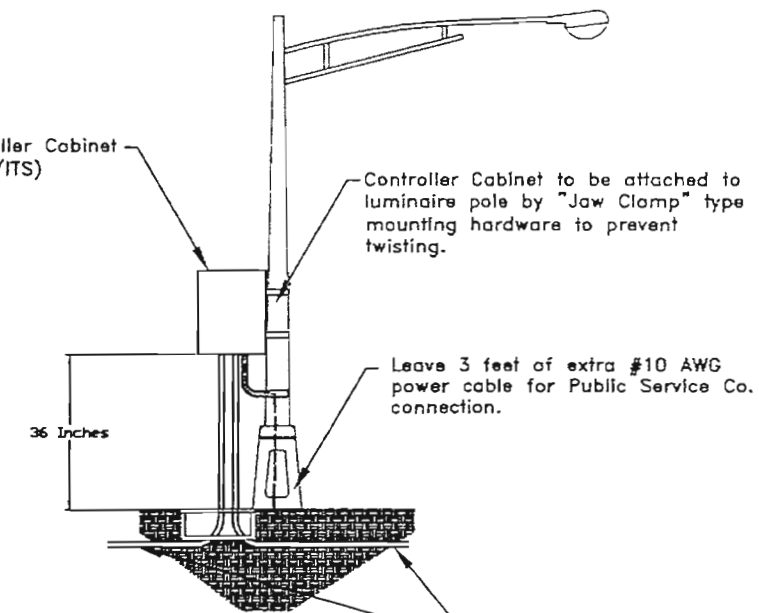
Y = LANE WIDTH  
X = Y - 8' or 6' MINIMUM

### ROADWAY INSTALLATION DETAILS

1. All detector loops shall measure as a 6' X 6' square (within 1/2" tolerance).
2. All detector loops shall be centered in the traffic lane.
3. All detector loop slots shall be cut to a minimum depth of 4"
4. Before installation of the wire, all slots shall be cleaned of debris using compressed air or water and the surface of the roadway and slots shall be dried by the use of compressed air.
5. All loops shall include 3 turns of loop detector wire. The wires shall be seated at the bottom of the saw slot.
6. No more than four loop detector wires shall be placed in a saw slot leading to the edge of roadway.
7. No wire splices shall be allowed in the saw slots. All loops shall have continuous wiring throughout the pavement, to the pull box on the side of the road.
8. All lead-in wire shall be continuous from the pull box on the side of the road, to the controller cabinet.
9. All loop and loop lead-in wires shall be clearly labeled in each pullbox.
10. Prior to the sealing of the saw slots and drill holes, an inductance and leakage test shall be performed. Loop inductance shall measure between 20 and 2500 microhenries. Leakage resistance will be greater than or equal to 100 megohms. Measurements outside of these specifications will be cause for immediate loop replacement.
11. Conduit for lead-in wire off the pavement surface shall be buried at a minimum depth of 3'.

12. Loop sets (two loops in a series) within a single lane shall be separated by 20' resulting in a distance of 26' from leading edge to leading edge (within 1/2" tolerance)
13. For new asphalt surfaces, slots shall be saw cut and detector wire installed prior to laying of the final lift of pavement. For new concrete pavement, preformed loops shall be used, see project plan sheets, project standards and project special provisions.
14. All saw cut corners shall be rounded using a 1 1/4" hole saw drilled to a minimum depth of 4". No 45 degree angled corners will be accepted.
15. The minimum saw cut slot width shall be 3/8 inch.
16. All saw slots and drill holes shall be sealed using an approved loop sealant. Excess sealant shall be removed to avoid unnecessary high spots.
17. Pull boxes shall contain an additional 5 feet of loop detector wire and lead-in wire.
18. Electrical conduit at Automatic Traffic Recorder locations shall be as follows:  
Under the roadway, 2" Electrical Conduit - Schedule 80 minimum.  
Elsewhere, 2" Electrical Conduit (Plastic). (Unless otherwise noted on the plans).
19. Some electrical conduit trenches shown on this sheet shall contain multiple conduits for the separation of electrical power, loop wire and/or fiber optic cable. See project plan sheets for exact number and location of conduit runs.
20. Power wiring, loop detector wire and fiber optic cable shall be each installed in a separate conduit as shown on the project plans unless otherwise directed by the Engineer.
21. All work shall conform to this Project Standard. See Project Plan Sheets for proposed work.

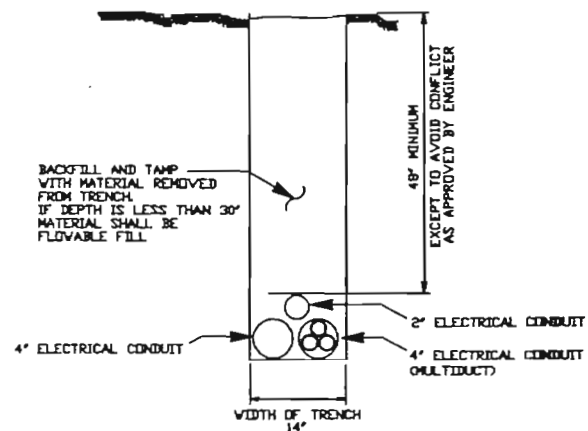
ATR Controller Cabinet (Type 303/ITS)



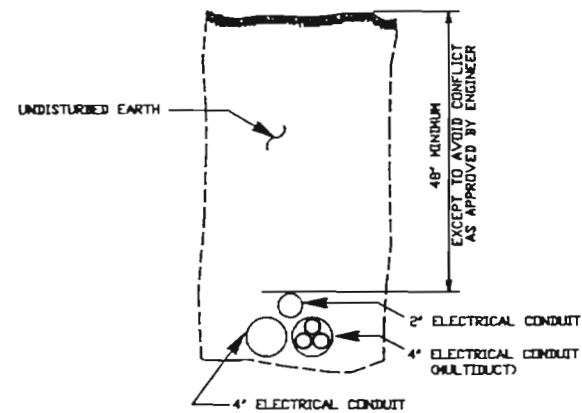
Install 2 inch electrical conduit for loop detector wire and fiber optic cable, Distances vary.

### ATR EQUIPMENT INSTALLATION ON LIGHT POLES

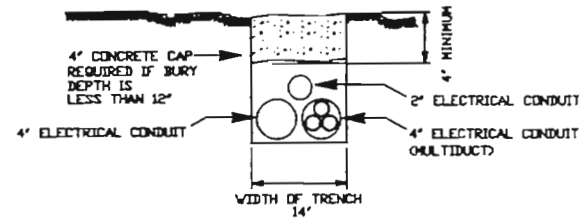
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Creation Date:	09/26/99	Initials:	WJKjr			Region 6 Traffic and Safety, ITS Unit 2000 South Holly Street Denver, CO 80222 Phone: 757-9511 FAX: 757-9907		No Revisions: 1/2/01		NH 0062-011	
Last Modification Date:	09/26/99	Initials:	WJKjr			Region 6		Revised:		12023	
Full Path:	D:\DESIGN\PROJ - (ZIP DISK)					AI - (DEW)		Vol:		Sheet Number 51	
Drawing File Name:	6TH AVENUE FIBER ATR STANDARD.DWG							Detailer:		Subset Sheet Number:	
Acad Ver:	R14	SCALE	ENGLISH					Sheet Subset:			



OPEN TRENCH  
DETAIL



DIRECTIONAL BORE CONDUIT  
DETAIL



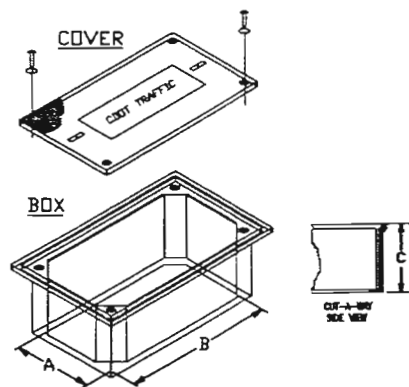
TYPICAL CAPPED  
TRENCH DETAIL

CONDUIT TRENCHING NOTES:

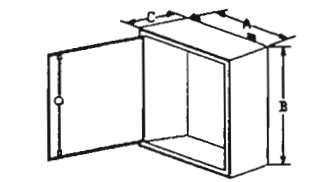
1. CONDUIT PLACEMENT DEPICTED BY THESE DETAILS IS REPRESENTATIVE ONLY. FINAL PLACEMENT AND NUMBER OF CONDUITS AT EACH LOCATION ARE SHOWN AND TABULATED ON THE PLAN SHEETS. TYPE OF CONDUIT INSTALLATION, EITHER TRENCH METHOD OR DIRECTIONAL BORE METHOD, ARE LABELED AND TABULATED ON THE PLAN SHEETS AND DETAILED IN THE PROJECT SPECIFICATIONS.
2. AREA OF CONSTRUCTION SHALL BE RETURNED TO EXISTING GRADE.
3. ALL CONDUIT SHALL TERMINATE IN EITHER SMALL SIZE PULL BOX (SPECIAL), LARGE SIZE PULL BOX (SPECIAL) OR SURFACE MOUNTED PULL BOXES AS SHOWN ON THE PLANS.
4. CONTRACTOR TO BACKFILL AND SEED ENTIRE TRENCH AND/OR BORE CONSTRUCTION AREA IN ACCORDANCE WITH CDOT SPECIFICATIONS AND STANDARDS.
5. ALL WORK TO INSTALL ELECTRICAL CONDUIT SHALL INCLUDE BUT NOT BE LIMITED TO SAW CUTTING, ASPHALT, REMOVAL OF ASPHALT AND ALL RELATED WORK AND SHALL BE PAID FOR AS PART OF THE ELECTRICAL CONDUIT ITEM.
6. THE CONTRACTOR SHALL COMPLY WITH OSHA TRENCH SAFETY EXCAVATION STANDARDS FOR INSTALLING ALL TRENCHED CONDUIT.

PULL BOX NOTES:

1. CONDUIT CENTERLINE SHALL BE ALIGNED TO TOP EDGE OF PULL BOX TO FACILITATE FIBER OPTIC CABLE PULLING.
2. ALL PULL BOX TYPES SHALL BE PAID FOR UNDER THE ITEM 614 PULL BOX (SPECIAL). ALL PULL BOX TYPES SHALL BE AS TABULATED IN THE PLANS.
3. PER THE PROJECT SPECIAL PROVISIONS, PULL BOXES SHALL HAVE 12" WIDE x 6" DEEP CONCRETE COLLARS SLOPED AWAY FROM PULL BOX. THE COST OF COLLAR IS TO BE INCLUDED IN THE COST OF EACH PULL BOX (SPECIAL).
4. IDENTIFICATION STAKES SHALL BE INSTALLED AT EACH PULL BOX LOCATION ALONG THE BACKBONE FIBER OPTIC RUN THROUGHOUT THE PROJECT. A LOCATION STAKE SHALL ALSO BE INSTALLED AT LATERAL PULL BOX LOCATIONS. LOCATION STAKES SHALL BE PAID FOR AS PART OF ITEM 613 PULL BOX (SPECIAL).
5. ALL WORK TO INSTALL THE ITEM PULL BOX (SPECIAL) SHALL INCLUDE BUT NOT BE LIMITED TO ASPHALT, CONCRETE, CONCRETE COLLAR, REMOVAL OF ASPHALT AND ALL RELATED WORK AND SHALL BE PAID FOR AS PART OF ITEM PULL BOX (SPECIAL).



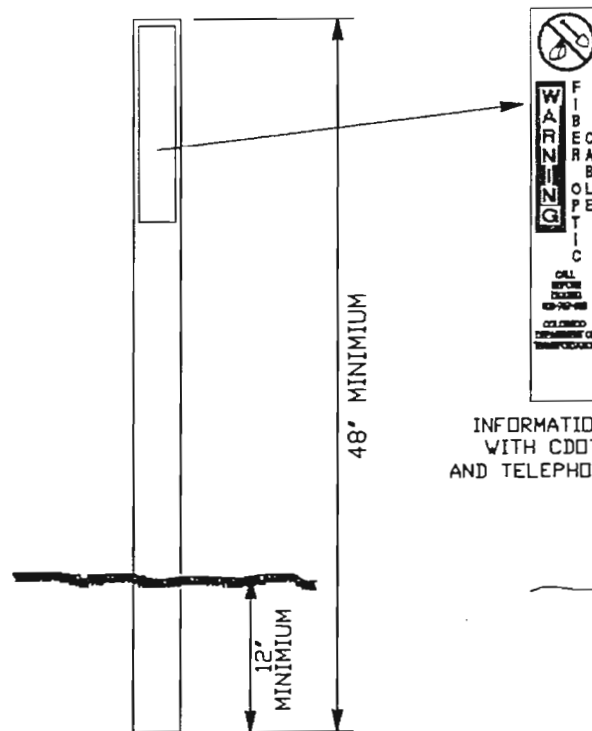
PULL BOX (SPECIAL)  
(Small and Large Size)



PULL BOX (SPECIAL) -  
(Surface Mounted Type)

PULL BOX TYPE	MINIMUM DIMENSIONS (Inches)		
	A	B	C
PULL BOX (SPECIAL) - (Small Size)	24	36	18
PULL BOX (SPECIAL) - (Large Size)	36	48	18
PULL BOX (SPECIAL) - (Surface Mounted)	24	24	8

PULL BOX (SPECIAL) DIMENTIONS

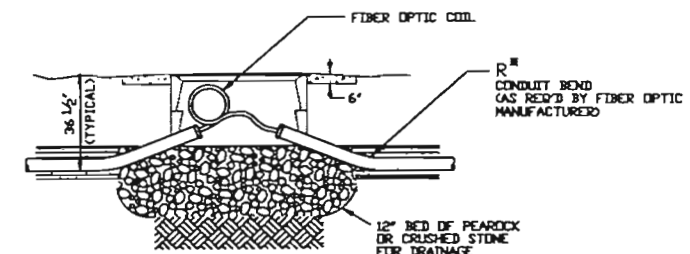


LOCATION STAKE

(SHALL BE ORANGE FIBERGLASS MATERIAL WITH AN ORANGE AND BLACK INFORMATION LABEL)

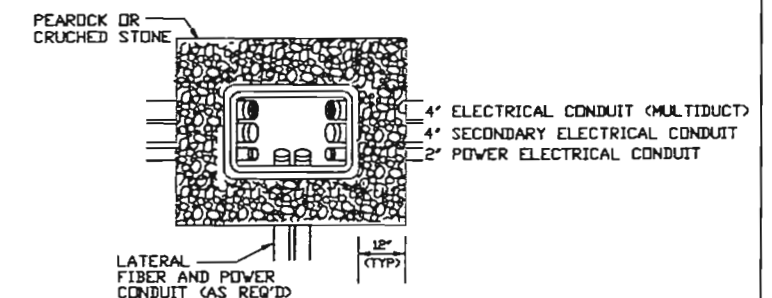
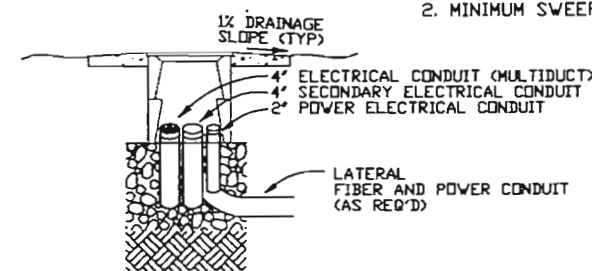


INFORMATION LABEL  
WITH CDOT NAME  
AND TELEPHONE NUMBER



\* CONDUIT BEND NOTES:

1. MINIMUM RADIUS 'R' MUST NOT BE LESS THAN 30'.
2. MINIMUM SWEEP MUST NOT BE GREATER THAN 90 DEGREES.



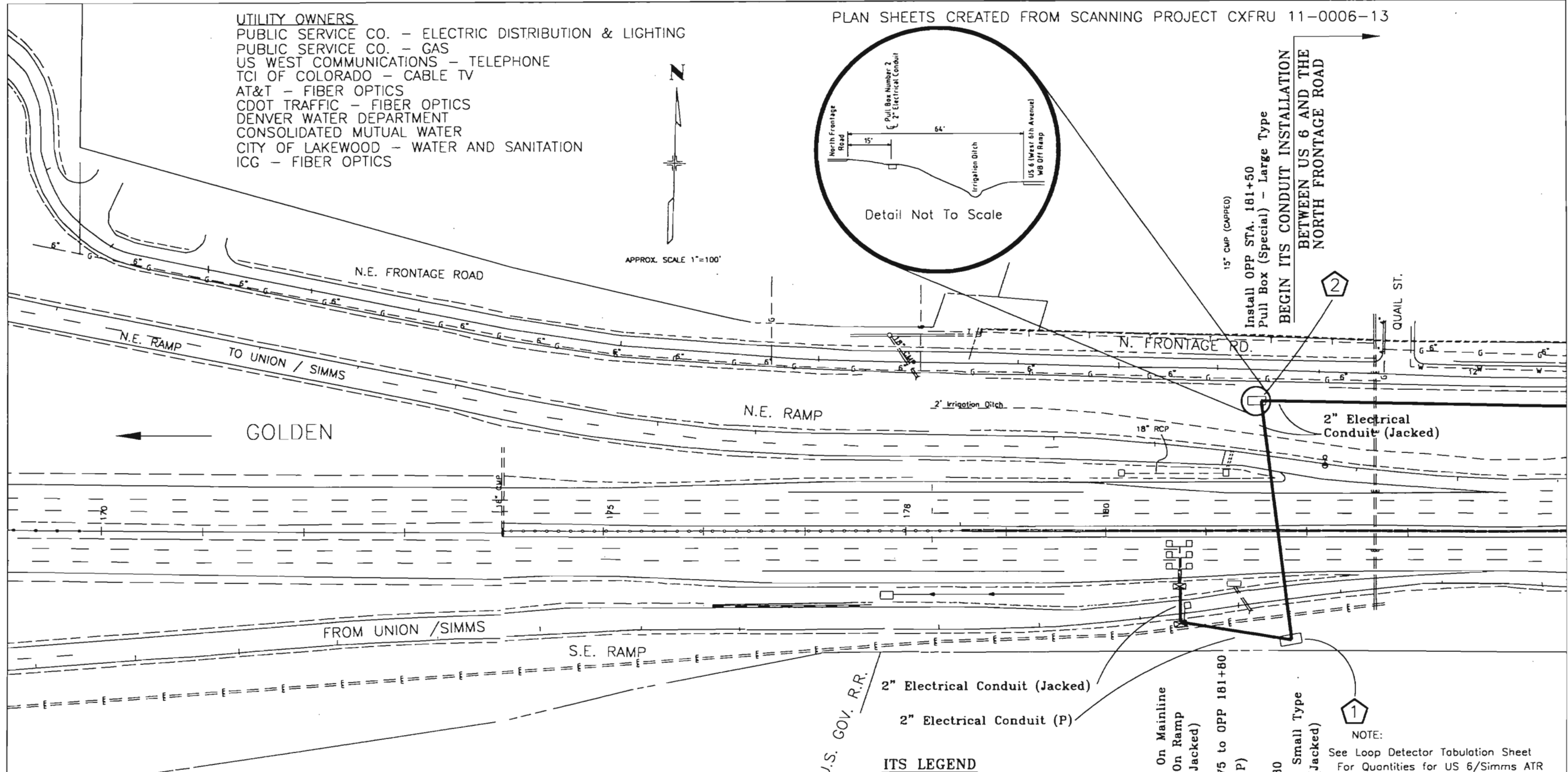
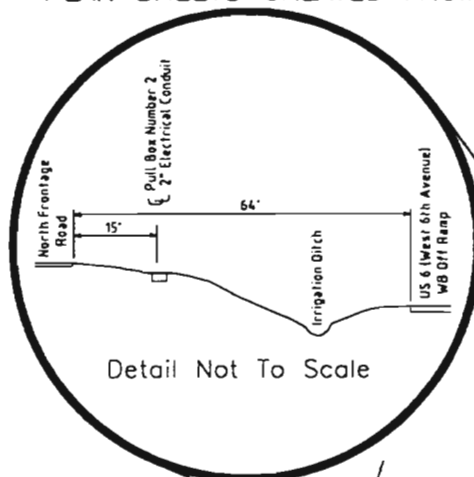
PULL BOX (SPECIAL) INSTALLATION DETAILS

Computer File Information		Index of Revisions		Colorado Department of Transportation		As Constructed		Project Standard		Project No./Code	
Creation Date:	09/22/99	Initials:	WjKjr			Region 6 Traffic and Safety - ITS Unit		ITS Pull Box and Conduit		NH 0062-001	
Last Modification Date:	09/26/99	Initials:	WjKjr			2000 South Holly Street		Designer:		12023	
Full Path:	D:\DESIGN\PROJ - (Zip Drive)					Denver, CO 80222		Detailer:		Sheet Number	
Drawing File Name:	ITS Pull Box Trench Standard.DWG					Phone: 757-9511 FAX: 757-9907		Sheet Subset:		Subset Sheet Number:	
Acad Ver:	R14	Scale:	1:00			Region 6		AI - (DEW)		Sheet Number 52	

**UTILITY OWNERS**  
 PUBLIC SERVICE CO. - ELECTRIC DISTRIBUTION & LIGHTING  
 PUBLIC SERVICE CO. - GAS  
 US WEST COMMUNICATIONS - TELEPHONE  
 TCI OF COLORADO - CABLE TV  
 AT&T - FIBER OPTICS  
 CDOT TRAFFIC - FIBER OPTICS  
 DENVER WATER DEPARTMENT  
 CONSOLIDATED MUTUAL WATER  
 CITY OF LAKEWOOD - WATER AND SANITATION  
 ICG - FIBER OPTICS



APPROX. SCALE 1"=100'



GOLDEN

U.S. GOV. R.R.

**ITS LEGEND**

- Conduit \_\_\_\_\_
- Pull Box (Special) \_\_\_\_\_
- Pull Box Reference Number, (For Tabulation Purposes) \_\_\_\_\_
- Vehicle Detector Loop Wire \_\_\_\_\_
- Pull Box For ATR Vehicle Detector Wire, (To Be Paid For With 2" Electrical Conduit (P) Item) \_\_\_\_\_

- Install - STA. 180+75
  - 6 ATR Vehicle Loops - On Mainline
  - 1 ATR Vehicle Loop - On Ramp
  - 2" Electrical Conduit (Jacked)
- Install - STA. OPP 180+75 to OPP 181+80
  - 2" Electrical Conduit (P)
- Install - OPP STA. 181+80
  - 2 Pull Box (Special) - Small Type
  - 2" Electrical Conduit (Jacked)

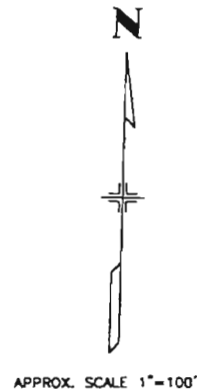
NOTE:  
 See Loop Detector Tabulation Sheet  
 For Quantities for US 6/Simms ATR

CALL UTILITY NOTIFICATION  
 CENTER OF COLORADO  
 1-800-922-1987  
 CALL 2-BUSINESS DAYS IN ADVANCE  
 BEFORE YOU DIG, GRADE, OR EXCAVATE  
 FOR THE MARKING OF UNDERGROUND  
 MEMBER UTILITIES.

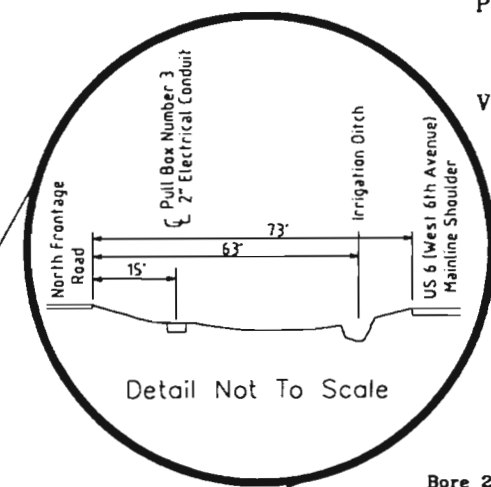
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Creation Date:	03/15/99	Initials:	AS					No Revisions: <i>jjj/ak</i>		NH 0062-011	
Last Modification Date:	10/24/99	Initials:	AK					Revised:		12023	
Full Path:	C:\PROJECTS\WADSWORTH TO CODY							Void:		Sheet Number 53	
Drawing File Name:	ITS DETAIL PLAN SHEETS							Designer: WJKJr		Structure Numbers	
Acad Ver:	R14	Scale:	1"=100'	Units:	ENGLISH			Detailer: WJKJr		Subset Sheets: 1 of 4	
Region 6						GCH		Sheet Subset:		Subset Sheets: 1 of 4	

**ITS LEGEND**

- Conduit \_\_\_\_\_
- Pull Box (Special) \_\_\_\_\_
- Pull Box Reference Number, (For Tabulation Purposes) \_\_\_\_\_
- VMS Sign Bridge Caisson and Type 7 Barrier \_\_\_\_\_



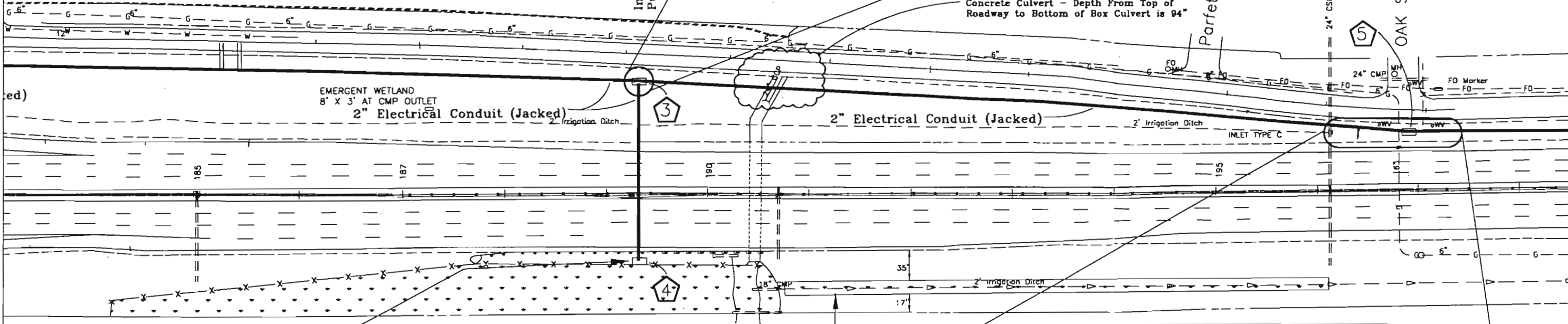
Install OPP STA. 189+25  
Pull Box (Special) - Large Type



Detail Not To Scale

Bore 2" Conduit Under Concrete Culvert - Depth From Top of Roadway to Bottom of Box Culvert is 94"

Install OPP STA. 196+80  
Pull Box (Special) - Small Type

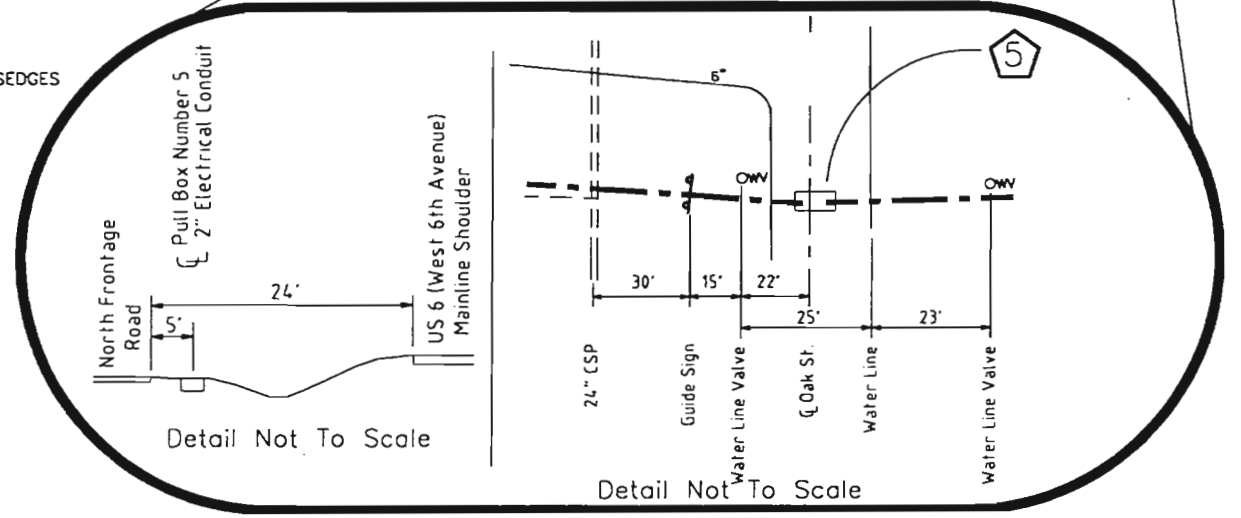


WETLANDS - CONTRACTOR SHALL USE CARE WHILE WORKING IN THIS AREA.

NO WORK WILL BE ALLOWED IN DELINEATED WETLAND AREAS. IF THERE IS A NEED TO WORK BEYOND THE ORANGE FENCING, CONTRACTOR MUST CONTACT LINDA TRZYNA, (303-757-9933) OR CHRIS PAULSEN (303-757-9930) OF THE COOT REGION 6 ENVIRONMENTAL OFFICE PRIOR TO THE WORK TAKING PLACE.

Install - 189+25  
• Pull Box (Special) - Small Type  
• 2" Electrical Conduit (Jacked)

DITCH WITH 6' WIDE EMERGENT WETLAND BAND OF CATTAIL & SEDGES STA. 190+85 TO 196+35,RT



Detail Not To Scale

Detail Not To Scale

CALL UTILITY NOTIFICATION CENTER OF COLORADO  
1-800-922-1987  
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.

for Tabulation Sheet for US 6/Simms ATR

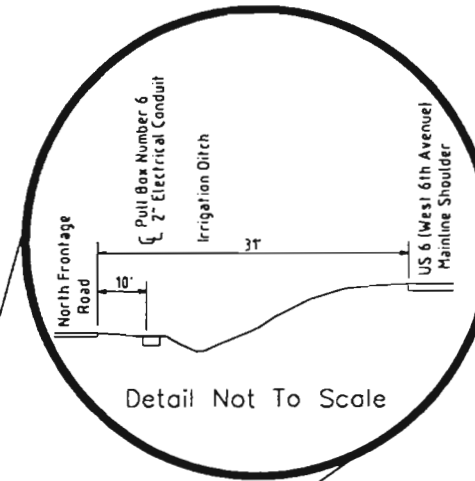
Computer File Information		Sheet Revisions		Colorado Department of Transportation		As Constructed		ITS DETAIL PLAN SHEET 2		Project No./Code	
Creation Date:	03/15/99	Initials:	AS			2000 SOUTH HOLLY ST.		No Revisions: 11/15/15		NH 0062-011	
Last Modification Date:	11/08/99	Initials:	BWD			DENVER, CO 80222		Revised:		12023	
Full Path:	C:\PROJECTS\WADSWORTH TO CODY\ITS					Phone: (303) 757-9511 FAX: (303) 757-9907		Void:		Sheet Number 54	
Drawing File Name:	ITS PLAN SHEETS					Region 6		AI - DEW		12023	
Acad Ver.	R14	Scale:	1"=100'	Units:	ENGLISH			Sheet Subset:		Subset Sheets: 2 of 4	

NO WORK WILL BE ALLOWED IN DELINEATED WETLAND AREAS.  
ALSO, NO STAGING OR PARKING OF EQUIPMENT IN IMMEDIATE VICINITY OF WETLAND AREAS.

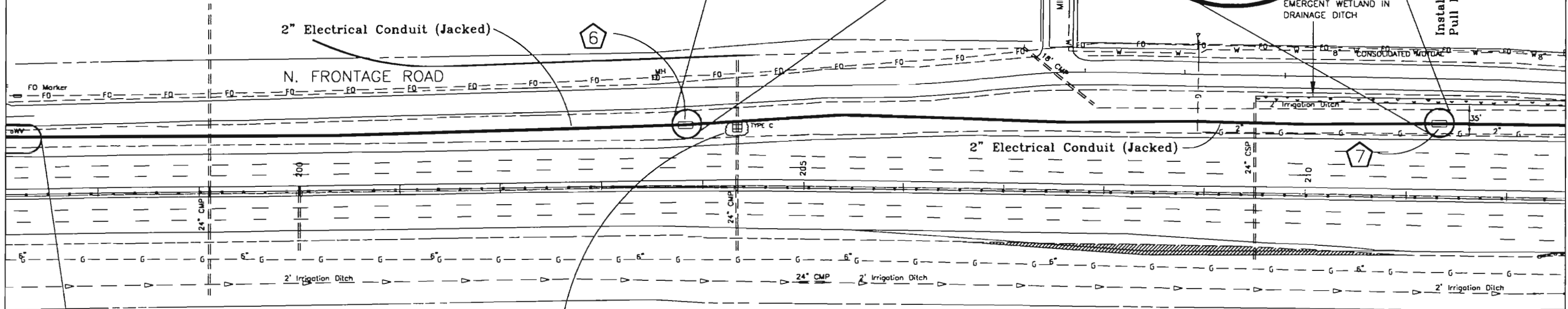
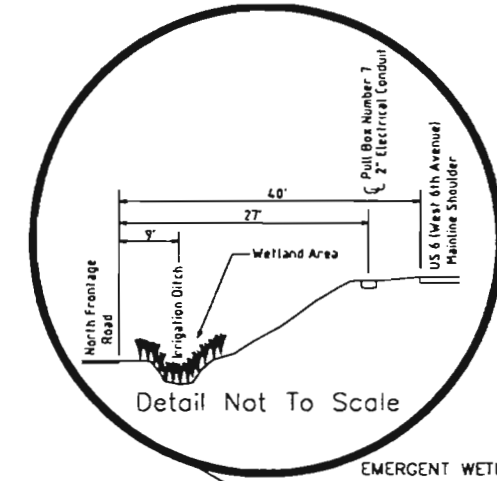


APPROX. SCALE 1"=100'

Install OPP STA. 203+80  
Pull Box (Special) - Small Type



Install OPP STA. 211+30  
Pull Box (Special) - Small Type



Bore 2" Conduit Under Concrete Culvert Pipe - Depth From Top of Grate to Bottom of Inlet is 42"

ITS LEGEND

- Conduit \_\_\_\_\_
- Pull Box (Special) \_\_\_\_\_
- Pull Box Reference Number, (For Tabulation Purposes) \_\_\_\_\_

CALL UTILITY NOTIFICATION CENTER OF COLORADO  
1-800-922-1987  
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.

Computer File Information	
Creation Date:	03/15/99 Initials: AS
Last Modification Date:	11/02/99 Initials: AK
Full Path:	C:\PROJECTS\WADSWORTH TO CODY\ITS
Drawing File Name:	ITS PLAN SHEETS
Acad Ver.	R14 Scale: 1"=100' Units: ENGLISH

Sheet Revisions	

Colorado Department of Transportation  
2000 SOUTH HOLLY ST.  
DENVER, CO 80222  
Phone: (303) 757-9511 FAX: (303) 757-9907  
Region 6 AI - DEW

As Constructed
No Revisions: 1/1/01
Revised:
Void:

ITS DETAIL PLAN SHEET 3			
Designer:	WJKJr	Structure Numbers:	
Detailer:	WJKJr	Sheet Subset:	
		Subset Sheets:	3 of 4

Project No./Code
NH 0062-011
12023
Sheet Number 55



NO WORK WILL BE ALLOWED IN DELINEATED WETLAND AREAS. ALSO, NO STAGING OR PARKING OF EQUIPMENT IN IMMEDIATE VICINITY OF WETLAND AREAS.

Replace Existing ATR Loops At The SH 121 (Wadsworth Blvd) Interchange On Both US 6 Mainline and Interchange Ramps See "Automatic Traffic Recorder Replacement" sheets in the project plans for locations.

Replace Existing ATR Loops See "Automatic Traffic Recorder Replacement" sheets in the project plans for locations.

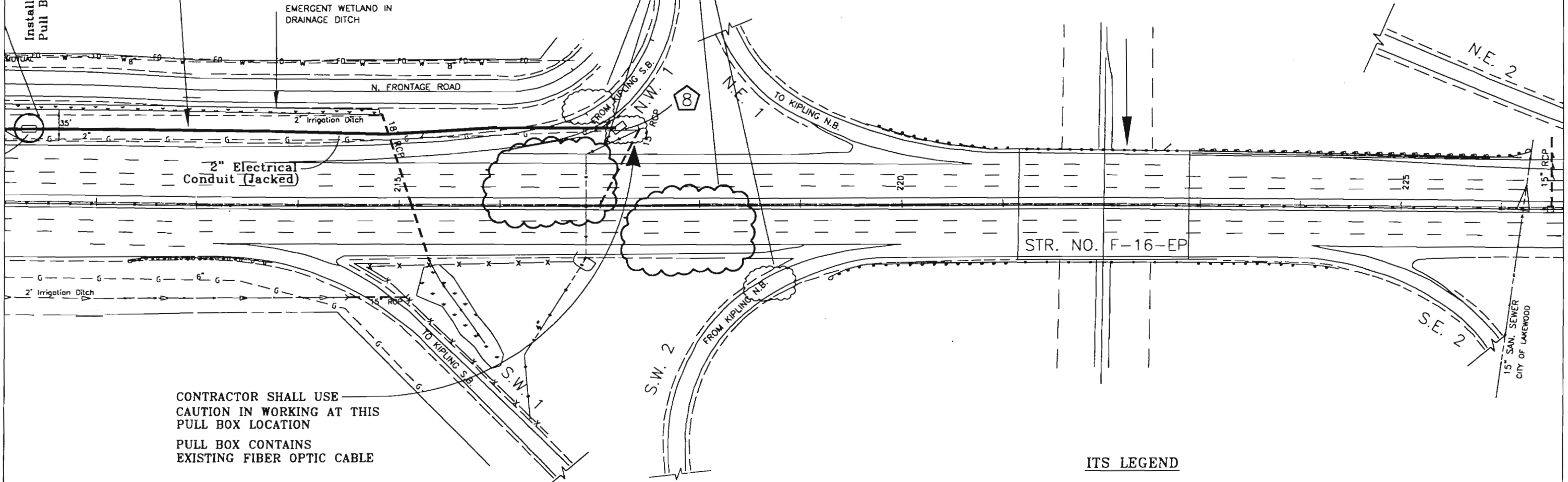
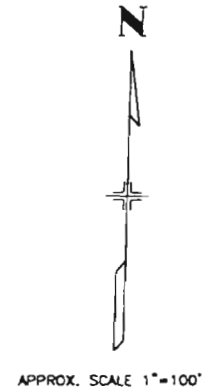
Install OPP STA. 211+30 Pull Box (Special) - Small Type

WETLANDS - CONTRACTOR SHALL USE CARE WHILE WORKING IN THIS AREA.

EMERGENT WETLAND IN DRAINAGE DITCH

217+20 Existing Pull Box Containing Fiber Optic Cable END ITS CONDUIT INSTALLATION BETWEEN US 6 AND THE NORTH FRONTAGE ROAD

KIPLING STREET (SH 391)



CONTRACTOR SHALL USE CAUTION IN WORKING AT THIS PULL BOX LOCATION PULL BOX CONTAINS EXISTING FIBER OPTIC CABLE

CALL UTILITY NOTIFICATION CENTER OF COLORADO 1-800-922-1987 CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.

EMERGENT DITCH WETLAND STA. 215+00 TO STA. 217+00

ITS LEGEND

- Conduit \_\_\_\_\_
- Pull Box (Special) \_\_\_\_\_
- Pull Box Reference Number, (For Tabulation Purposes) \_\_\_\_\_

Computer File Information		Sheet Revisions		Colorado Department of Transportation		As Constructed		ITS DETAIL PLAN SHEET 4		Project No./Code	
Creation Date:	03/15/99	Initials:	AS			2000 SOUTH HOLLY ST. ROOM 185 DENVER, CO 80222 Phone: (303) 757-9879 FAX: (303) 757-9053		No Revisions: 11/10/01		NH 0062-011	
Last Modification Date:	11/03/99	Initials:	BWD			Region 6		Revised:		12023	
Full Path:	C:\PROJECTS\WASWORTH TO CODY\ITS					GCH		Void:		Sheet Number 56	
Drawing File Name:	ITS PLAN SHEETS							Designer: WJKJr		Structure Numbers	
Acad Ver.	R14	Scale:	1"=100'	Units:	ENGLISH			Detailer: WJKJr		Subset Sheets: 4 of 4	
								Sheet Subset:		Subset Sheets: 4 of 4	



TABULATION OF TRAFFIC ENGINEERING ITEMS

SCHEDULE OF CONSTRUCTION TRAFFIC CONTROL DEVICES

ITEM NO.	ITEM DESCRIPTION	UNIT	PROJECT TOTALS
202	REM PAVEMENT MARKING	SF	30015
202	REM OVERHEAD SIGN STR	EA	1
202	REM GROUND SIGN	EA	46
503	DRILLED CAISSON (54 IN)	LF	48
614	SIGN PANEL (CL I)	SF	27
614	SIGN PANEL (CL II)	SF	408
614	SIGN PANEL (CL III)	SF	933
614	STEEL SIGN POST(U-2)	LF	36
614	STEEL SIGN POST(W 8X18)	LF	71
614	STEEL SIGN POST(W 8X21)	LF	37
614	STEEL SIGN POST(W 10X22)	LF	41
614	STEEL SIGN POST(2.5 IN RD) (SLIP)	LF	521
614	CONC FOOTING (TY 3)	EA	4
614	CONC FOOTING (TY 4)	EA	2
614	CONC FOOTING (TY 5)	EA	2
614	PAINT OVERHEAD SIGN STR	EA	2
614	SIGN BRDG STR (60 < 65)	EA	1
614	LOOP DETECT WIRE	LF	5606
627	PVMT MKG PAINT	GAL	1430
627	THERMOPLASTIC PVMT MKG	SF	21599
627	PREFORM PLASTIC PVMT MKG (TY A)	SF	8416
630	FLAGGING	HOUR	3000
630	TRAFFIC CONTROL SUPERVISOR	DAY	150
630	UNIFORMED TRAFFIC CONTROL	HOUR	500
630	TRAFFIC CONTROL INSPECTION	DAY	65
630	FLASH BEACON (PORT)	EA	4
630	BARRICADE (3 M-B) (TEMP)	EA	4
630	CONST TRAF SIGN (A)	EA	12
630	CONST TRAF SIGN (B)	EA	33
630	CONST TRAF SIGN (C)	EA	12
630	CONST TRAF SIGN (SPEC)	SF	260
630	FLASH ARROW PANEL (C TY)	EA	4
630	DRUM CHANNELIZING DEV	EA	500
630	CONC BARRIER (TEMP)	LF	6000
630	TRAFFIC CONE	EA	500
630	MOBILE PVMT MKG ZONE	DAY	6
630	IMPACT ATTN (TEMP)	EA	2

SIGNS					
SIGN CODE	LEGEND	DIMENSIONS	PANEL SIZE		
			A	B	C
4BR21-4	ROAD / WORK / XXXXX	48"x48"	8		
4BW20-5R	RIGHT/LANE/CLOSED/___ FT	48"x48"	4		
4BW20-5L	LEFT/LANE/CLOSED/___ FT	48"x48"	4		
4BW4-2()	▲ TRANSITION SYMBOL	48"x48"	8		
4BR2-1(55)	SPEED / LIMIT / 55	48"x60"		4	
4BW21-5	SHOULDER / WORK	48"x48"	2		
4BW20-7a	FLAGGER (SYM)	48"x48"	2		
4BW20-61	RIGHT/SHOULDER/CLOSED/AHEAD	48"x48"	1		
4BR52-5	▶ END / FINES / DOUBLED / FOR / SPEEDING	48"x60"		4	
4BR52-4	▶ BEGIN / FINES / DOUBLED / FOR / SPEEDING	48"x60"		4	
4BW20-64	▶ FINES / DOUBLED ●	48"x24"	4		
48G20-10	THANK YOU / XYZ / CONSTRUCTION / 555-5555	48"x48"	4		
24R5-8	SIDEWALK CLOSED	24"x12"	4		
24R5-9	SIDEWALK CLOSED / "ARROW" / USE OTHER SIDE	24"x12"	4		
SIGN TOTALS			12	33	12

SIGNS				
*CONSTRUCTION TRAFFIC SIGN (SPECIAL)	LEGEND	DIMENSIONS	QUANTITY	PANEL SIZE SF
* SPECIAL	● "CONSTRUCTION INFO"	10'X7'	2	140
* SPECIAL	● "CONSTRUCTION INFO"	4'X5'	6	120
SIGN TOTAL				260


OTHER DEVICES		
ITEM	UNIT	QUANTITY
FLASH BEACON (PORT)	EA	4
BARRICADE (3 M-B) (TEMP)	EA	4
FLASH ARROW PANEL (C TY)	EA	4
DRUM CHANNELIZING DEV	EA	500
CONC BARRIER (TEMP)	LF	6000
TRAFFIC CONE	EA	500
IMPACT ATTN (TEMP)	EA	2

NOTES:

- SEE CASES V, VI, VII, VIII, XI, XII, XIII, XIV, XVIII, AND XIX OF STANDARD S-630-1 OF THE "COLORADO STANDARD PLANS" FOR TYPICAL PLACEMENT OF THE CONSTRUCTION TRAFFIC CONTROL DEVICES
- \* CONST TRAF SIGN (SPECIAL) PAID BY SQUARE FOOT
- ▲ 3. TO BE PROVIDED WITH INTERCHANGEABLE PLAQUES READING "RIGHT" & "LEFT" AT NO ADDITIONAL COST TO THE PROJECT
- 4. STENCIL BLACK ON REFLECTIVE ORANGE
- ▶ 5. THE "BEGIN-FINES DOUBLED FOR SPEEDING" SIGN SHOULD BE POSTED AFTER THE "ROAD WORK AHEAD" SIGN  
THE "END-FINES DOUBLED FOR SPEEDING" SIGN SHOULD BE POSTED JUST PRIOR TO THE "THANK YOU" SIGN OR AT THE LAST POINT EFFECTED BY THE WORK  
  
THE BLACK/ORANGE "FINES DOUBLED" SIGN SHOULD BE ADDED BENEATH EXISTING SPEED LIMIT SIGNS WITHIN THE WORK ZONE
- 6. EAST BOUND STRUCTURES F-16-G1 ● STA 213+35 NEAR KIPLING ST AND STRUCTURE F-16-IN ● STA 293+00 NEAR WADSWORTH BLVD

QUANTITIES CARRIED FORWARD TO TABULATION OF TRAFFIC ENGINEERING ITEMS

SPACING TABLE FOR ALUMINUM BACKING ZEES					
SIGN NO.	PANEL SIZE (ft)	NO. OF ZEES	ZEE SIZE	OVERHANG (in)	SPACING (in)
1	5 x 5	2	3" x 2 11/16" x 3.33	1' - 3"	2' - 6"
3	13 x 5	4	3" x 2 11/16" x 3.38	0' - 6"	1' - 4"
8	11 x 6	4	3" x 2 11/16" x 3.38	0' - 9"	1' - 6"
11	12 x 8	4	3" x 2 11/16" x 3.38	0' - 9"	2' - 2"
14	15 x 6	5	3" x 2 11/16" x 3.38	0' - 6"	1' - 3"
26	15 x 6	5	3" x 2 11/16" x 3.38	0' - 6"	1' - 3"

Computer File Information		Index of Revisions		Colorado Department of Transportation		As Constructed		Project No./Code	
Creation Date: 7/2/97	Initials: PJN			 Region 6 Traffic 2000 S. Holly Street Denver, CO 80222 Phone: 303-757-9511 FAX: 303-757-9907		TABULATION OF TRAFFIC ITEMS		NH 0062-011	
Last Modification Date: 11/08/99	Initials: PJN					Revised: 11/10/01		Designer: PJN	Structure Numbers
Full Path: US6_Wads_Simms				Void:		Detailer: PJN	Sheet Number:	57	
Drawing File Name: SUMMARY.DWG						Sheet Subset:	Subset Sheet Number:		
Scale: NONE									






TABULATION OF OVERHEAD SIGNS ☐

SIGN NO.	STATION	SIGN PANEL SIZE	BACK-GROUND COLOR	REMOVE OVERHEAD SIGN STR	REMOVE SIGN PANEL	RESET SIGN PANEL	POLE DIAMETER	STRUCTURE TYPE	FRAME SIZE	STRUCTURE NUMBER	SIGN PANEL CLASS I (SQ. FT.)	SIGN PANEL CLASS III (SQ. FT.)	CAISSON		COMMENTS
													DEPTH	PAY LENGTH	
													48"	54"	
22A	<del>220+15</del>	14X9	GREEN	1			18"	BRIDGE	-54'-7"	F-16-GH	126	126	48'		
22B	US6 WB 22+10	14X9													
PROJECT TOTALS				1							252		48'		

NOTES FOR OVERHEAD SIGNS

- PANELS FOR OVERHEAD SIGNS SHALL BE ALUMINUM SEE DEPARTMENT STANDARD "CLASS III SIGNS" FOR PANEL AND BACKING ZEE REQUIREMENTS. SEE DEPARTMENT STANDARD "CLASS II GROUND SIGN INSTALLATION" FOR CLASS II PANELS; PANELS SHALL HAVE 3 ALUMINUM BACKING ZEES SPACED AT 2'-6". SEE DEPARTMENT STANDARD "CLASS I GROUND INSTALLATION FOR CLASS I PANEL REQUIREMENTS. MINIMUM THICKNESS IS REDUCED TO 0.080".
- LEGEND AND BORDER FOR GREEN BACKGROUND SIGNS SHALL BE SYSTEM 1, 2, OR 3 AND FOR YELLOW BACKGROUND SIGNS SHALL BE SYSTEM 4. SEE SECTION 713 OF THE STANDARD SPECIFICATIONS.
- OVERHEAD SIGNS SHALL HAVE THE STRUCTURE NUMBER STENCILED ON THE STRUCTURE POST. FOR DETAILS SEE STRUCTURE NUMBER INSTALLATION".
- THE CONTRACTOR SHALL NOTIFY PUBLIC SERVICE COMPANY - ELECTRIC 48 HOURS PRIOR TO REMOVAL SIGN STRUCTURE CONTACT CHERI WEERS AT 303-571-2505

☐ QUANTITIES CARRIED FORWARD TO TABULATION OF TRAFFIC ENGINEERING ITEMS

<b>Computer File Information</b> Creation Date: 08/19/99 Initials: AK Last Modification Date: 11/04/99 Initials: AK Full Path: US6_WADS_SIMMS Drawing File Name: Overhead Sign Tab.dwg Scale: NONE		<b>Index of Revisions</b> <table border="1"> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>										Colorado Department of Transportation  Region 6 Traffic 2000 S HOLLY Denver, CO 80222 Phone: (303) 757-9511 FAX: (303) 757-9907		As Constructed No Revisions: Revised: 1/19/01 Void:		<b>TABULATION OF OVERHEAD SIGNS</b> Designer: AK Detailer: AK Sheet Subset:		Project No./Code NH 0062-011 Structure Numbers 12023 Subset Sheet Number: Sheet Number <b>60</b>	

TABULATION OF PAVEMENT MARKINGS

STATION	LOCATION	PAVEMENT MARKING LINES (FEET)											PVMT MKG ARROW (EACH)
		EDGE		LANE WHITE BROKEN 4 INCH	CENTER		CHANNELIZING		CROSSHATCH		CROSS WALK WHITE SOLID 24 INCH	STOP WHITE SOLID 24 INCH	
		WHITE SOLID 4 INCH	YELLOW SOLID 4 INCH		YELLOW SOLID 4 INCH	YELLOW SOLID 4 INCH	WHITE SOLID 8 INCH	YELLOW SOLID 8 INCH	WHITE SOLID 8 INCH	YELLOW SOLID 8 INCH			
STA 175+00L - STA 301+25L	WB 6TH AVE	12625	12625	6312									
STA 175+00R - STA 301+25R	EB 6TH AVE	12625	12625	6312									
STA 181+00L - STA 184+00L	WB 6TH AVE, SIMMS EXIT RAMP							600					
STA 181+00R - STA 184+00R	EB 6TH AVE, SIMMS ENTRANCE RAMP							600					
STA 213+00L - STA 216+00L	WB 6TH AVE, KIPLING ENTRANCE RAMP							600					
STA 213+00R - STA 216+00R	EB 6TH AVE, KIPLING EXIT RAMP							600					
STA 219+00L - STA 221+00L	WB 6TH AVE, KIPLING EXIT RAMP							400					
STA 219+00R - STA 221+00R	EB 6TH AVE, KIPLING ENTRANCE RAMP							400					
STA 224+00R - STA 225+50R	EB 6TH AVE, KIPLING ENTRANCE RAMP							300					
STA 226+00L - STA 228+50L	WB 6TH AVE, KIPLING EXIT RAMP							500					
STA 230+00R - STA 233+00R	WB 6TH AVE, KIPLING EXIT RAMP							500					
STA 236+50L - STA 237+00L	WB 6TH AVE, GARRISON ENTRANCE RAMP							100					
STA 240+00R - STA 242+00R	EB 6TH AVE, GARRISON EXIT RAMP							400					
STA 277+00L - STA 280+00L	WB 6TH AVE, GARRISON OFF RAMP							600					
STA 277+00R - STA 279+00R	EB 6TH AVE, GARRISON ENTRANCE RAMP							400					
STA 293+50R - STA 294+50R	WB 6TH AVE, WADSWORTH ENTRANCE RAMP							200					
STA 293+25L - STA 295+50L	EB 6TH AVE, WADSWORTH EXIT RAMP							450					
STA 298+50R - STA 300+00R	WB 6TH AVE, WADSWORTH ENTRANCE RAMP							300					
STA 299+00L - STA 300+00L	EB 6TH AVE, WADSWORTH EXIT RAMP							200					
(LF) TOTALS====>		25250	25250	12624				7150					
(SF) TOTALS====>		8416	8416	8416				4767					

SUMMARY OF PAVEMENT MARKING QUANTITIES				
COLOR	THERMOPLASTIC (SQ.FT)	PREFORMED PLASTIC PAVEMENT MARKING (TYPE A) (SQ.FT.)	PREFORMED PLASTIC PAVEMENT MARKING (TYPE B) (SQ.FT.)	
			(WS)	(XS)
YELLOW	8416	0		
WHITE	13185	8416		
<b>TOTAL</b>	<b>21599</b>	<b>8416</b>	<b>4130</b>	

QUANTITIES CARRIED FORWARD TO TABULATION OF TRAFFIC ENGINEERING ITEMS

NOTES :

- FOR DETAILS OF PAVEMENT MARKING LINES AND LINE PLACEMENT. SEE STANDARD S-627-1
- IT IS ESTIMATED THAT 1430 GAL OF PAVEMENT MARKING PAINT WILL BE NEEDED FOR TEMPORARY PAVEMENT MARKINGS. THE QUANTITIES PROVIDED ARE SUFFICIENT FOR 5 APPLICATIONS DURING CONSTRUCTION.  
WHITE: 1029 GAL  
YELLOW: 401 GAL
- CONTRACTOR SHALL MAINTAIN FULL COMPLIANCE PAVEMENT MARKING ON THE PROJECT AT ALL TIMES THROUGHOUT THE CONSTRUCTION PERIOD.
- THE CONTRACTOR WILL BE RESPONSIBLE FOR THE INVENTORY OF EXISTING PAVEMENT MARKING AND RECORDING THEM SO THAT NEW MARKING CAN BE INSTALLED TO MATCH.

Computer File Information		Index of Revisions		Colorado Department of Transportation		As Constructed		PAVEMENT MARKING TABULATION		Project No./Code	
Creation Date:	02/21/97	Initials:	PJN				No Revisions:			NH 0062-011	
Last Modification Date:	11/04/99	Initials:	PJN				Revised:	1/KJA	Designer:	PJN	Structure Numbers:
Full Patn:	US6_WADS_SIMMS						Void:		Detailer:	PJN	
Drawing File Name:	StripingTab.dwg								Sheet Subset:		Subset Sheet Number:
Scale:	NONE										Sheet Number
											61



# US 6, Kipling St to Wadsworth Blvd

## LOOP QUANTITIES

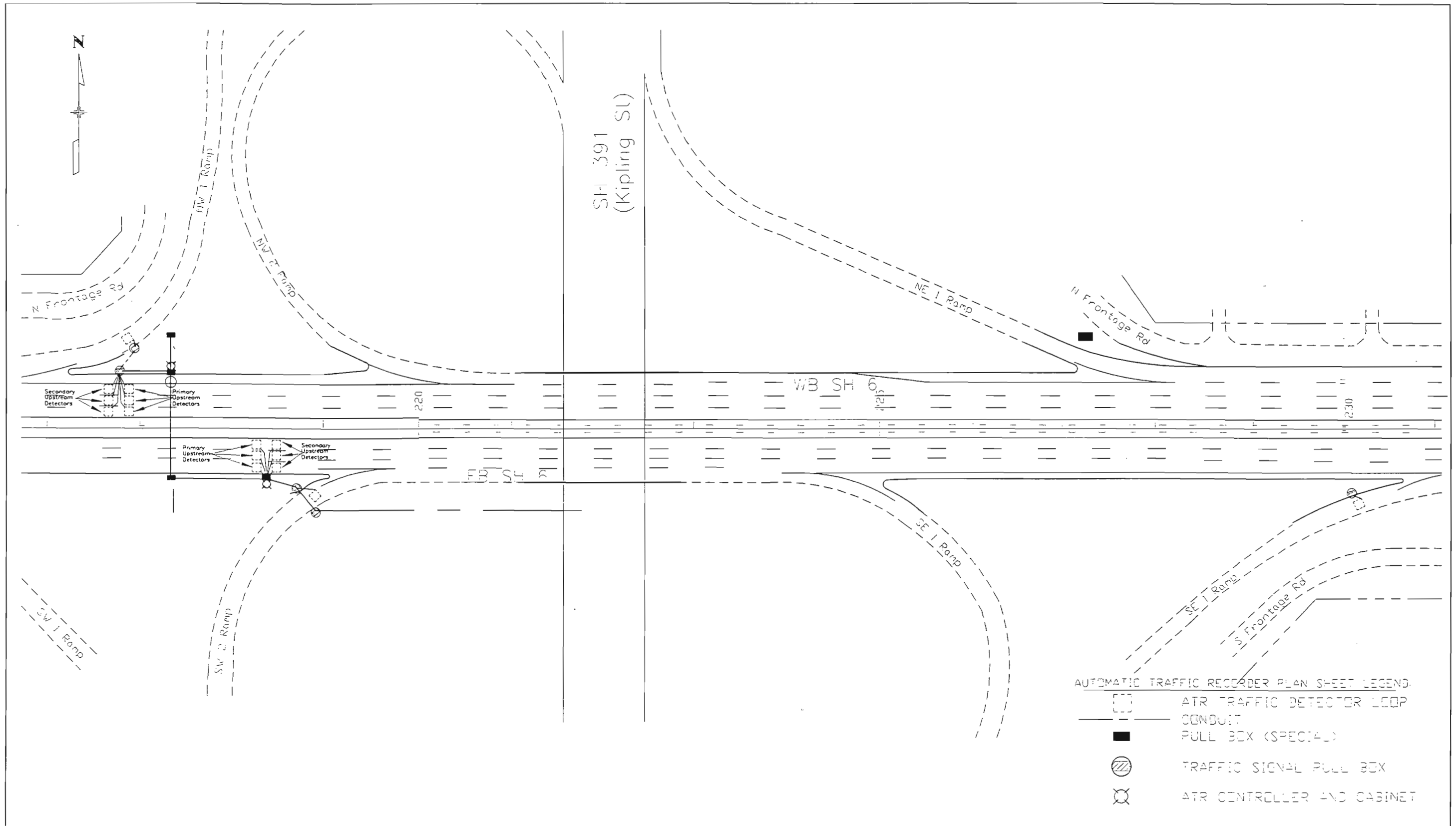
APPROXIMATE QUANTITIES FOR 6 X 6 FT LOOP DETECTORS				
APPROXIMATE LOCATIONS	NUMBER OF LOOPS		LOOP DETECTOR WIRE	ELECTRICAL CONDUIT 2"
	MAINLINE US6	ON RAMP	FEET	FEET
US6 WB				
EB US6 at SW Kipling ramp (Approximate station 218+30R)	6	2	1200	
EB US6 at SW Wadsworth ramp (Approximate station 298+50R)	6	2	1152	
WB US6 at NW Kipling ramp (Approximate station 216+80L)	6	1	1032	
WB US6 at NE Wadsworth ramp (Approximate station 305+00L)	6	2	1252	
EB US6 at SE Union Blvd ramp (Approximate station 180+75R) (See TIS Detail Plan Sheet 1" for installation details)	6	1	466 <del>970</del>	
TOTALS=====			5600 <input type="checkbox"/>	

NOTES:

- CONTRACTOR SHALL REPLACE ANY VEHICLE DETECTOR WIRE DAMAGED DURING THE PLANING PROCESS WITH AN ENTIRELY NEW VEHICLE DETECTOR LOOP. DETECTOR LOOPS SHALL BE INSTALLED IN ROADWAY PRIOR TO THE LAST LIFT OF ASPHALT.
- CONTACT CHRIS LILLIE OF CDOT REGION 6 TRAFFIC AT 303-757-9511 48 HOURS PRIOR TO LOOP INSTALLATION.
- PAYMENT FOR LOOP INSTALLATION IS COVERED UNDER ITEM 614-LOOP DETECTOR WIRE.

QUANTITIES CARRIED FORWARD TO TABULATION OF TRAFFIC ENGINEERING ITEMS

Computer File Information		Index of Revisions		Colorado Department of Transportation		As Constructed		LOOP DETECTOR TABULATION		Project No./Code	
Creation Date:	08/24/98	Initials:	AK					No Revisions:		NH 0062-011	
Last Modification Date:	11/04/99	Initials:	JKS					Revised:	11/9/01	Designer:	AK
Full Path:	US6_Wads_Simms							Void:		Detailer:	AK
Drawing File Name:	ATRLoopTab.dwg									Structure Numbers:	
Scale:	NONE									Sheet Subset:	
										Subset Sheet Number:	1 of 3
										Sheet Number	62




- AUTOMATIC TRAFFIC RECORDER PLAN SHEET LEGEND:
- ATR TRAFFIC DETECTOR LOOP
  - CONDUIT
  - PULL BOX (SPECIAL)
  - TRAFFIC SIGNAL PULL BOX
  - ATR CONTROLLER AND CABINET

Computer File Information	
Creation Date:	08/28/97 Initials: WJKjr
Last Modification Date:	08/02/99 Initials: JKS
Full Pth.	US6_Wads_Simms
Drawing Name:	ATRLoopsKipling.dwg
Scale:	Not to scale

Sheet Revisions	

Colorado Department of Transportation



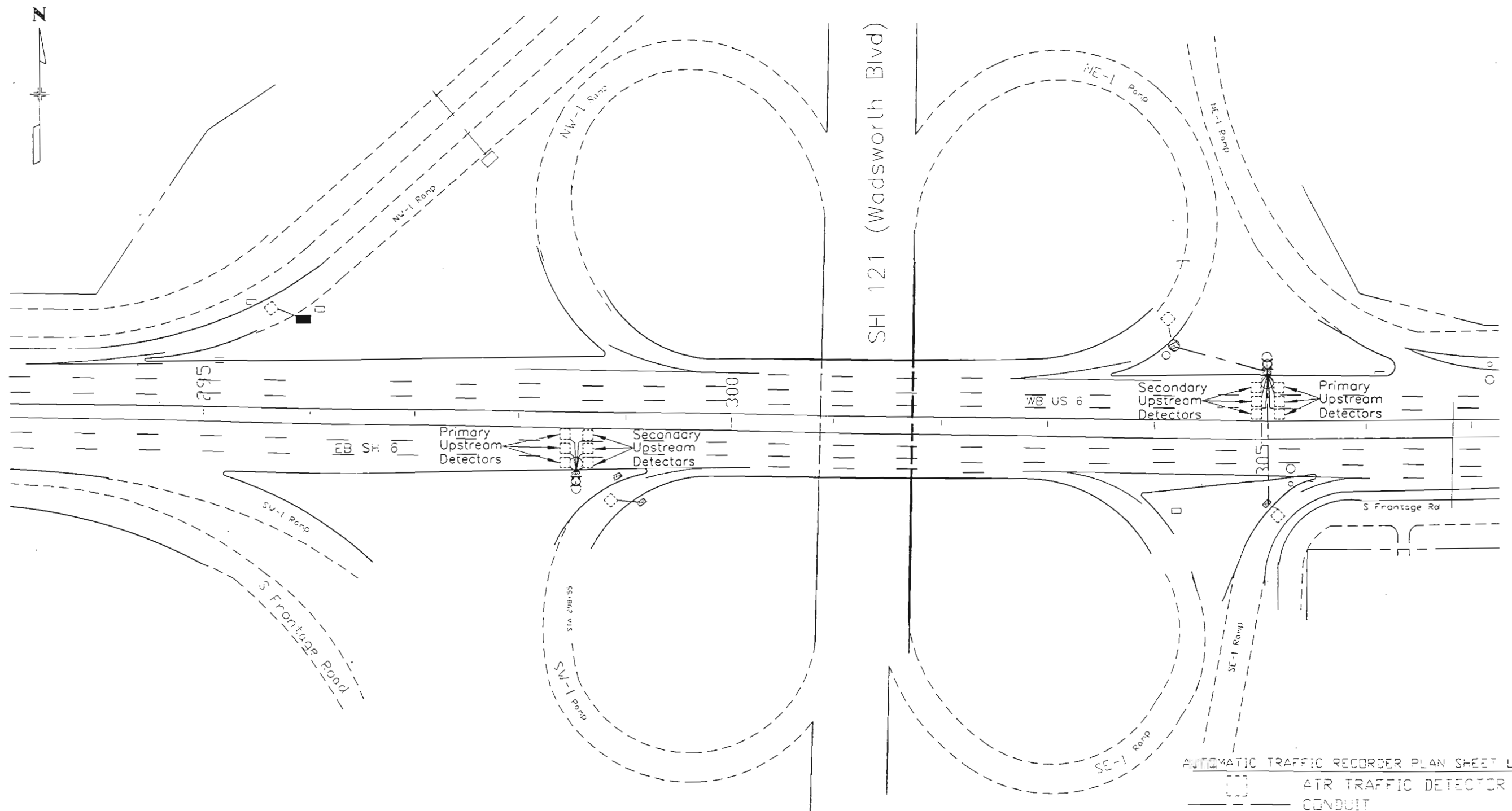
Region 6 Traffic  
 2000 South Holly Phone: 303-757-9511  
 Denver, Colorado 80222 FAX: 303-757-9907

As Constructed
No Revisions: 1/1/1
Revised:
Void:

Plan Sheet	
AUTOMATIC TRAFFIC RECORDER REPLACEMENT	
Designer: WJKjr	Structure Numbers
Detailer: JKS	
Sheet Subset:	Subset Sheet Number: 2 of 3

Project No./Code	NH 0062-011
	12023
Sheet Number	63






**AUTOMATIC TRAFFIC RECORDER PLAN SHEET LEGEND**

	ATR TRAFFIC DETECTOR LOOP
	CONDUIT
	PULL BOX (SPECIAL)
	TRAFFIC SIGNAL PULL BOX
	ATR CONTROLLER AND CABINET

Computer File Information	
Creation Date:	08/28/97 Initials: WJKjr
Last Modification Date:	08/02/99 Initials: JKS
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Sheet Revisions	

Colorado Department of Transportation



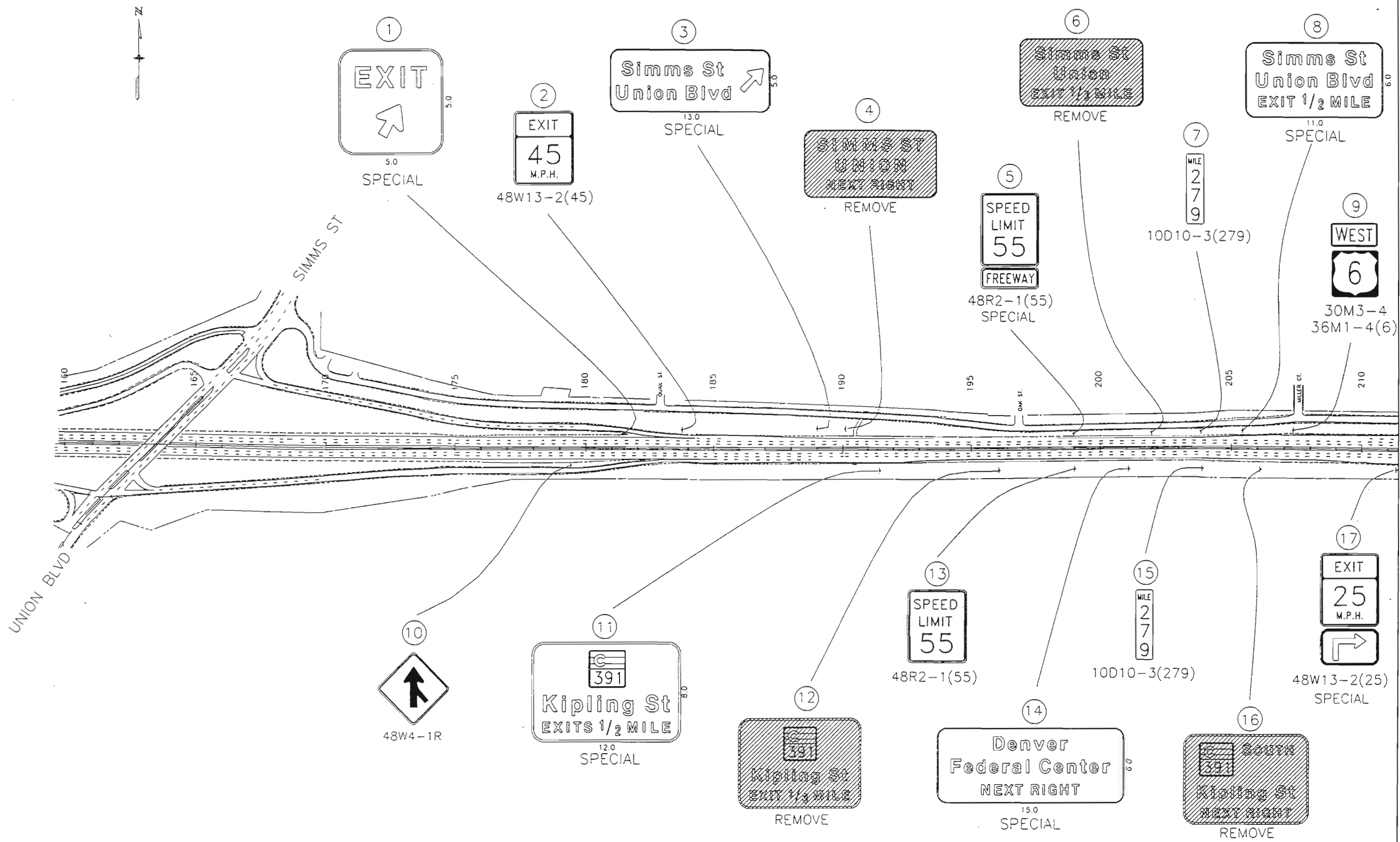
Region 6 Traffic  
 2000 South Holly Phone: 303-757-9511  
 Denver, Colorado 80222 FAX: 303-757-9907


As Constructed
No Revisions: <del>1/1/01</del>
Revised:
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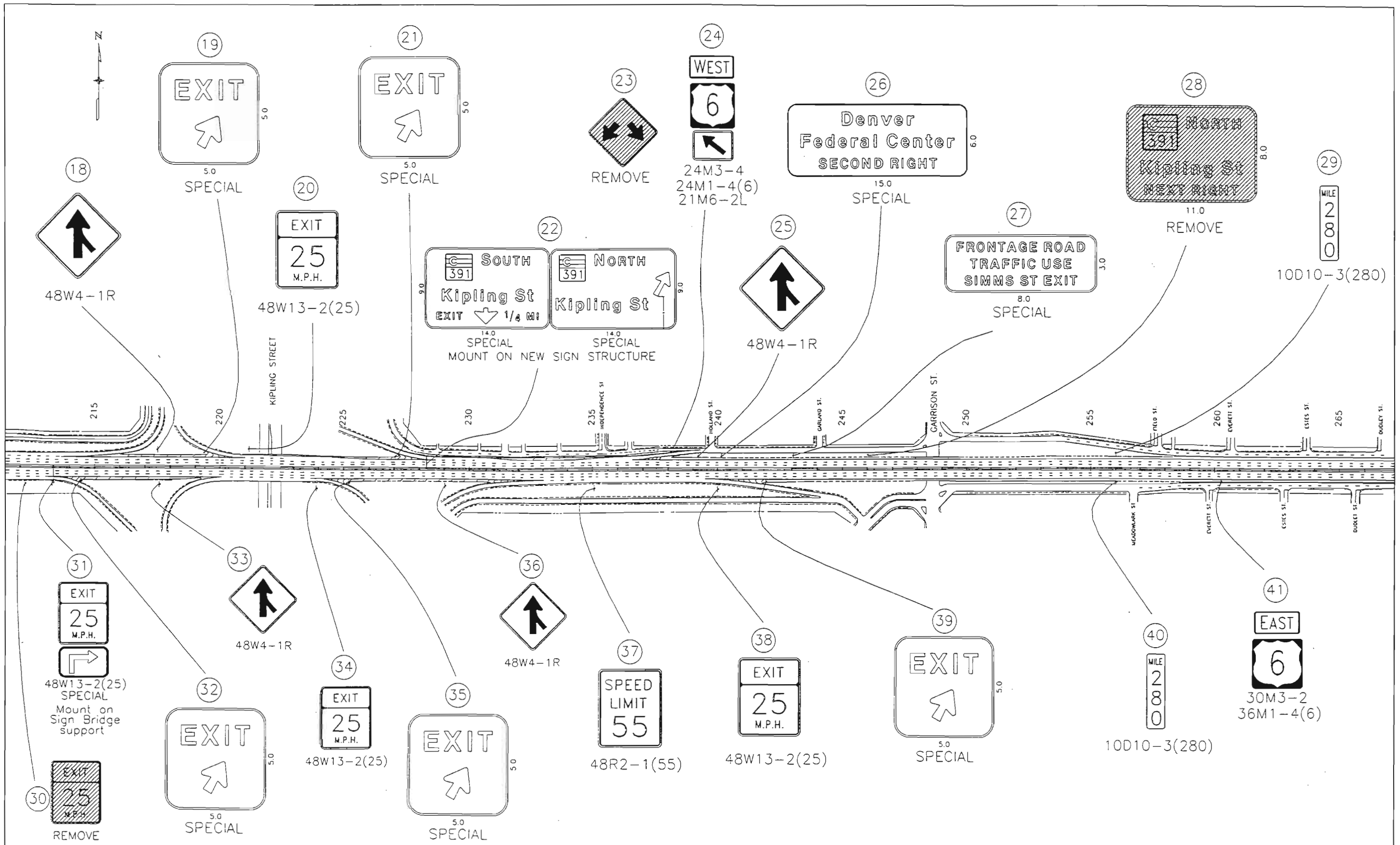
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Designer: WJKjr	Structure Numbers:
Detailer: JKS	
Sheet Subset:	Subset Sheet Number: 3 of 3


Project No./Code	NH 0062-011
	12023
Sheet Number	64

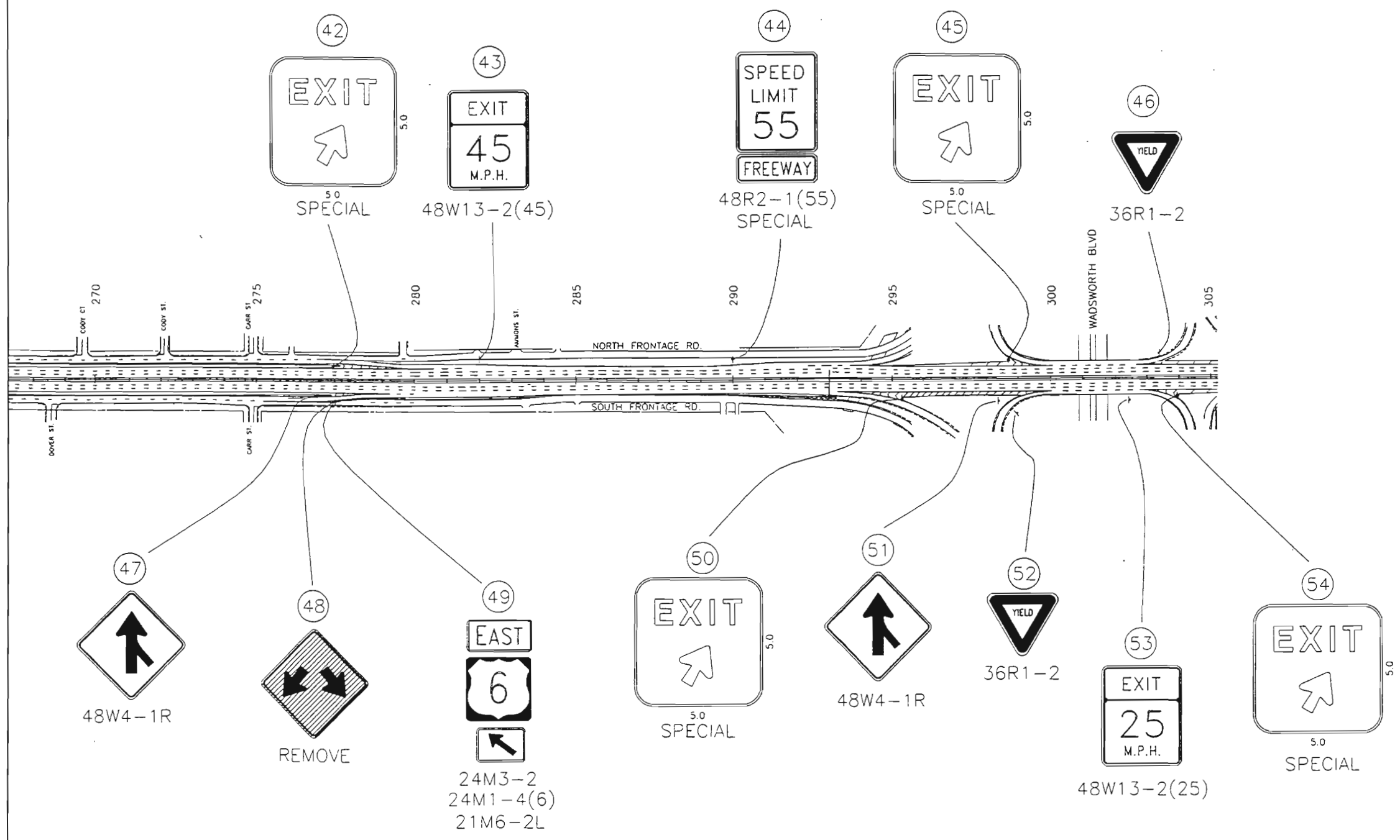





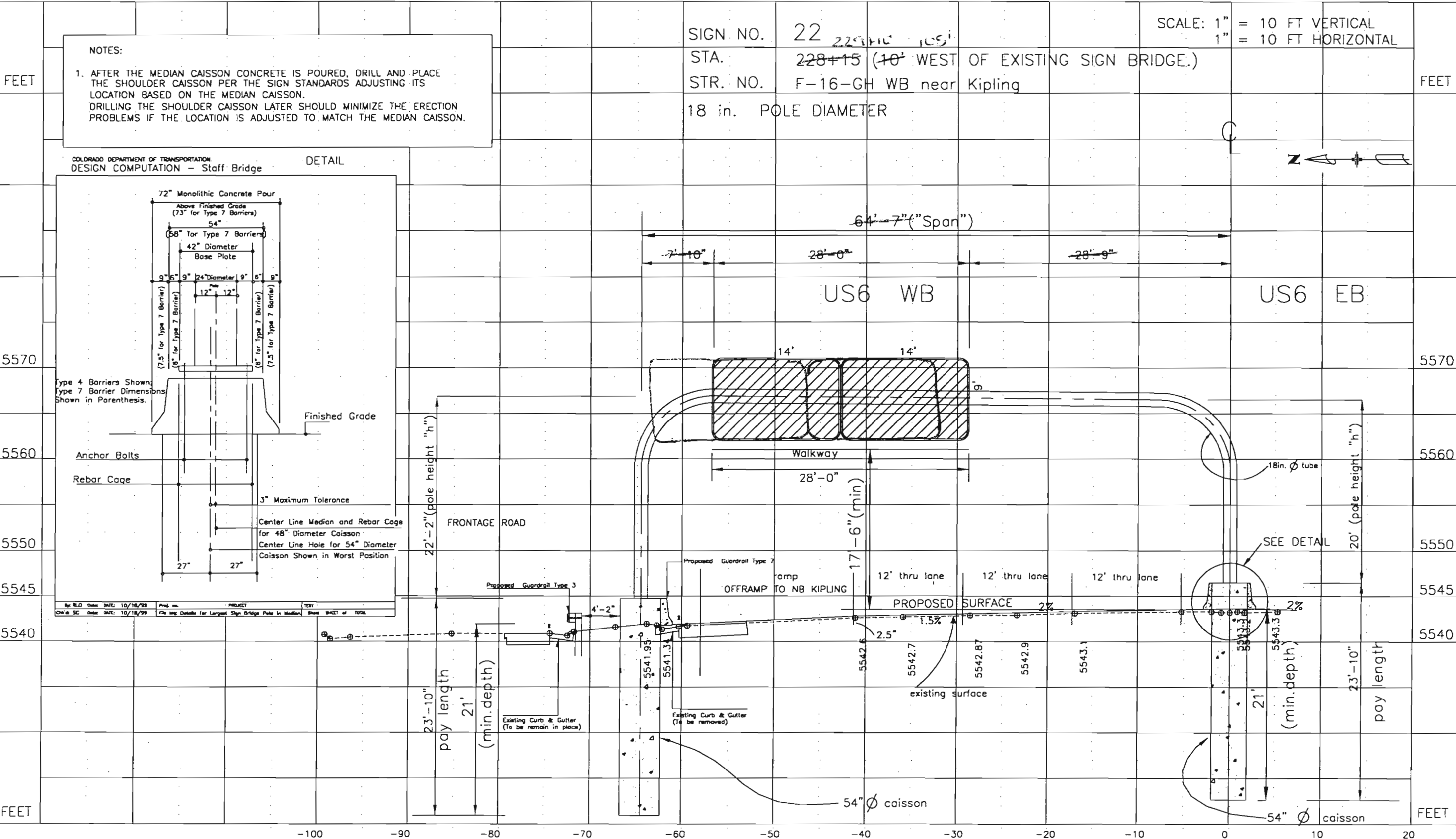
Computer File Information		Sheet Revisions		Colorado Department of Transportation		As Constructed		FINAL SIGNING AND STRIPING		Project No./Code		
Creation Date:	3/18/98	Initials:	PJN	 Region 6 Traffic 2000 South Holly Denver, Colorado 80222 Phone: 303-757-9511 FAX: 303-757-9907		No Revisions: 1/1/01		Designer:		NH 0062-011		
Last Modification Date:	10/13/99	Initials:	JKS			Revised:	Detailer:		Structure Numbers		12023	
Full Path:	US6_WADS_SIMMS					Void:	Sheet Subset:		Subset Sheets:		1 of 3	
Drawing File Name:	Final Signing and Striping Plans1.dwg					Sheet Number		65				
Scale:	NONE											



Computer File Information		Sheet Revisions		Colorado Department of Transportation  Region 6 Traffic 2000 South Holly Denver, Colorado 80222 Phone: 303-757-9511 FAX: 303-757-9907	As Constructed	FINAL SIGNING AND STRIPING		Project No./Code
Creation Date:	3/18/98 Initials: PjN				No Revisions: 11/3/01			NH 0062-011
Last Modification Date:	10/13/99 Initials: JKS				Revised:	Designer:	Structure Numbers	12023
Full Path:	US6_WADS_SIMMS				Void:	Detailer:	Sheet Subsets	2 of 3
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Scale:	NONE							



Computer File Information		Sheet Revisions		Colorado Department of Transportation		As Constructed		Project No./Code			
Creation Date:	3/18/98	Initials:	PJN	 Region 6 Traffic 2000 South Holly Denver, Colorado 80222 Phone: 303-757-9511 FAX: 303-757-9907		No Revisions: <i>11/1/98</i>		FINAL SIGNING AND STRIPING		NH 0062-011	
Last Modification Date:	10/13/99	Initials:	JKS			Revised:	Designer:	Structure Numbers	12023		
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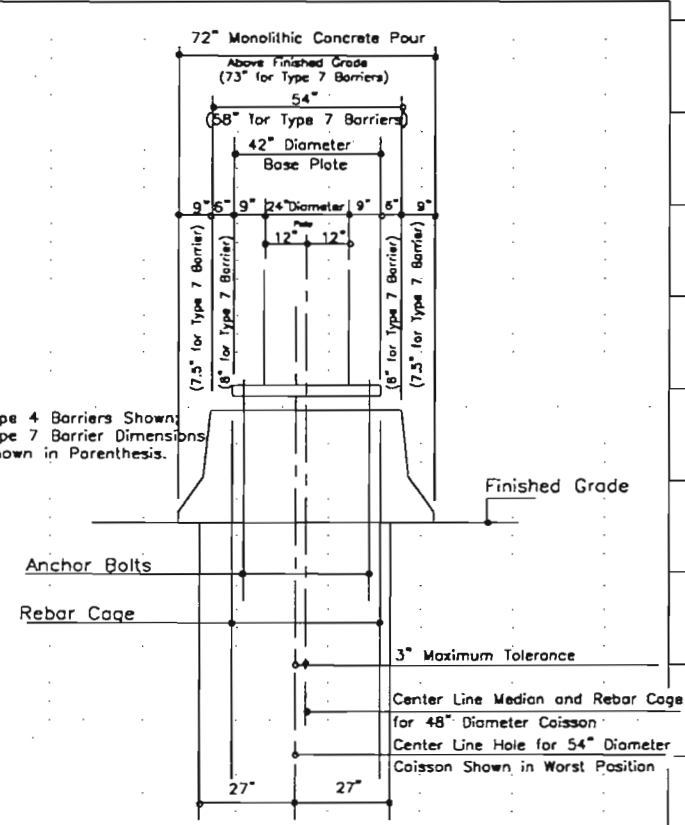
NOTES:  
 1. AFTER THE MEDIAN CAISSON CONCRETE IS POURED, DRILL AND PLACE THE SHOULDER CAISSON PER THE SIGN STANDARDS ADJUSTING ITS LOCATION BASED ON THE MEDIAN CAISSON. DRILLING THE SHOULDER CAISSON LATER SHOULD MINIMIZE THE ERECTION PROBLEMS IF THE LOCATION IS ADJUSTED TO MATCH THE MEDIAN CAISSON.

SIGN NO. 22 *225110 1051*  
 STA. 228+15 (10' WEST OF EXISTING SIGN BRIDGE.)  
 STR. NO. F-16-GH WB near Kipling  
 18 in. POLE DIAMETER

SCALE: 1" = 10 FT VERTICAL  
 1" = 10 FT HORIZONTAL

COLORADO DEPARTMENT OF TRANSPORTATION  
 DESIGN COMPUTATION - Staff Bridge

DETAIL



By: RLD Date: 10/18/99	Proj. No.	PROJECT	TEXT
Checked: SC Date: 10/18/99	File: sig Details for Largest Sign Bridge Pole in Median	Sheet 34 of 107	

Computer File Information

Creation Date:	08/04/99	Initials:	AK
Last Modification Date:	11/04/99	Initials:	AK
Full Path:	US6_WADS_SIMMS		
Drawing File Name:	Overhead Sign X-section.dwg		
Acad Ver.	R14	Scale:	(1"=10'V)(1"=10'H) Units: English

Sheet Revisions


Colorado Department of Transportation

Region 6 Traffic  
 2000 S Holly St  
 Denver, Co 80222

Phone: 303-757-9511  
 FAX: 303-757-9907

As Constructed

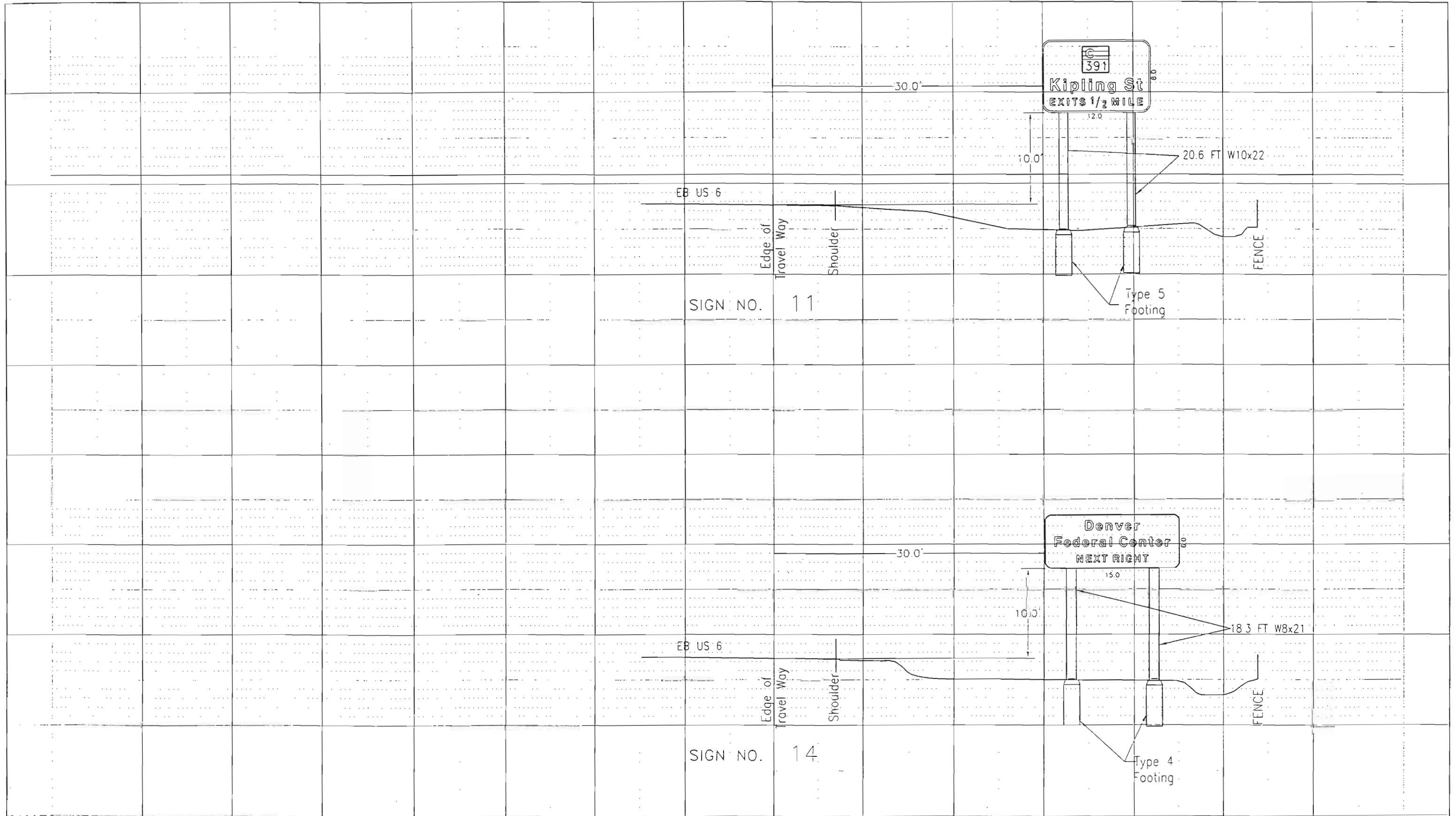
No Revisions:
Revised: 1119101
Void:

SIGN STRUCTURE CROSS SECTION

Designer:	AK	Structure Numbers
Detailer:	AK	
Sheet Subset:		Subset Sheets:

Project No./Code


NH 0062-011
12023
Sheet Number 68



Computer File Information	
Creation Date:	08/04/99 Initials: AK
Last Modification Date:	11/04/99 Initials: JKS
Full Path:	US6_WADS_SIMMS
Drawing File Name:	XSECTIONS SIGN 11 AND 14.dwg
Scale:	(1"=10'V)(1"=10'H)

Sheet Revisions	

Colorado Department of Transportation

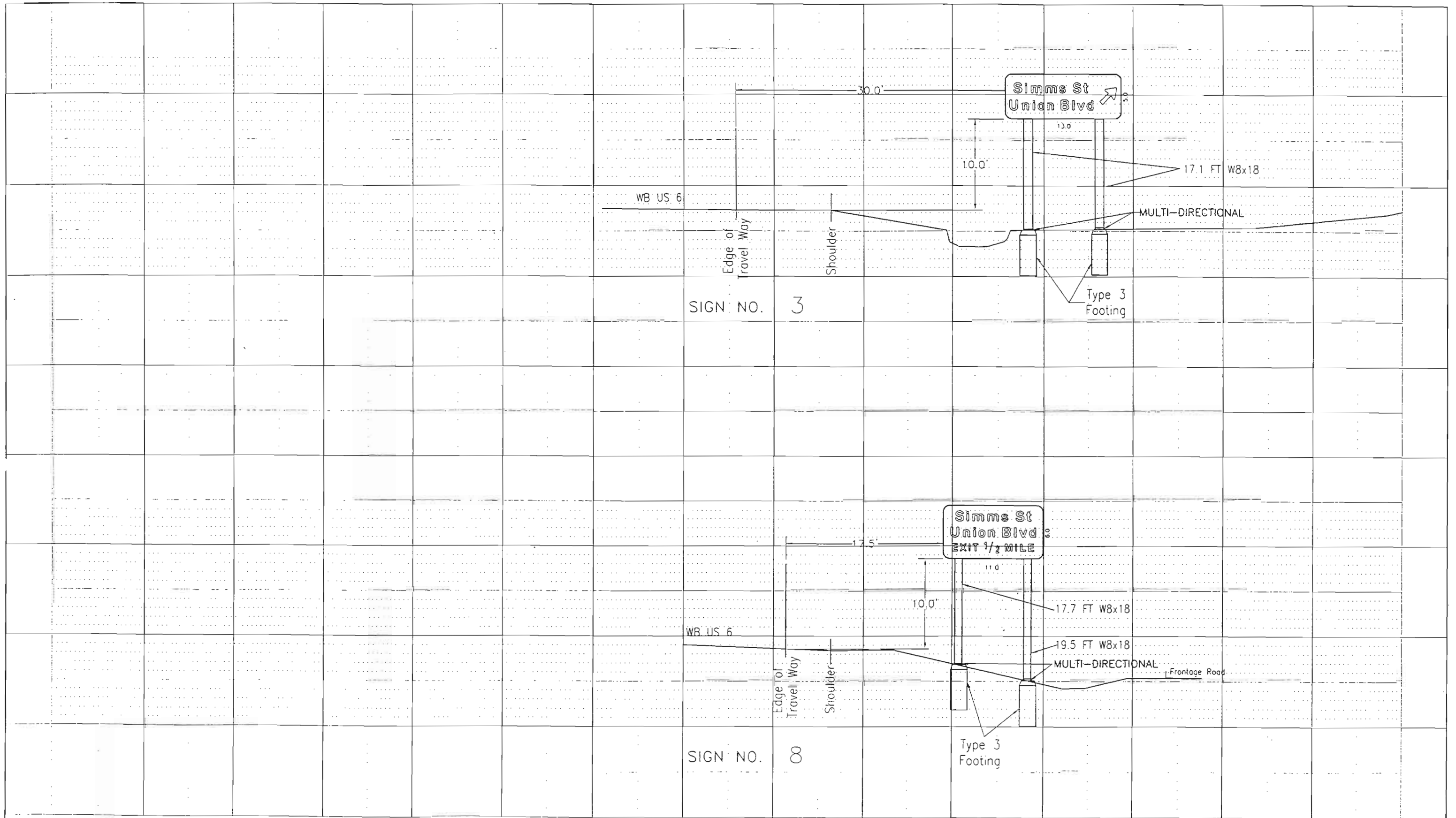


Region 6 Traffic  
2000 South Holly Denver, Colorado 80222  
Phone: 303-757-9511 FAX: 303-757-9907

As Constructed
No Revisions: 1/13/01
Revised:
Void:

SIGN CROSS SECTION	
Designer:	Structure Numbers:
Detailer:	
Sheet Subset:	Subset Sheets:

Project No./Code	NH 0062-011
	12023
Sheet Number	69




SIGN NO. 3

SIGN NO. 8

Computer File Information		
Creation Date:	08/04/99	Initials: AK
Last Modification Date:	11/04/99	Initials: JKS
Full Path:	US6_WADS_SIMMS	
Drawing File Name:	XSECTIONS SIGN 3 AND 8.dwg	
Scale:	(1"=10'V)(1"=10'H)	

Sheet Revisions		

Colorado Department of Transportation



Region 6 Traffic  
2000 South Holly  
Denver, Colorado 80222

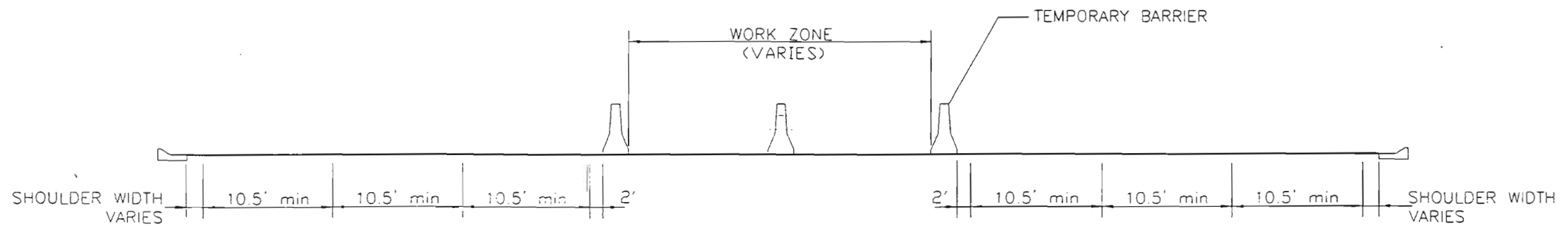
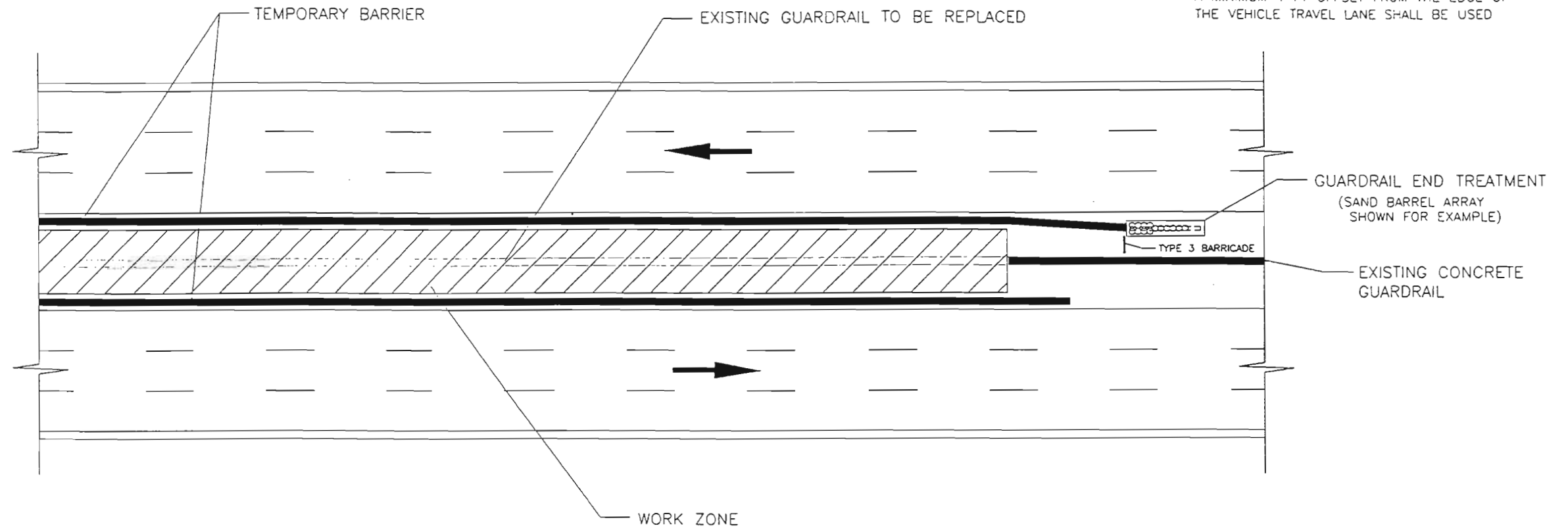
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As Constructed
No Revisions: 1119101
Revised:
Void:

SIGN CROSS SECTION		
Designer:	Structure Numbers:	
Detailer:		
Sheet Subset:	Subset Sheets:	

Project No./Code	NH 0062-011
	12023
Sheet Number	70

NOTE:  
 IF SAND BARRELS ARE USE  
 A MINIMUM 4 FT OFFSET FROM THE EDGE OF  
 THE VEHICLE TRAVEL LANE SHALL BE USED



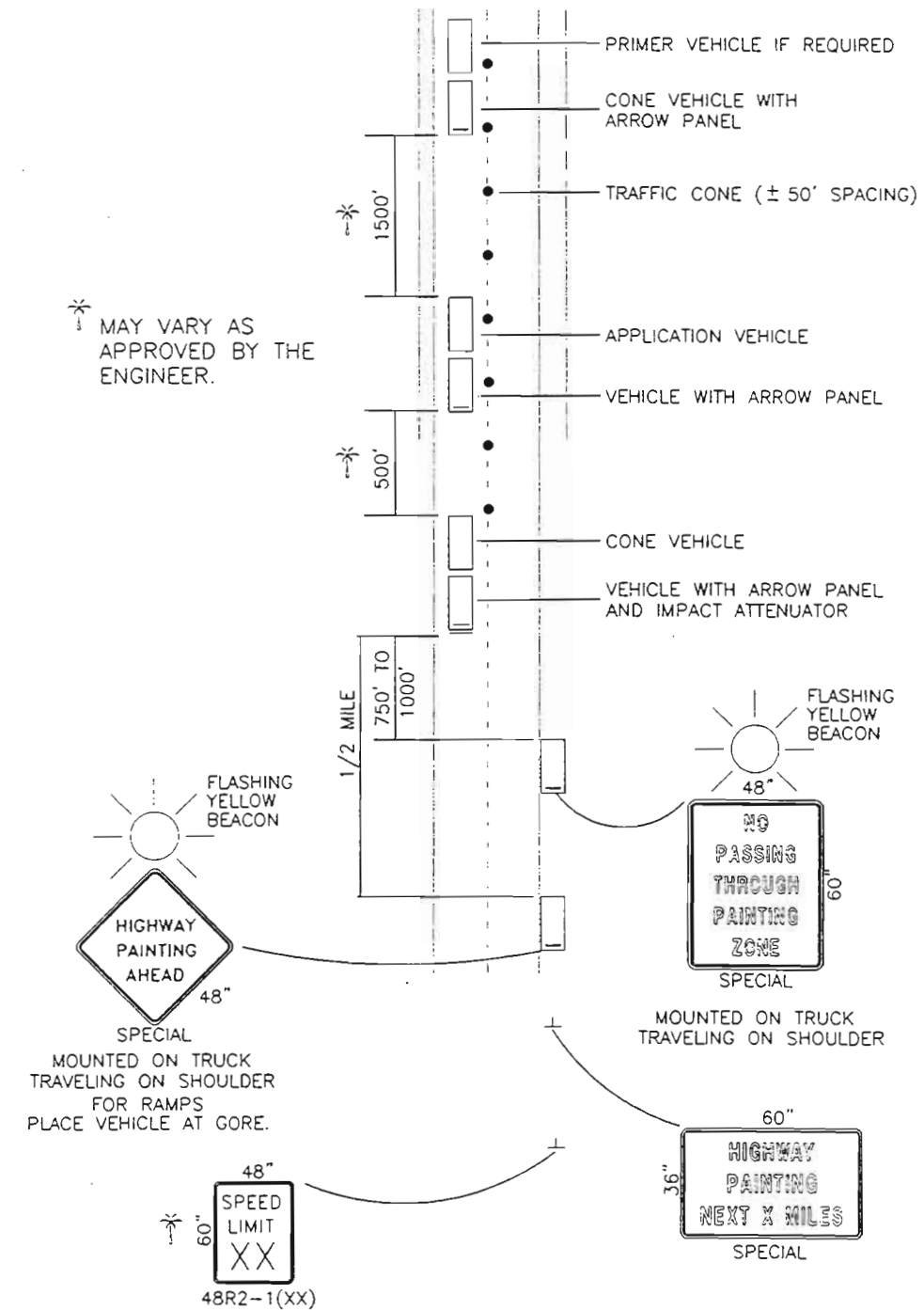
Computer File Information		Sheet Revisions		Colorado Department of Transportation		As Constructed		TYPICAL TRAFFIC CONTROL FOR MEDIAN REPLACEMENT		Project No./Code			
Creation Date:	09/11/98	Initials:	PJN	 Region 6 Traffic 2000 S. Holly Street Denver, CO 80222 Phone: 757-9511 FAX: 757-9907		No Revisions:		1/Aci		NH 0062-011			
Last Modification Date:	10/13/99	Initials:	PJN			Revised:			Designer:	PJN	Structure Numbers:	12023	
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Drawing File Name:	TypicalTrafficControl.dwg							Sheet Subset:			Subset Sheets:		
Scale:	NONE									Sheet Number	71		

## CONSTRUCTION TRAFFIC CONTROL DEVICES FOR MOBILE PAVEMENT MARKING ZONE

SIGN CODE	LEGEND	SIZE	PANEL SIZE			OTHER
			EACH			
			A	B	C	
SPECIAL	HIGHWAY/PAINTING/NEXT X MILES	60" X 36"		1		
SPECIAL	HIGHWAY/PAINTING/AHEAD	48" X 48"		1		
SPECIAL	NO/PASSING/THROUGH/PAINTING/ZONE	48" X 60"		1		
48R2-1	SPEED/LIMIT/XX	48" X 60"		1		
	SIGN TOTALS			** 4		
	FLASHING BEACON (PORTABLE)					**2 EA.
	FLASHING ARROW PANEL (C TYPE)					**3 EA.
	TRAFFIC CONES	900				**300 EA.
	MOBILE PAVEMENT MARKING ZONE					6 DAY

\*\* THESE ITEMS SHALL BE INCLUDED IN THE PAY ITEM "MOBILE PAVEMENT MARKING ZONE" AND WILL NOT BE PAID FOR SEPERATELY.

## MOBILE PAVEMENT MARKING ZONE

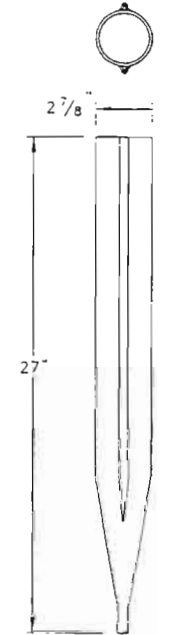
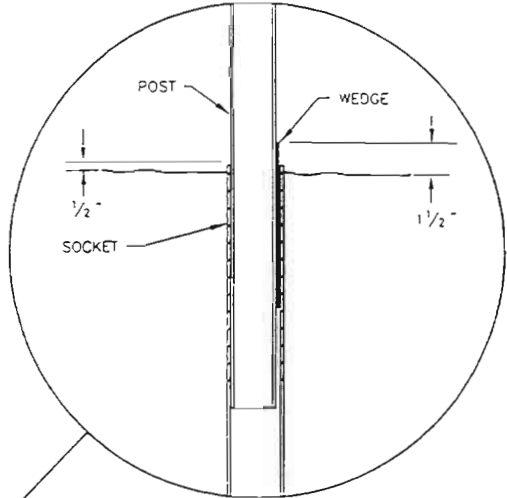
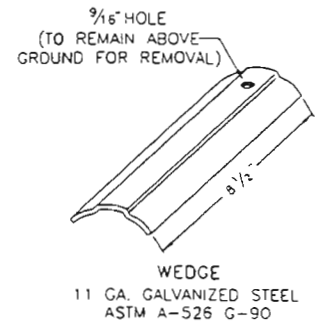
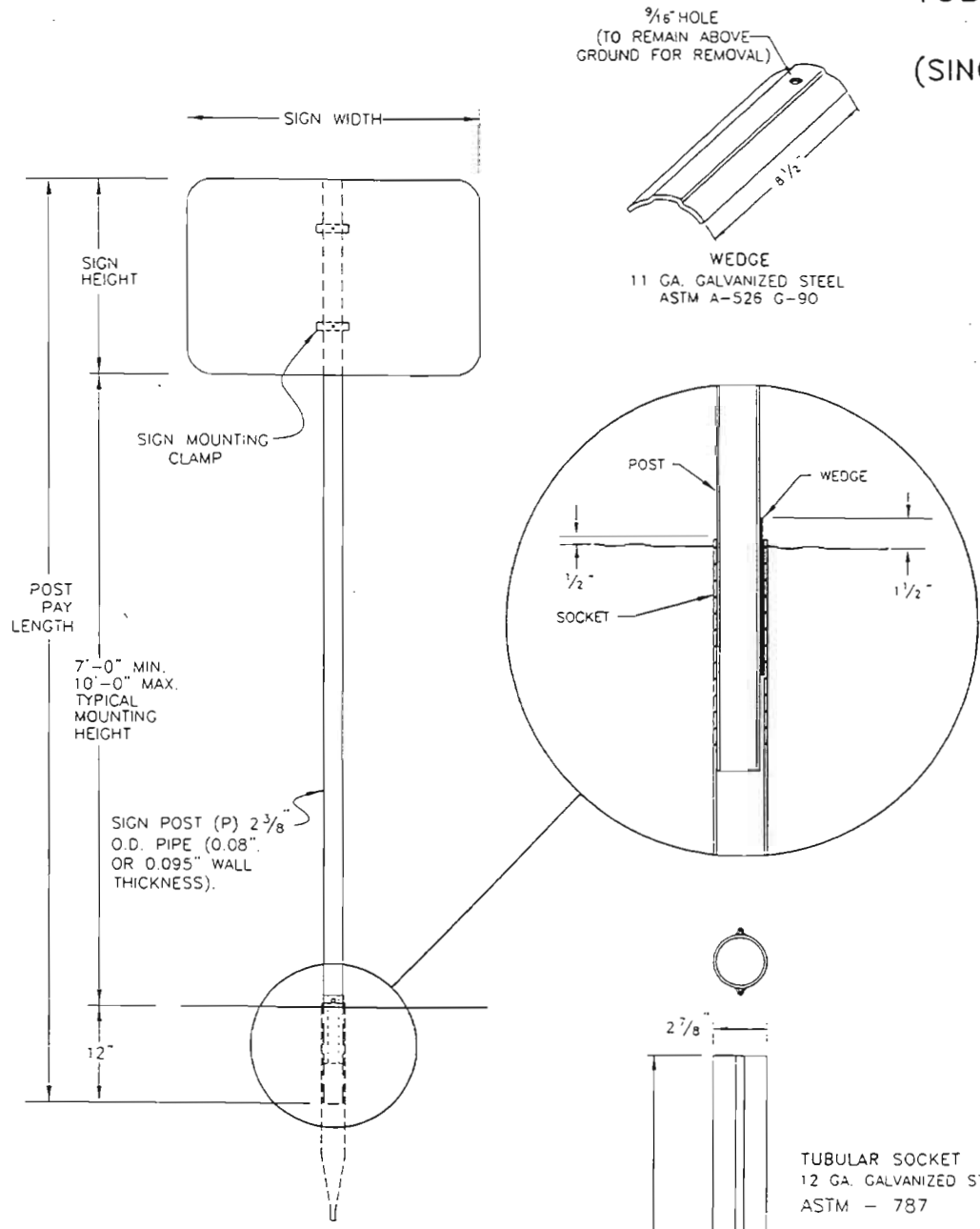


Computer File Information		Index of Revisions		Colorado Department of Transportation		As Constructed		MOBILE PAVEMENT MARKING ZONE		Project No./Code			
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Last Modification Date:	11/04/99	Initials:	PJN			Revised:						12023	
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Drawing File Name:	Mobile Pavement Marking Zone E.dwg												
Scale:	NONE												



# TUBULAR STEEL POSTS (SOCKET SYSTEM) (SINGLE OR DOUBLE POST)

## SIGNPOST SELECTION GUIDE



**POST NOTES:**  
THE POST MAY BE PRE-PUNCHED WITH 3/8" HOLES AND THE SIGN MOUNTED DIRECTLY TO THE POST, OR AN APPROVED MOUNTING CLAMP MAY BE USED TO MOUNT THE SIGN TO THE POST. IF THE POST IS PRE-PUNCHED, THE HOLES SHALL BE SPACED THE FOLLOWING DISTANCES FROM THE TOP:  
1", 3", 10", 16", 21", 23", 24", 27", 33", 37", 39", AND 45"

SIGN HEIGHT (FT)	SIGN WIDTH (FT) / MOUNTING HEIGHT (FT)																																																																
	1					2					2.5					3					4					5					6					7					8					9																			
	7	8	9	10	10	7	8	9	10	10	7	8	9	10	10	7	8	9	10	10	7	8	9	10	10	7	8	9	10	10	7	8	9	10	10	7	8	9	10	10	7	8	9	10	10																				
1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	...																								
2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P																				
2.5	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P																				
3	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P																				
4	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P																				
5	...					P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P																				
6	...					2					2					2					2					2					2					2					2					2					2					2					2				
7	...					2					2					2					2					2					2					2					2					2					2					2					2				

**GENERAL NOTES:**

- SIGN POSTS SHALL BE COLD FORMED STEEL WITH A MINIMUM YIELD STRENGTH OF 35 KSI. POST COLOR SHALL BE FEDERAL STANDARD 595 NUMBER 20059 BROWN, OR EQUIVALENT OR AS SHOWN IN THE TABULATION OF SIGNS.
- STEEL TUBE SIGN SUPPORTS SHALL BE INSTALLED UNDER THE SUPERVISION OF AN ON-SITE INDIVIDUAL TRAINED BY THE MANUFACTURER OF THE SUPPORTS. PRIOR TO INSTALLATION OF THE SIGN SUPPORTS, THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER WRITTEN CERTIFICATION FROM THE MANUFACTURER THAT THE INDIVIDUAL SUPERVISING THE INSTALLATION HAS BEEN TRAINED TO PROPERLY INSTALL THE SUPPORTS. UPON COMPLETION OF SIGN SUPPORT INSTALLATION, THE CONTRACTOR SHALL SUBMIT WRITTEN CERTIFICATION, SIGNED BY THE TRAINED INSTALLER, THAT THE SUPPORTS WERE INSTALLED ACCORDING TO THE MANUFACTURER'S REQUIREMENTS.
- SIGNS AND POSTS SHALL INCLUDE ALL HARDWARE NECESSARY FOR COMPLETE INSTALLATION. POST TYPE P SHALL BE PAID FOR AS 614 STEEL SIGN POST (2 INCH ROUND), LIN. FT.
- FOR BACKING ZEE REQUIREMENTS AND DETAILS, SEE COLORADO STANDARDS PLANS S-614-3 AND S-614-4.
- SIGNS BETWEEN 30" AND 60" WIDTH WITH ONE POST INSTALLATION REQUIRE A SIGN SUPPORT BRACKET IN ADDITION TO THE BACKING ZEE REQUIREMENTS.
- MULTIPLE SIGNS MAY USE THE U SIGN SUPPORT BRACKET.

\*\*\* SIZES NOT USED. REFER TO COLORADO STANDARD PLANS SECTION 614 FOR LARGER SIGN SUPPORTS.

**MAXIMUM ALLOWABLE MOMENT PER POST:**  
P (2", 2.375" OD) 1.46 KIP FT  
P1 (2 1/2", 2.875" OD, SCHEDULE 10) 3.52 KIP FT  
P2 (2 1/2", 2.875" OD, SCHEDULE 80) 4.68 KIP FT

**CHART NOTES:**

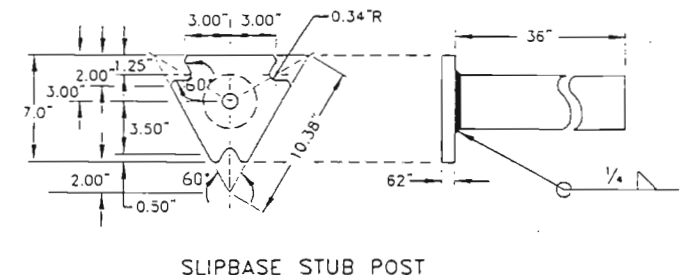
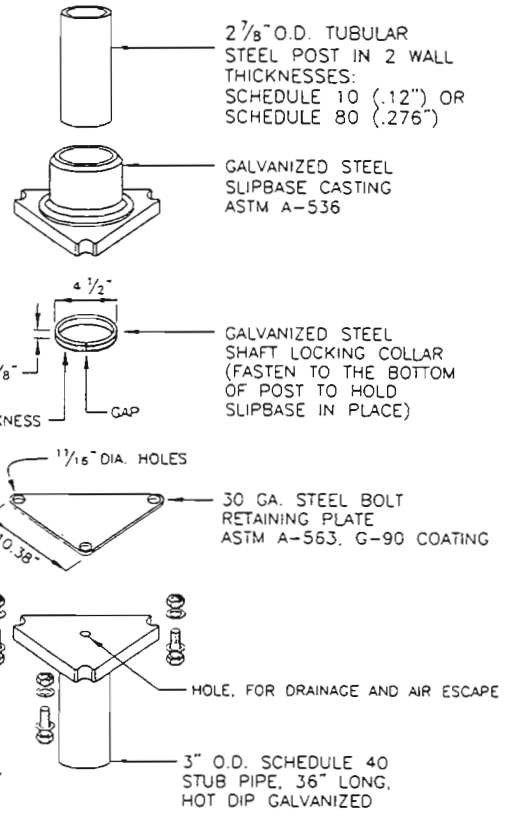
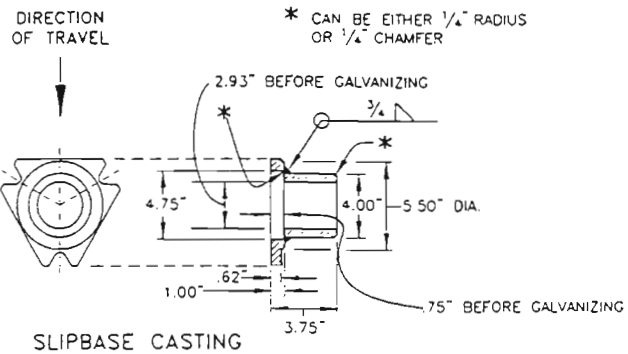
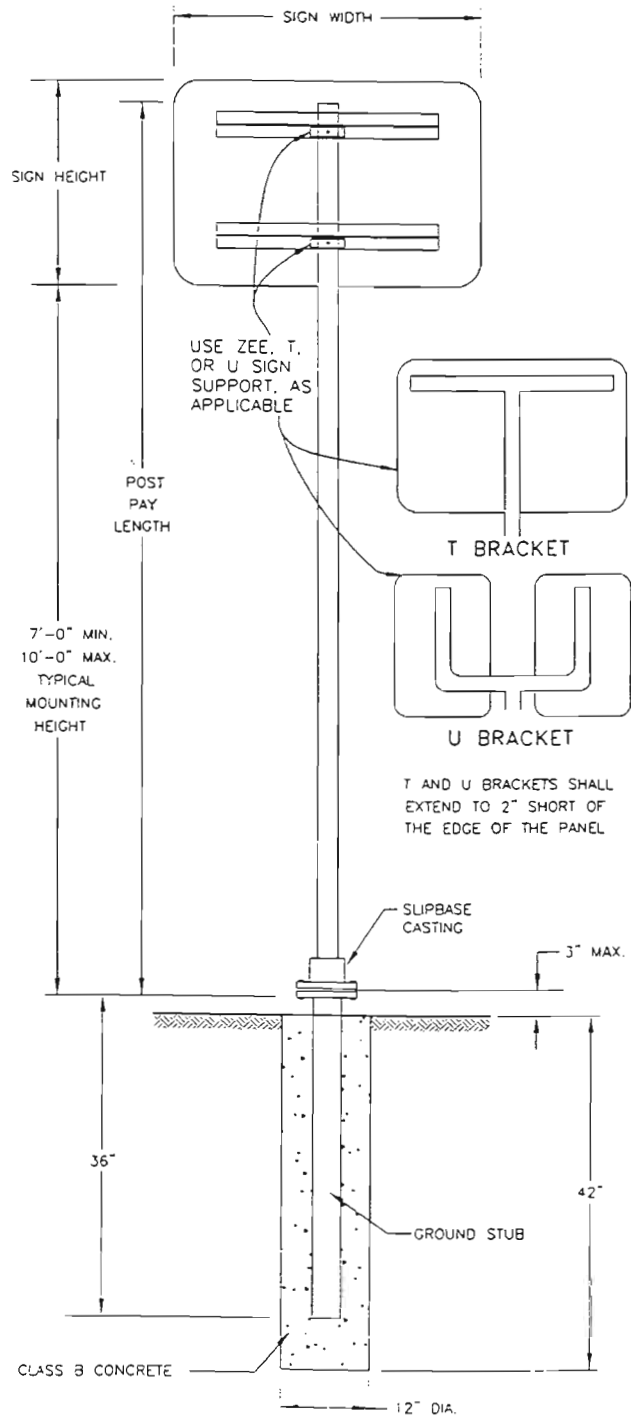
- WIND LOAD DESIGN = 80 MPH.
- TYPICAL POST MOUNTING HEIGHTS FROM GROUND TO BOTTOM OF SIGN PANEL ARE 7, 8, 9, 10 FEET.
- FOR SIGNS MOUNTED ON TWO POSTS, MINIMUM DISTANCE BETWEEN POSTS SHALL BE 2 FEET AND MAXIMUM DISTANCE SHALL BE 8 FEET. MAXIMUM DISTANCE FROM POST TO EDGE OF SIGN PANEL(S) SHALL BE 0 TO 4 INCHES.

**COLORADO  
DEPARTMENT OF TRANSPORTATION**

ISSUED BY TRANS SAFETY & TRAFFIC ENGR BRANCH FEBRUARY 10, 1999	GROUND MOUNTED SIGN SUPPORT DETAILS SHEET 1 OF 2 (ENGLISH)
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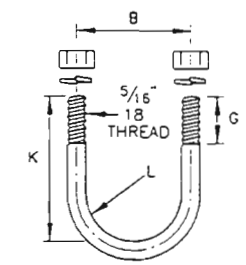
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Creation Date: 09/11/98	Initials: PJN			Region 6 Traffic 2000 S. Holly Street Denver, CO 80222 Phone: 757-9511 FAX: 757-9907		No Revisions: <i>1/19/99</i>		Designer: PJN Detailer: PJN Structure Numbers: Sheet Subset:		NH 0062-011	
Last Modification Date: 10/13/99	Initials: PJN					Revised:				12023	
Full Path: US6_Wads_Simms						Void:				Sheet Number <b>73</b>	
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# TUBULAR STEEL POSTS (WITH SLIPBASE) (SINGLE OR DOUBLE POST)

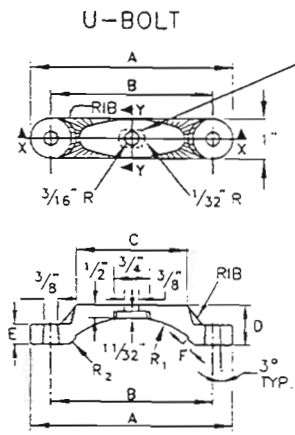


STANDARD PIPE SIZE	A	B	C	D	E	F	G	K	L	R <sub>1</sub>	R <sub>2</sub>
2	3 3/4	2 3/4	1 1/2	1 1/8	1/2	3/16	1	2 11/16	1 7/32	1 1/4	1 3/16
2 1/2	4 1/4	3 1/4	2	1 1/4	1/2	1/4	1	3 3/16	1 9/32	1 1/2	1 7/16

DIMENSIONS FOR MOUNTING CLAMP



U-BOLT TO BE MADE IN ACCORDANCE WITH STANDARD MANUFACTURING PROCEDURE. 1/32" OR 3/8" DIAMETER STOCK IS PERMISSIBLE. AMERICAN STANDARD REGULAR SEMI-FINISHED HEX NUTS AND SPRING LOCKWASHERS.



SLOT TO HOLD HEAD OF 3/8" SQUARE HEAD BOLT. THE BOLT SHALL BE 1/4" LONG, WITH FULL THREADS. A MEDIUM WASHER, AND GALVANIZED STEEL OR ALUMINUM SELF-LOCKING HEX HEAD NUT. THE BOLT HEAD MUST NOT TURN IN THE SLOT.

SECTION X-X

SECTION Y-Y

MOUNTING CLAMP FOR SOCKET OR SLIPBASE

## PIPE CLAMP CASTING

PIPE CLAMP CASTING SHALL BE ASTM B26 OR B108 ALUMINUM ALLOY A444.0-T4 OR 356.0-F. ALL SIGN MOUNTING CLAMP PARTS NOT MADE FROM ALUMINUM SHALL BE GALVANIZED STEEL IN CONFORMANCE WITH ASTM A153 OR STAINLESS STEEL.

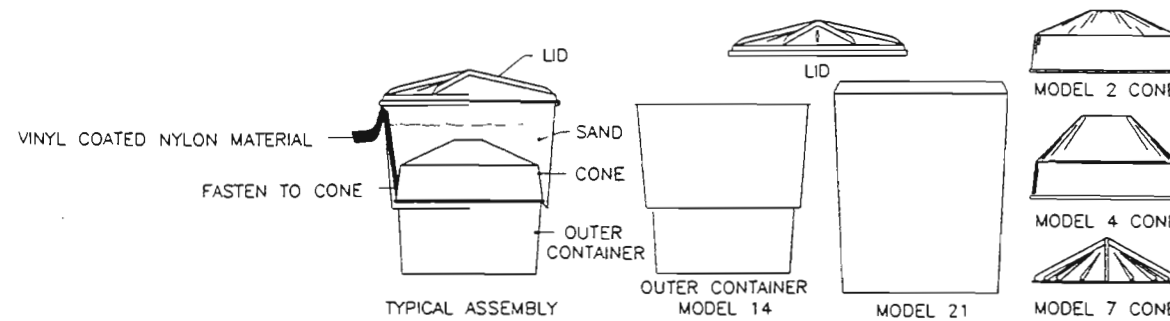
## GENERAL NOTES:

- SIGN POSTS SHALL BE COLD FORMED STEEL WITH A MINIMUM YIELD STRENGTH OF 55 KSI. POST COLOR SHALL BE FEDERAL STANDARD 595 NUMBER 20059 BROWN, OR EQUIVALENT OR AS SHOWN IN THE TABULATION OF SIGNS.
- STEEL TUBE SIGN SUPPORTS SHALL BE INSTALLED UNDER THE SUPERVISION OF AN ON-SITE INDIVIDUAL TRAINED BY THE MANUFACTURER OF THE SUPPORTS. PRIOR TO INSTALLATION OF THE SIGN SUPPORTS, THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER WRITTEN CERTIFICATION FROM THE MANUFACTURER THAT THE INDIVIDUAL SUPERVISING THE INSTALLATION HAS BEEN TRAINED TO PROPERLY INSTALL THE SUPPORTS. UPON COMPLETION OF SIGN SUPPORT INSTALLATION, THE CONTRACTOR SHALL SUBMIT WRITTEN CERTIFICATION, SIGNED BY THE TRAINED INSTALLER, THAT THE SUPPORTS WERE INSTALLED ACCORDING TO THE MANUFACTURER'S REQUIREMENTS.
- SIGNS AND POSTS SHALL INCLUDE THE FOOTING, SLIPBASE, AND ALL HARDWARE NECESSARY FOR COMPLETE INSTALLATION. POST TYPE P1 AND P2, INCLUDING T AND U MOUNTINGS, SHALL BE PAID FOR AS 614 STEEL SIGN POST (2.5 INCH ROUND) (SLIPBASE), LIN. FT.
- FOR BACKING ZEE REQUIREMENTS AND DETAILS. SEE COLORADO STANDARD PLANS S-614-3 AND S-614-4.
- SIGNS BETWEEN 30" AND 60" WIDTH WITH ONE POST INSTALLATION REQUIRE T SIGN SUPPORT BRACKET IN ADDITION TO THE BACKING ZEE REQUIREMENTS.
- MULTIPLE SIGNS MAY USE THE U SIGN SUPPORT BRACKET.

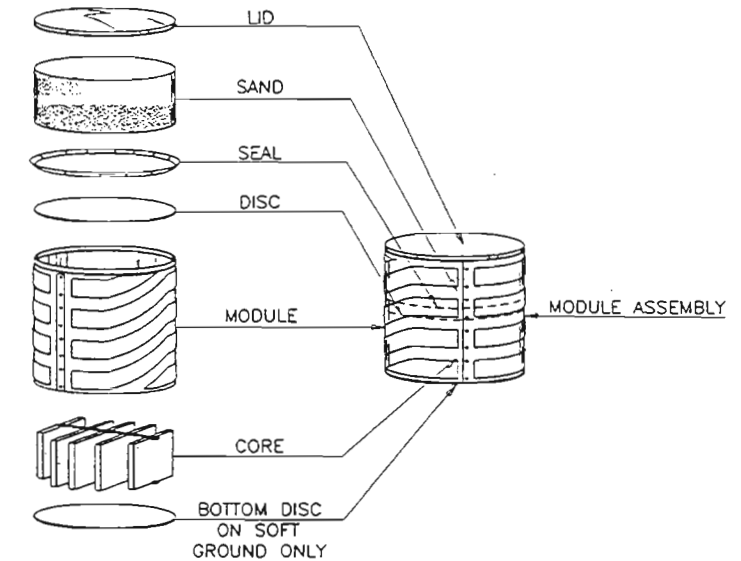
COLORADO DEPARTMENT OF TRANSPORTATION	
ISSUED BY TRANS SAFETY & TRAFFIC ENGR BRANCH FEBRUARY 10, 1999	GROUND MOUNTED SIGN SUPPORT DETAILS SHEET 2 OF 2 (ENGLISH)

Computer File Information		Sheet Revisions		Colorado Department of Transportation		As Constructed		STEEL SIGN POST DETAIL		Project No./Code	
Creation Date: 09/11/98	Initials: PJN			Region 6 Traffic 2000 S. Holly Street Denver, CO 80222 Phone: 757-9511 FAX: 757-9907		No Revisions: 11/19/07				NH 0062-011	
Last Modification Date: 10/13/99	Initials: PJN							Revised:	Designer: PJN	Structure Numbers:	12023
Full Path: US6_Waas_Simms						Void:	Detailer: PJN	Sheet Subset:	Sheet Number		
Drawing File Name: Steel Sign Post Detail 2.dwg								Subset Sheets:	74		
Scale: NONE											

TEMPORARY  
SAND BARREL IMPACT ATTENUATORS  
TYPE - ENERGITE AND FITCH



THE ENERGITE III MODULE



FITCH BARREL ASSEMBLY

Note: Impact attenuator shall be: Fitch Barrel Assembly (Grades Sales Co. Inc., 2555 W. Alameda Ave., Littleton Co., 80120, (303)730-8710), or Energite Barrel Assembly (Interwest Safety Supply, 195 So. Navajo, Denver, Co., 80223, (303)733-8447), or an approved equal.

Item 630 Impact Attenuator (Sand-Filled Plastic Barrel) (Temporary) shall consist of all barrels as shown in Details of Impact Attenuator.

The Contractor shall have one full set of replacement barrels available on the site at all times. The cost will be included in the price bid for Impact Attenuator.

The materials for plastic barrels and sand shall conform to the requirements of the manufacturer. The barrels shall be installed in accordance with the manufacturer's recommendations. The sand shall conform to ASTM C-33 or equal. All items necessary including ground preparation will be included in the cost of Impact Attenuator.

Impact attenuators shall be placed on a hot bituminous or concrete pad or any flat compacted surface approved by the Engineer. The size and location of pad shall be shown in the plans. The pad shall have a minimum thickness of four (4) inches. The installation of Sand-Filled barrels shall include painting, with a white epoxy paint, an outline and the weight of each barrel on the pad prior to final placement. All numbers shall be a minimum of six (6) inches high.

Impact Attenuator barrels shall also be labeled according to weight by fastening a colored strip of nylon coated material to the inside cone of each barrel. The colored strip shall have a minimum width of 4 inches and a maximum width of 6 inches. The nylon coated material shall extend from the cone to a minimum of 6 inches visible outside the barrel with the lid in place. The color scheme shall be according to cone type and weight as follows:

- Green - 400 lbs.
- Red - 700 lbs.\*
- Black - 1400 lbs.

The material shall be 18 ounce vinyl coated nylon. The strips of material will not be paid for separately, but included in the cost.

\*The 1400 lbs. Energite System does not have a cone. The colored strip shall lay across the bottom of the barrel and extend 6 inches over the side when barrel is filled with sand.

Impact Attenuator (Sand-Filled Plastic Barrel) (Temporary) will be measured by the number of complete installations furnished and installed and shall include sand and plastic barrel assemblies, required grading, and hot bituminous pavement, concrete or suitable compact material as approved by the engineer.

Impact Attenuator (Sand-Filled Plastic Barrel) (Temporary) will be paid for separately. Pay Unit shall be -- Each.

The Contractor will be required to provide crash attenuator barrels with the following features to prevent the occurrence of frozen sand in the barrels.

1. Barrels shall be filled with dry, free draining sand with a moisture content of 3 per cent or less.
2. Barrels shall have positive drainage pathways for moisture. Slots or weep holes shall be provided in the sides or bottoms of the barrels to prevent the collection of moisture. To prevent the loss of sand, holes shall be covered with filter fabric on the inside of the barrel.
3. Barrel lids shall have rainproof ventilation pathways.
4. A system shall be provided which would secure lids to the barrels and prevent dislocation. The Contractor shall replace broken or cracked lids and/or barrels immediately.
5. If requested by the Engineer the Contractor may be required to mix an antifreeze agent with the sand, or use pea gravel for the internal material, as follows:
  - A. Antifreeze agent - use of rock salt (NaCl) mixed at a rate of no more than 5 per cent by weight, salt to sand.
  - B. Pea gravel - one hundred per cent of this material shall pass a 1/2 inch sieve, no more than 5 per cent shall pass a number 50 sieve, and no more than 2 per cent shall pass a number 100 sieve.

Computer File Information		Index of Revisions		Colorado Department of Transportation		As Constructed		SAND BARREL DETAIL		Project No./Code	
Creation Date:	7/2/97	Initials:	PJN							NH 0062-011	
Last Modification Date:	10/13/99	Initials:	PJN							12023	
Full Path:	US6_WADS_SIMMS									Sheet Number: 75	
Drawing File Name:	Sand Barrel Detail.dwg										
Scale:	NONE										



Region 6 Traffic  
2000 S. Holly Street  
Denver, CO 80222  
Phone: 303-757-9511  
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No Revisions: 11/9/01

Revised:

Void:

Designer:

Detailer:

Sheet Subset:

Structure

Numbers

Subset Sheet Number:



Sand Barrel Detail  
614-2

Computer File Information

Creation Date: 1/2/96 Initials: SPS  
Last Modification Date: 09/18/96 Initials: TLM  
Full Path: Acaddata\270 Extension  
Drawing File Name: Sand Barrel Design Detail Collection 614-2E.dwg  
Acad Ver. R14 Scale: None Units: Feet

Designer: E. Demming Structure Numbers  
Detailer: S. Smith  
Sheet Subset: 614-2 Subset Sheets: 2 of 2

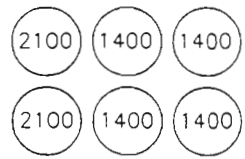
Index of Revisions

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Project No./Code As Constructed  
NH 0062-011 No Revisions: 119101  
12023 Revised:  
Sheet Number 76 Void:

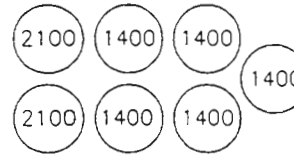
DESIGN VELOCITY 25 mph

ROW	1800 lb VEHICLE				500 lb VEHICLE		
	SAND MASS (lbs)	EXIT VEH (mph)	AVE G'S FOR ROW	IMPULSE TIME	EXIT VEH (mph)	AVE G'S FOR ROW	IMPULSE TIME
0		25.0			25.0		
1	2800	9.8	5.9	0.12	15.4	4.3	0.10
2	2800	3.8	0.9	0.30	9.5	1.6	0.16
3	4200	1.1	0.1	0.82	4.9	0.7	0.28



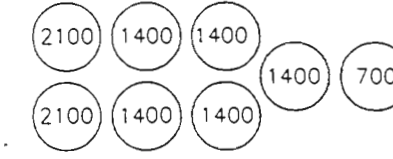
DESIGN VELOCITY 30 mph

ROW	1800 lb VEHICLE				4500 lb VEHICLE		
	SAND MASS (lbs)	EXIT VEH (mph)	AVE G'S FOR ROW	IMPULSE TIME	EXIT VEH (mph)	AVE G'S FOR ROW	IMPULSE TIME
0		30.0			30.0		
1	1400	16.9	6.9	0.09	22.9	4.2	0.08
2	2800	6.6	2.7	0.17	14.1	3.6	0.11
3	2800	2.6	0.4	0.45	8.7	1.4	0.18
4	4200	0.8	0.1	1.22	4.5	0.6	0.31



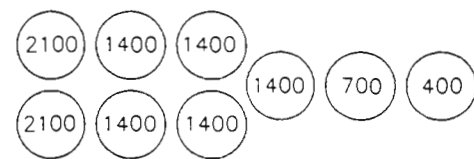
DESIGN VELOCITY 35 mph

ROW	1800 lb VEHICLE				4500 lb VEHICLE		
	SAND MASS (lbs)	EXIT VEH (mph)	AVE G'S FOR ROW	IMPULSE TIME	EXIT VEH (mph)	AVE G'S FOR ROW	IMPULSE TIME
0		35.0			35.0		
1	700	25.2	6.6	0.07	30.3	3.4	0.06
2	1400	14.2	4.8	0.10	23.1	4.3	0.08
3	2800	5.5	1.9	0.21	14.2	3.7	0.11
4	2800	2.2	0.3	0.53	8.8	1.4	0.18
5	4200	0.7	0.0	1.45	4.5	0.6	0.31



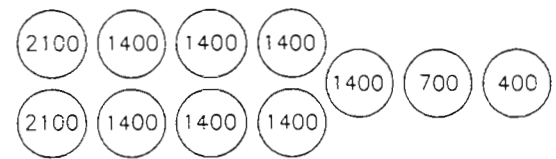
DESIGN VELOCITY 40 mph

ROW	1800 lb VEHICLE				4500 lb VEHICLE		
	SAND MASS (lbs)	EXIT VEH (mph)	AVE G'S FOR ROW	IMPULSE TIME	EXIT VEH (mph)	AVE G'S FOR ROW	IMPULSE TIME
0		40.0			40.0		
1	400	32.7	5.9	0.06	36.8	2.8	0.05
2	700	23.6	5.7	0.07	31.8	3.8	0.06
3	1400	13.3	4.2	0.11	24.3	4.7	0.07
4	2800	5.2	1.7	0.22	15.0	4.1	0.10
5	2800	2.0	0.3	0.57	9.2	1.5	0.17
6	4200	0.6	0.0	1.55	4.8	0.7	0.29



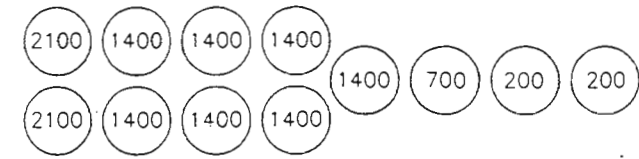
DESIGN VELOCITY 45 mph

ROW	1800 lb VEHICLE				4500 lb VEHICLE		
	SAND MASS (lbs)	EXIT VEH (mph)	AVE G'S FOR ROW	IMPULSE TIME	EXIT VEH (mph)	AVE G'S FOR ROW	IMPULSE TIME
0		45.0			45.0		
1	400	36.8	7.5	0.05	41.3	2.8	0.05
2	700	26.5	7.3	0.06	35.8	3.8	0.05
3	1400	14.9	5.4	0.10	27.3	4.7	0.06
4	2800	5.8	2.1	0.20	16.8	4.1	0.09
5	2800	2.3	0.3	0.50	10.4	1.5	0.15
6	2800	0.9	0.0	1.29	6.4	0.7	0.24
7	4200	0.3	0.0	3.52	3.3	0.3	0.42



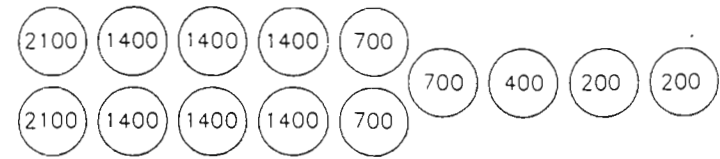
DESIGN VELOCITY 50 mph

ROW	820 kg VEHICLE				2000 kg VEHICLE		
	SAND MASS (lbs)	EXIT VEH (mph)	AVE G'S FOR ROW	IMPULSE TIME	EXIT VEH (mph)	AVE G'S FOR ROW	IMPULSE TIME
0		50.0			50.0		
1	200	45.0	5.3	0.04	47.9	2.3	0.04
2	400	36.8	7.5	0.05	44.0	4.0	0.04
3	700	26.5	7.3	0.06	38.1	5.4	0.05
4	1400	14.9	5.4	0.10	29.0	6.7	0.06
5	2800	5.8	2.1	0.20	17.9	5.8	0.09
6	2800	2.3	0.3	0.50	11.0	2.2	0.15
7	2800	0.9	0.0	1.29	6.8	0.8	0.23
8	4200	0.3	0.0	3.52	3.5	0.4	0.40



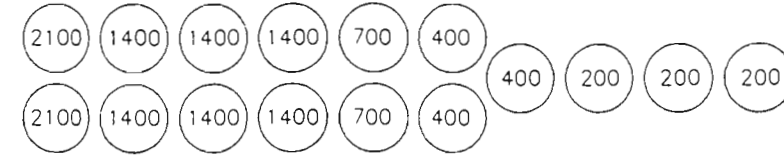
DESIGN VELOCITY 55 mph

ROW	1800 lb VEHICLE				4500 lb VEHICLE		
	SAND MASS (lbs)	EXIT VEH (mph)	AVE G'S FOR ROW	IMPULSE TIME	EXIT VEH (mph)	AVE G'S FOR ROW	IMPULSE TIME
0		55.0			55.0		
1	200	49.5	6.4	0.04	52.7	2.8	0.04
2	200	44.6	5.2	0.04	52.7	2.6	0.04
3	400	36.5	7.3	0.05	50.4	4.4	0.04
4	700	26.3	7.1	0.07	46.3	6.0	0.05
5	1400	14.8	5.2	0.10	40.1	7.5	0.06
6	2800	5.8	2.1	0.20	30.6	6.6	0.08
7	2800	2.3	0.3	0.51	18.8	2.5	0.14
8	2800	0.9	0.0	1.30	7.2	0.9	0.22
9	4200	0.3	0.0	3.56	3.7	0.4	0.38



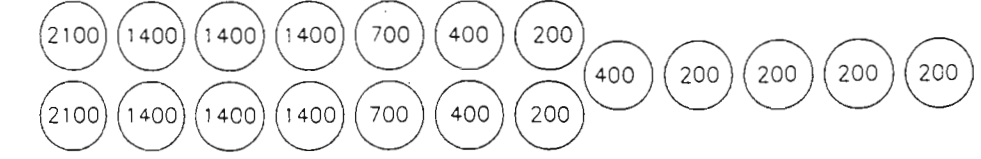
DESIGN VELOCITY 60 mph

ROW	1800 lb VEHICLE				4500 lb VEHICLE		
	SAND MASS (lbs)	EXIT VEH (mph)	AVE G'S FOR ROW	IMPULSE TIME	EXIT VEH (mph)	AVE G'S FOR ROW	IMPULSE TIME
0		60.0			60.0		
1	200	54.0	7.6	0.04	57.5	3.3	0.03
2	200	48.6	6.6	0.04	55.0	3.1	0.04
3	400	43.8	5.0	0.04	52.7	2.8	0.04
4	400	35.8	7.0	0.05	48.4	4.8	0.04
5	800	24.8	7.4	0.07	41.1	7.3	0.05
6	1400	13.9	4.7	0.11	31.3	7.9	0.06
7	2800	5.5	2.7	0.21	19.3	6.8	0.08
8	2800	2.1	0.3	0.54	11.9	2.6	0.13
9	2800	0.8	0.0	1.38	7.3	1.0	0.21
10	4200	0.3	0.0	3.77	3.8	0.4	0.37



DESIGN VELOCITY 65 mph

ROW	1800 lb VEHICLE				4500 lb VEHICLE		
	SAND MASS (lbs)	EXIT VEH (mph)	AVE G'S FOR ROW	IMPULSE TIME	EXIT VEH (mph)	AVE G'S FOR ROW	IMPULSE TIME
0		65.0			65.0		
1	200	58.5	8.9	0.03	62.3	3.9	0.03
2	200	52.7	7.2	0.04	59.6	3.6	0.03
3	400	47.4	5.9	0.04	57.1	3.3	0.04
4	400	42.7	4.8	0.05	54.6	3.0	0.04
5	800	34.9	6.7	0.05	50.2	5.2	0.04
6	800	28.6	4.5	0.06	46.1	4.4	0.04
7	800	19.8	4.7	0.08	39.1	6.6	0.05
8	1400	11.1	3.0	0.13	29.8	7.1	0.06
9	2800	4.4	1.2	0.26	18.4	6.1	0.08
10	2800	1.7	0.2	0.68	11.3	2.3	0.14
11	2800	0.7	0.0	1.73	7.0	0.9	0.22
12	4200	0.2	0.0	4.72	3.6	0.4	0.39





Staff Design: STANDARDS ENGINEER  
4201 E. Arkansas  
Denver, Colorado 80222  
Phone: (303) 757-9083 FAX: (303) 757-9868

Designer: E. Demming Structure  
Detailer: S. Smith Numbers

Creation Date: 1/2/96 Initials: SPS  
Last Modification Date: 07/18/96 Initials: TLM  
Full Path: ACADDATA\270 EXTENTION  
Drawing File Name: SAND BARREL DESIGN DETAIL 614-1E.dwg  
Acad Ver. R14 Scale: NONE Units: Feet

NH 0062-011 No Revisions: 1/19/01

12023 Revised:

DESIGN DETAIL COLLECTION

Sheet Subset: 614-1 Subset Sheets: 1 of 2

Sheet Number 77 Void:

NOTES:

Freezing Temperatures: In cold climates, sand having moisture content of 3% or more should be mixed with 5% rock salt (by weight) to prevent the sand from freezing into potentially dangerous solid blocks.

Modules Placed on Structures: On structures where the vibrations from moving traffic may cause modules to shift, steel or formed-in-place asphaltic concrete half-rings placed on the downhill side of the modules will prevent such movement. Also, nails or bolts through the bottom of the outer container and into the roadway will prevent module movement.

Offset array to avoid impact to the rear module from wrong-way vehicles.

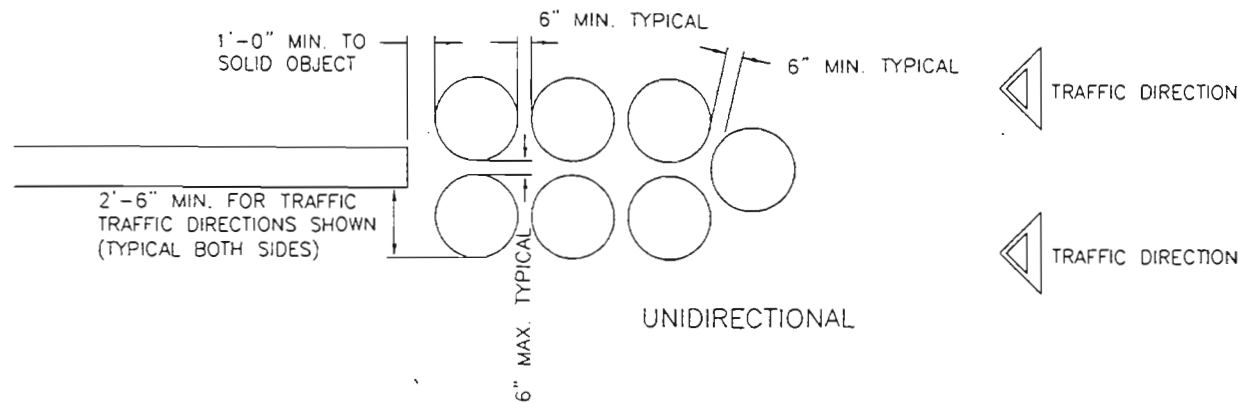
Sloping sites (lateral and longitudinal) shall be a 5% grade maximum.

Curbs and raised islands shall be no more than 4" high.

Foundation pads shall be a flat surface of either concrete or asphalt.

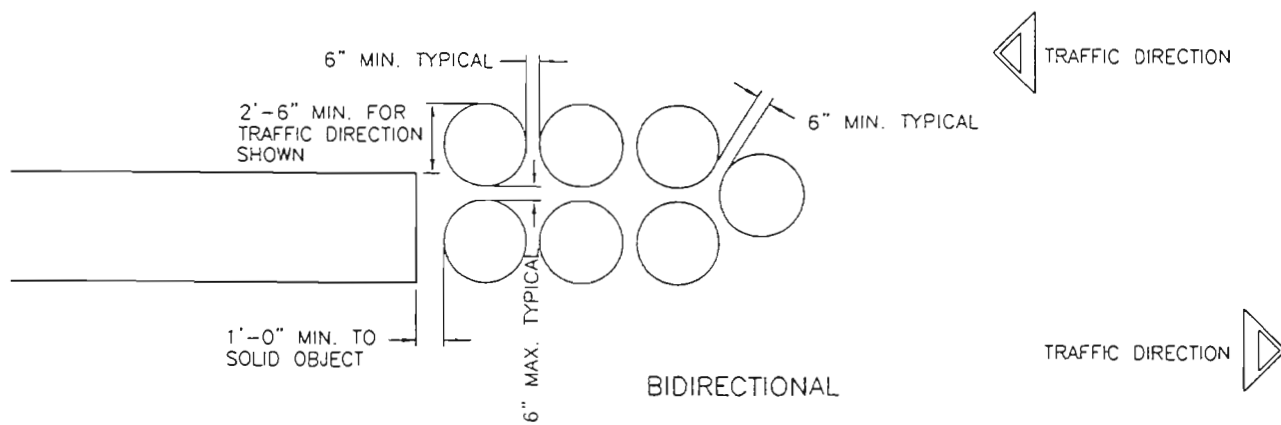
Intermixing of brands of modules are approved, as long as modules are federally approved and array meets design criteria.

Single rows of modules are not recommended.

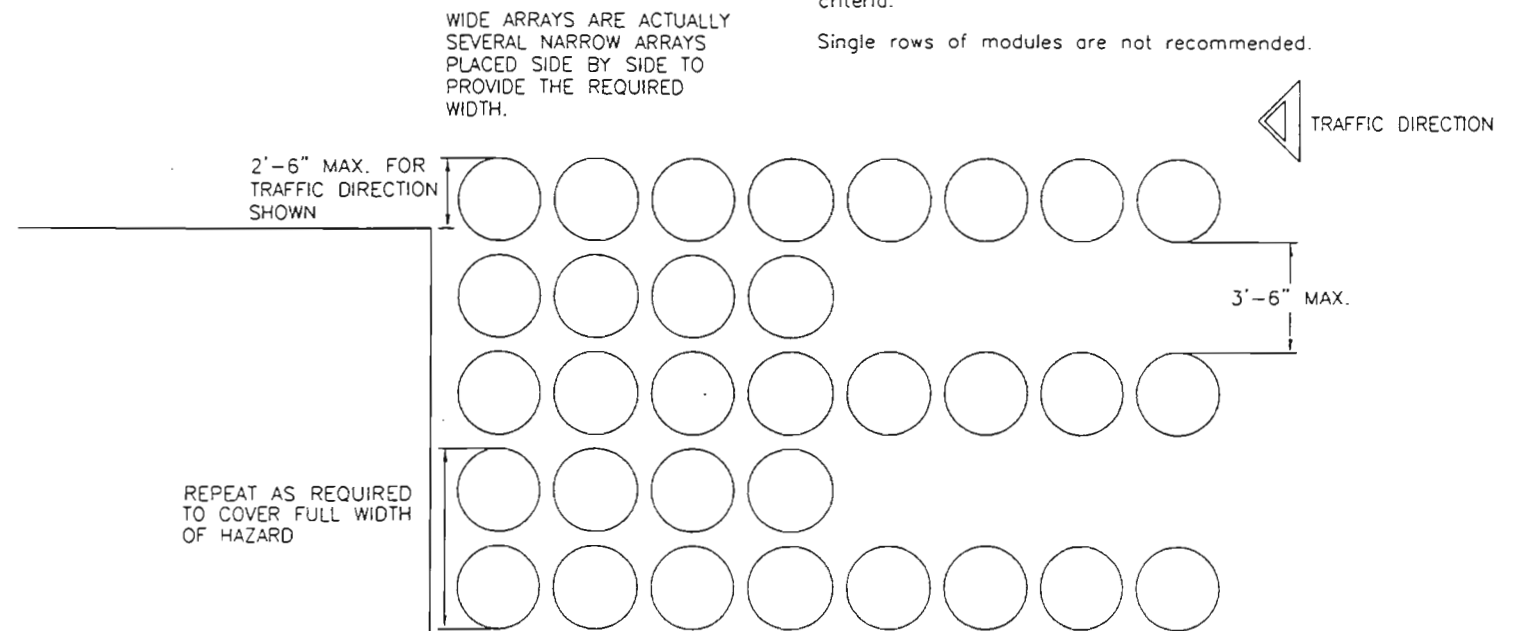


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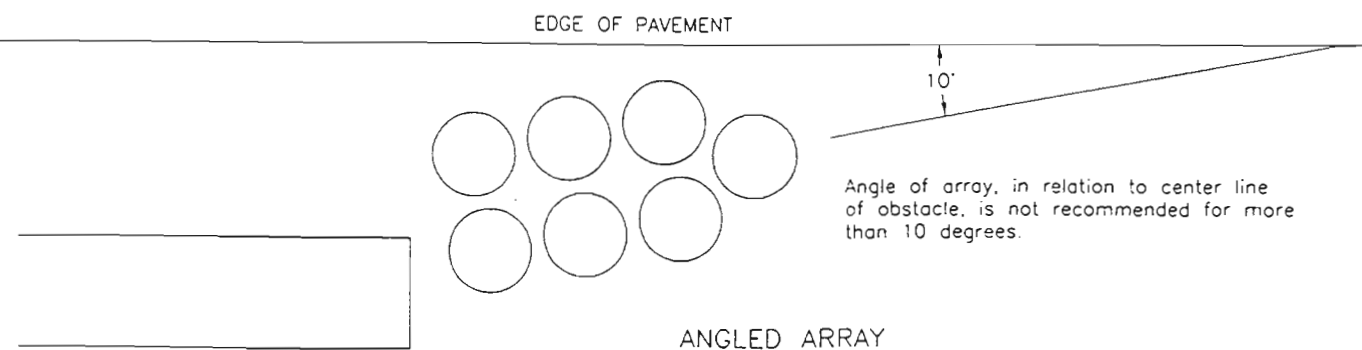
WIDE HAZARD PROTECTION



BIDIRECTIONAL

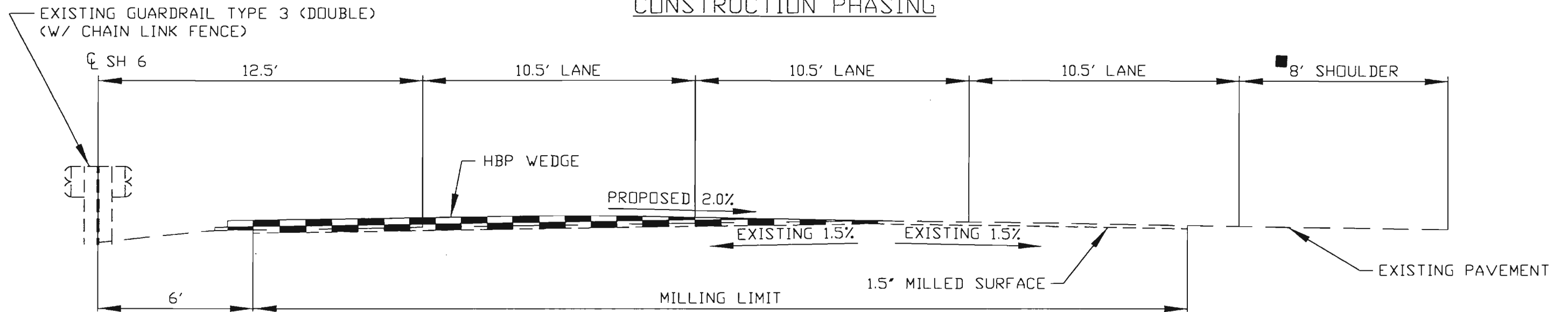


REPEAT AS REQUIRED TO COVER FULL WIDTH OF HAZARD



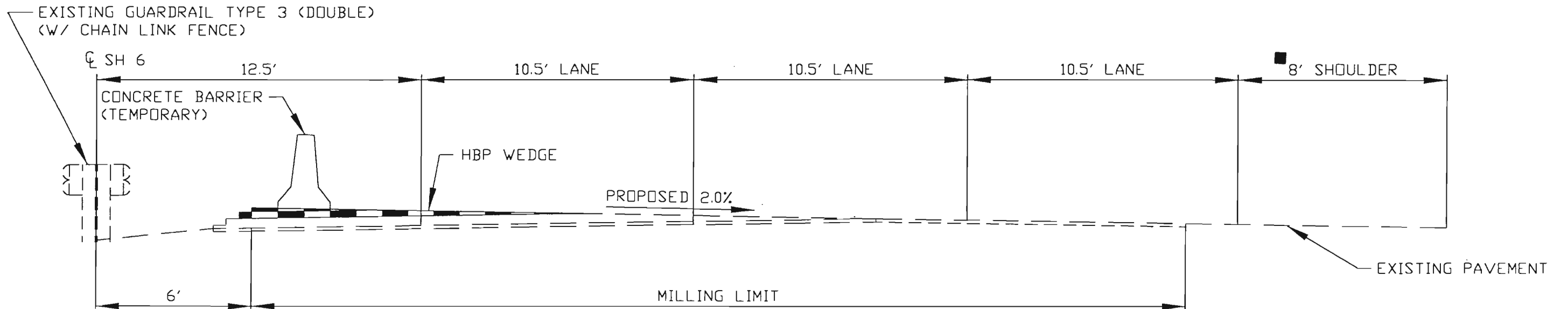
ANGLED ARRAY

## CONSTRUCTION PHASING



### PHASE 1A

1. MILL EXISTING ASPHALT MAT.
2. RESTRIPE AND SHIFT TRAFFIC TO 10.5' LANE(S). (THIS IS A NIGHT TIME OPERATION. ONE LANE OF TRAFFIC IS OPEN.)
3. PLACE FIRST TWO VARIABLE WIDTHS OF ASPHALT LEVELING COURSES TO CORRECT THE CROWN SLOPE.



### PHASE 1B

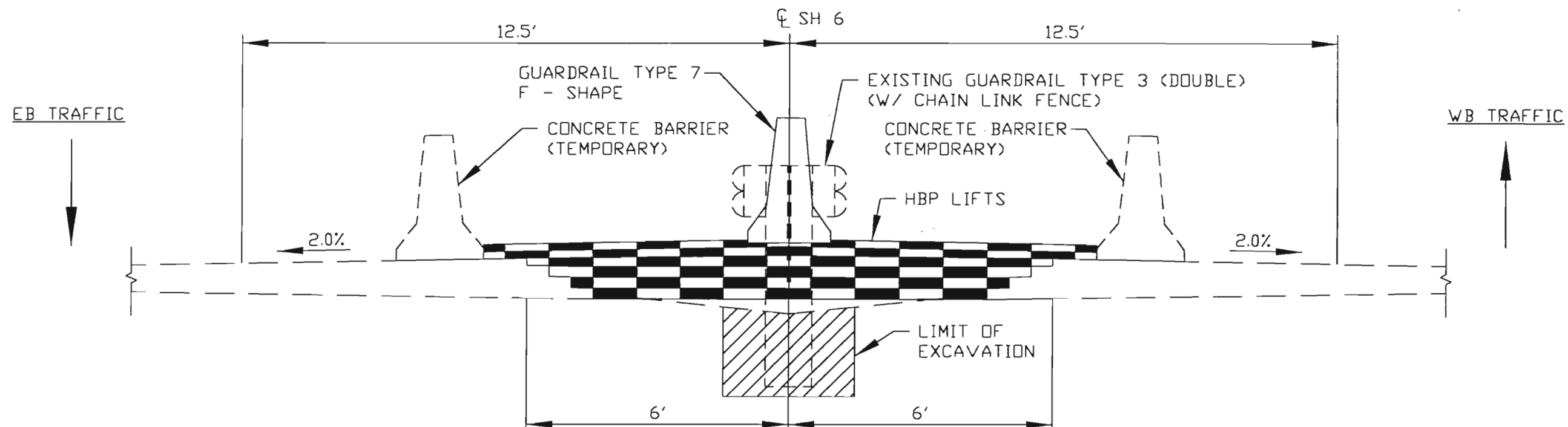
1. PLACE CONCRETE BARRIER (TEMPORARY).
2. PLACE SECOND AND THIRD VARIABLE WIDTHS OF ASPHALT LEVELING COURSES TO CORRECT THE CROWN SLOPE.
3. CONSTRUCT APPROPRIATE DRAINAGE STRUCTURES AS MAY BE REQUIRED.

NOTE: ONLY ONE DIRECTION OF TRAFFIC IS SHOWN

■ SHOULDER WIDTH VARIES AT ACCEL/DECEL LANE LOCATIONS.  
10.5' ACCEL/DECEL LANE NOT SHOWN.

Computer File Information		Sheet Revisions		Colorado Department of Transportation		As Constructed		SUGGESTED CONSTRUCTION PHASING		Project No./Code	
Creation Date:	08/26/99	Initials:	AS			 Address 2000 S. Holly St. Denver, Co 80222 Phone: 303-984-5260 FAX: 303-984-5299	No Revisions: 1/19/01		NH 0062-0011		
Lost Modification Date:	10/26/99	Initials:	AS				Revised:	Designer:	Structure Numbers	12023	
Full Path:	C:\PROJECTS\12023\						Void:	Detailer:		Sheet Number 78	
Drawing File Name:	PHASING.DWG							Sheet Subset: 1 OF 3	Subset Sheets:		
Acad Ver.	R14	Scale:	NTS	Units:	English	Region Number 6	DEW				

# CONSTRUCTION PHASING




## PHASE 2

1. REMOVE MEDIAN TYPE 3 GUARDRAIL (DOUBLE) (W/ CHAIN LINK FENCE).
2. EXCAVATE UNDERNEATH EXISTING GUARDRAIL TYPE 3 AND PLACE EMBANKMENT MATERIAL.
3. PLACE 9' +/- WIDE X 3" THICK LIFTS OF HBP TO COMPLETE CROWN CORRECTION AT THE MEDIAN AREA.
4. PLACE FIRST LIFT OF HBP TO FINAL GRADE.
5. CAP MEDIAN INLETS.
6. CONSTRUCT NEW GUARDRAIL TYPE 7 F - SHAPE BARRIER AND ALL ATTACHED STRUCTURES.
7. BUILD WIDENED AREA FOR KIPLING DECEL LANE EXTENSION.

Computer File Information			
Creation Date:	08/26/99	Initials:	AS
Last Modification Date:	10/25/99	Initials:	AS
Full Path:	C:\PROJECTS\12023\		
Drawing File Name:	PHASING.DWG		
Acad Ver.	R14	Scale:	NTS
		Units:	ENGLISH

Sheet Revisions			

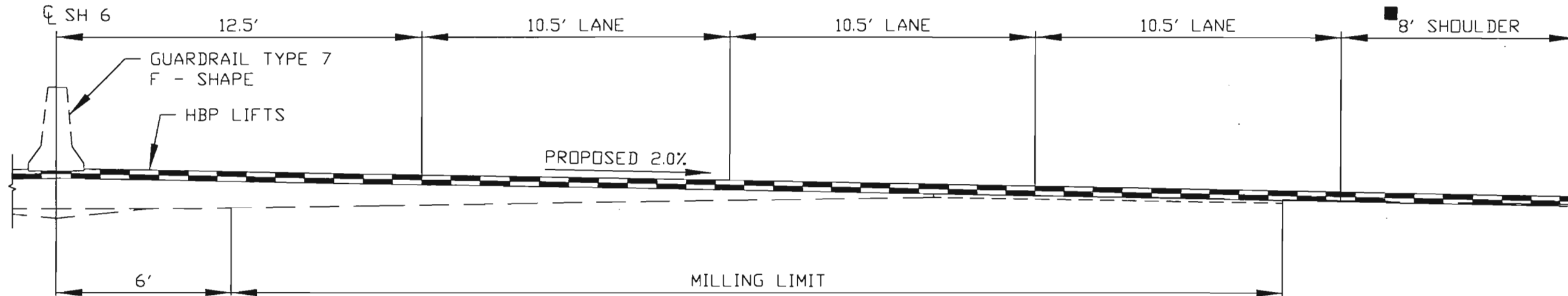

**Colorado Department of Transportation**  
 Address: 2000 S. Holly St., Denver, Co 80222  
 Phone: 303-984-5260 FAX: 303-984-5299  
 Region Number 6 DEW

As Constructed
No Revisions: 11/7/91
Revised:
Void:

SUGGESTED CONSTRUCTION PHASING			
Designer:	Structure Numbers:		
Detailer:			
Sheet Subset: 2 OF 3	Subset Sheets:		

Project No./Code
NH 0062-0011
12023
Sheet Number 79

# CONSTRUCTION PHASING



### PHASE 3

1. REMOVE TEMPORARY TYPE 4 BARRIER.
2. PLACE FIRST 2' LIFT OF HBP TO FINAL GRADE.
3. PLACE SECONDD 2' LIST OF HBP TO FINAL GRADE.

### PHASE 4

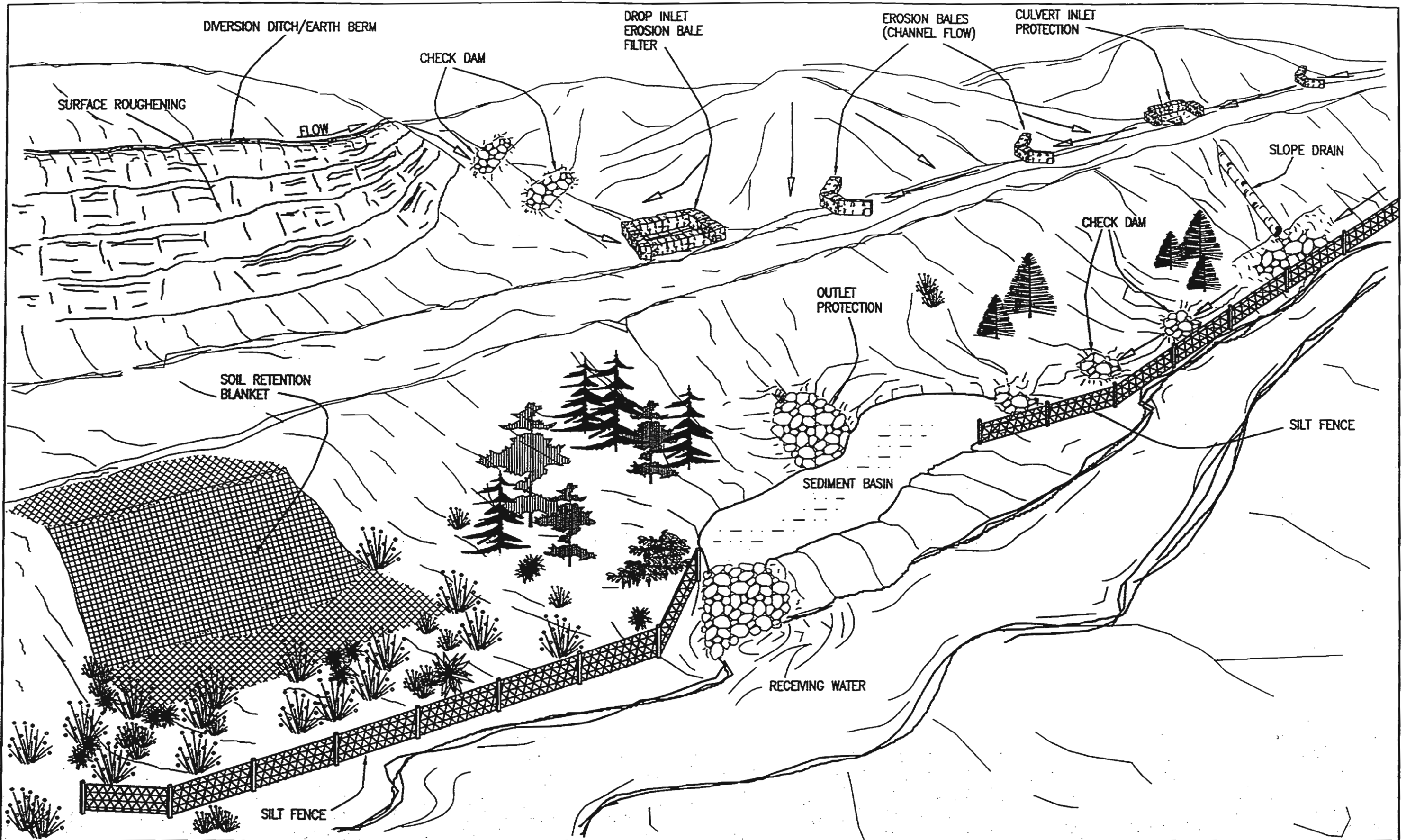
1. REMOVE OBSTRUCTIONS.
2. CONSTRUCT OUTSIDE GUARDRAIL TYPE 3 AND GUARDRAIL TYPE 7 F - SHAPE.
3. CONSTRUCT BRIDGE RAIL AND PERFORM BRIDGE DECK WORK.


■ SHOULDER WIDTH VARIES AT ACCEL/DECEL LANE LOCATIONS.  
10.5' ACCEL/DECEL LANE NOT SHOWN.

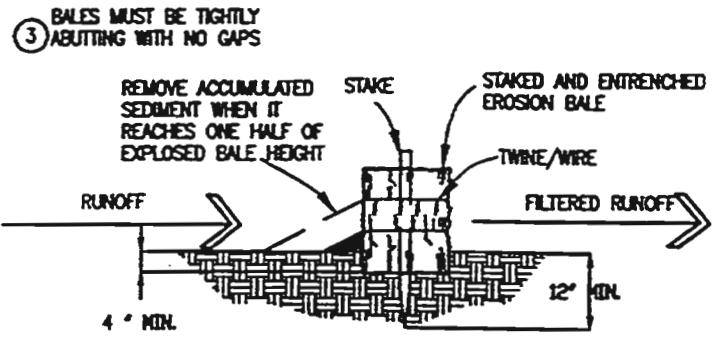
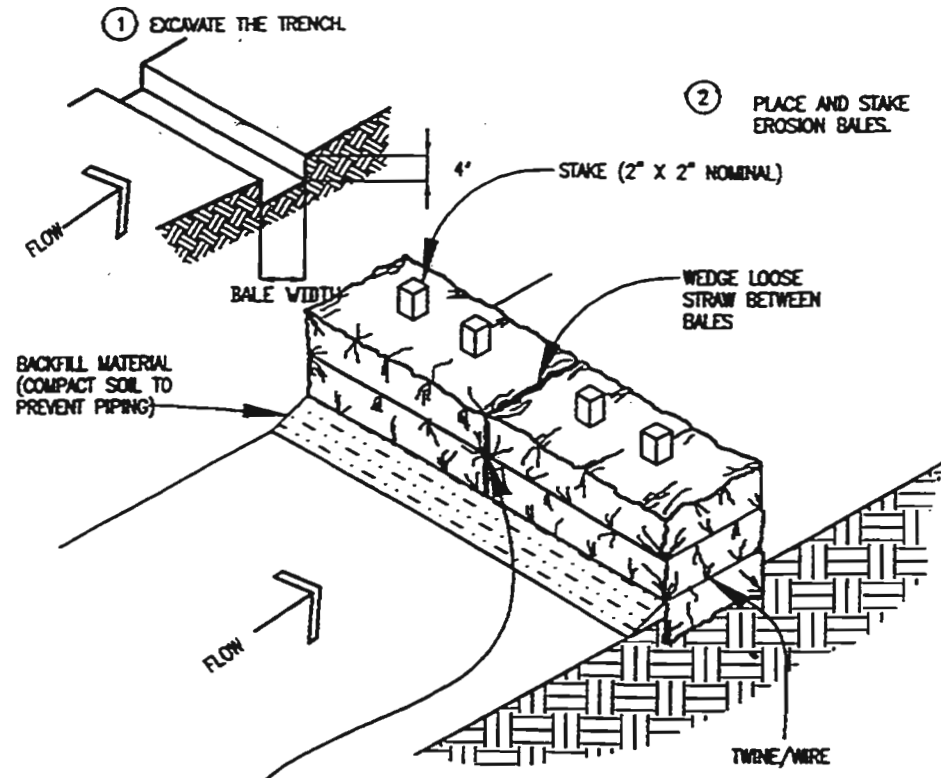
NOTE: ONLY ONE DIRECTION OF TRAFFIC IS SHOWN

Computer File Information		Sheet Revisions		Colorado Department of Transportation		As Constructed		SUGGESTED CONSTRUCTION PHASING		Project No./Code	
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Last Modification Date:	10/26/99	Initials:	AS				Revised:			12023	
Full Path:	C:\PROJECTS\12023\						Void:			Sheet Number 80	
Drawing File Name:	PHASING.DWG							Designer:	Structure Numbers:		
Acad Ver.	R14	Scale:	NTS	Units:	English			Detailer:	Sheet Subset:	3 OF 3	Subset Sheets:
				Address: 2000 S. Holly St. Denver, Co 80222 Phone: 303-984-5260 FAX: 303-984-5299 Region Number 6 DEW							

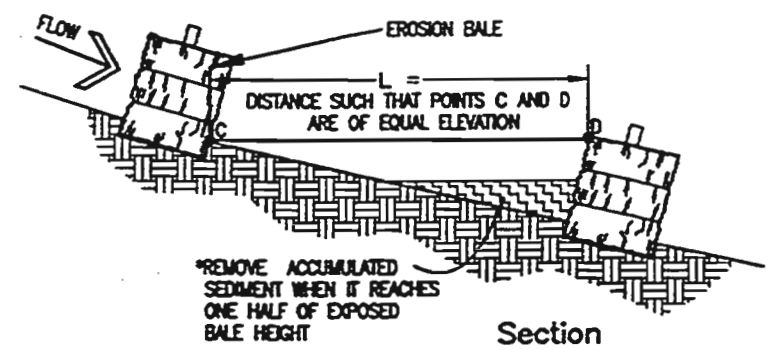
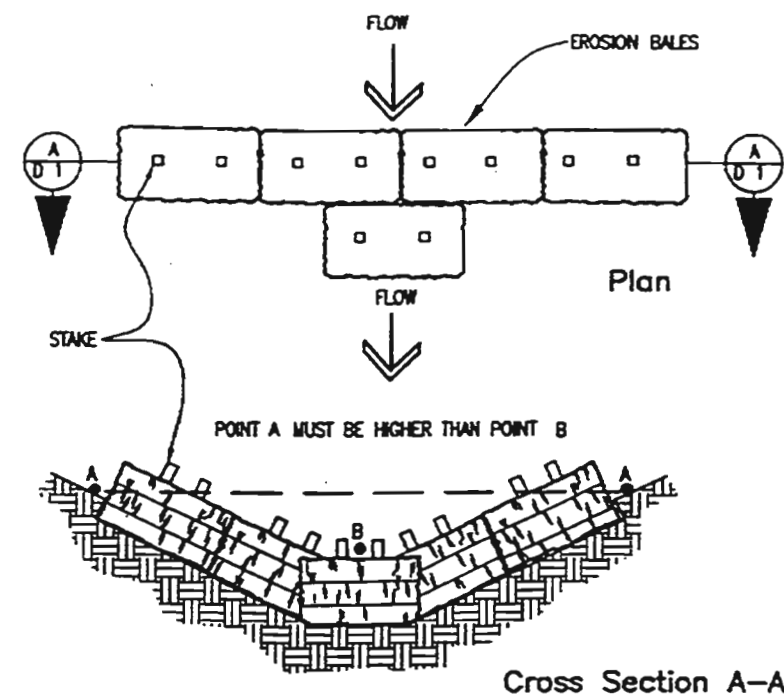




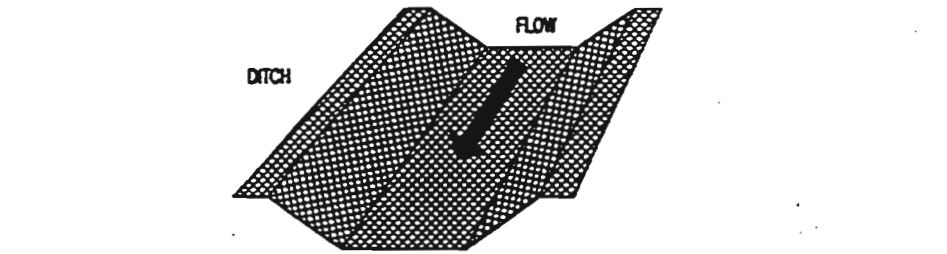
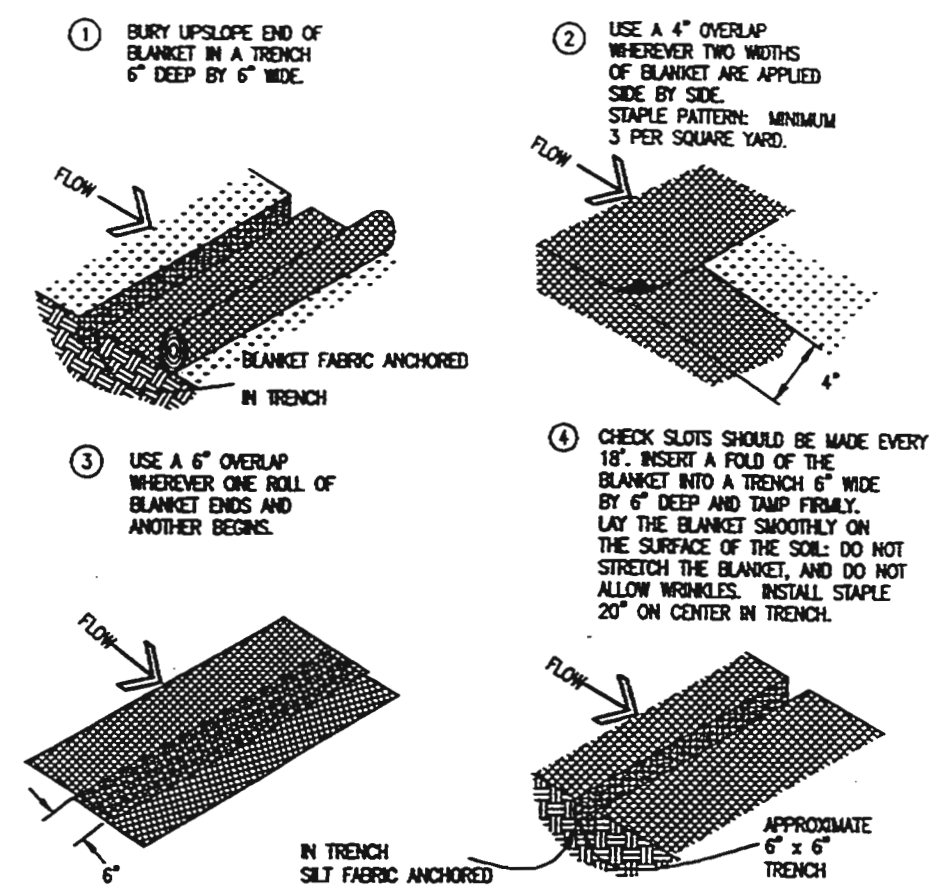
Colorado Department of Transportation  4201 East Arkansas Avenue Denver, Colorado 80222 Phone: (303) 757-9083 FAX: (303) 757-9868 Staff Design WRS	<b>Computer File Information</b> Drawing available in Shared Network Drawer DESIGN STANDARDS Drawing File Name: 10701011.dwg Acad Version: R13_c4 Scale: Varies Units: English		<b>Standard Plan Revised</b> Date: 3-24-97 Comments: Current Erosion Control Practices		<b>TEMPORARY EROSION CONTROL (TYPICAL LAYOUT)</b> Issued By: Staff Design Branch November 1, 1992	<b>STANDARD PLAN NO.</b> M-107-1 Sheet No. 1 of 4



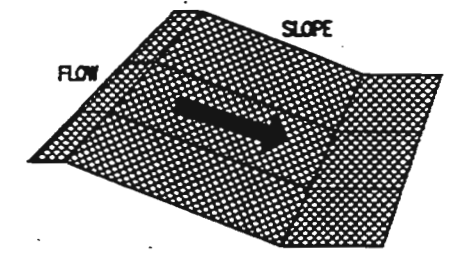
EROSION BALE TRENCHING



EROSION BALES CHANNEL FLOW APPLICATION

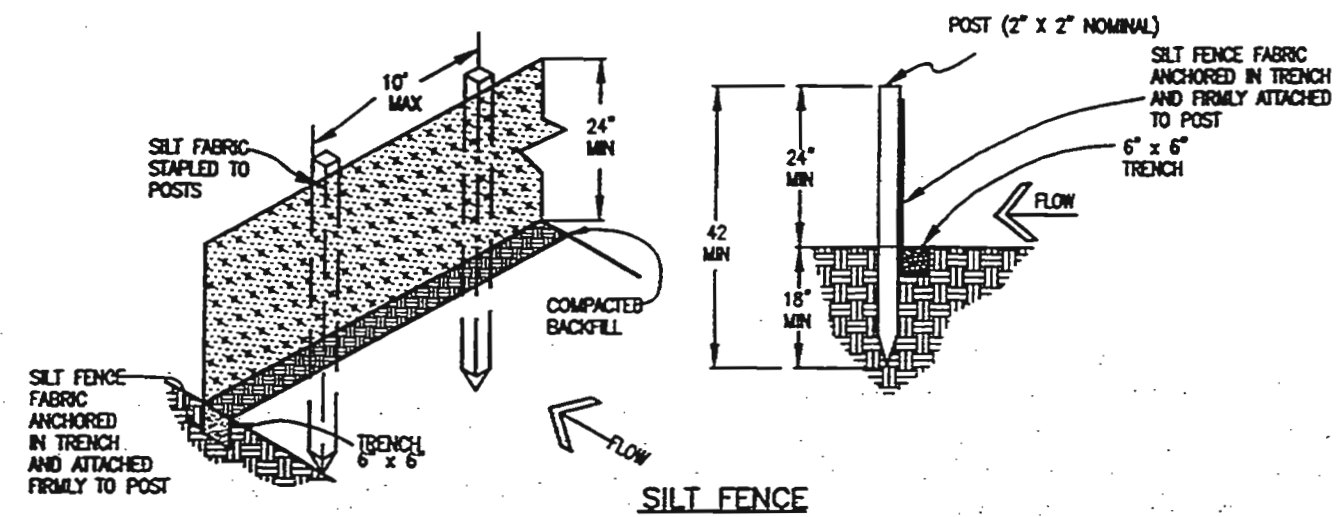


PLACE BLANKET PARALLEL TO THE DIRECTION OF FLOW. DO NOT JOIN STRIPS IN THE CENTER OF THE DITCH. USE CHECK SLOTS AS REQUIRED.



PLACE BLANKET PARALLEL TO THE DIRECTION OF FLOW AND ANCHOR SECURELY. BRING BLANKET TO A LEVEL AREA BEFORE TERMINATING THE INSTALLATION.

SOIL RETENTION BLANKETS  
SEE SPECIFICATIONS OF PLANS FOR MORE DETAIL



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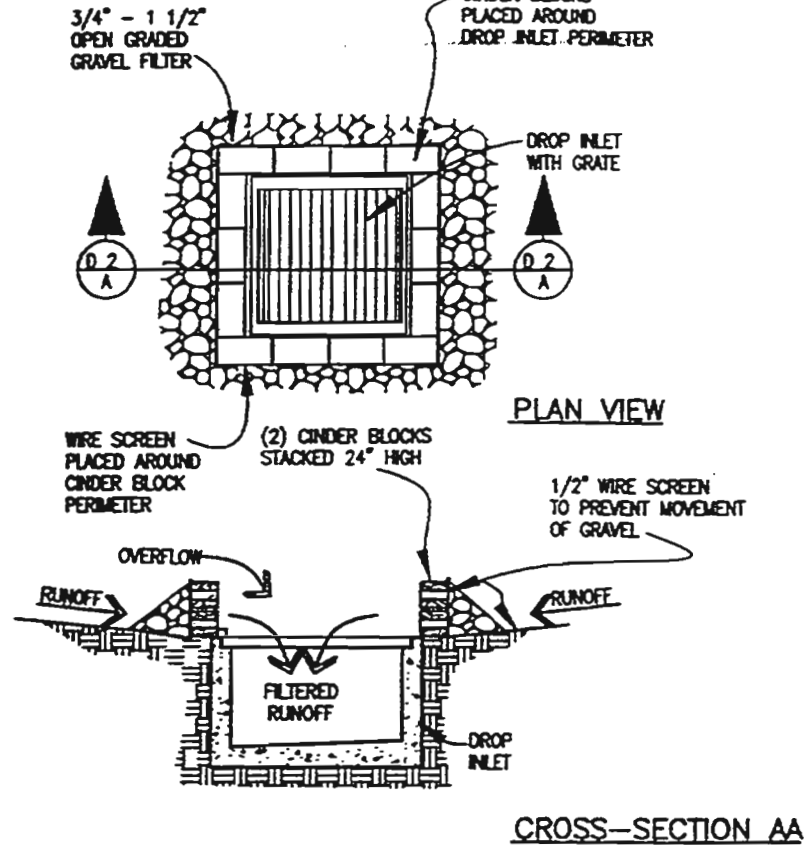
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Date: 3-24-97  
Comments: Current Erosion Control Practices

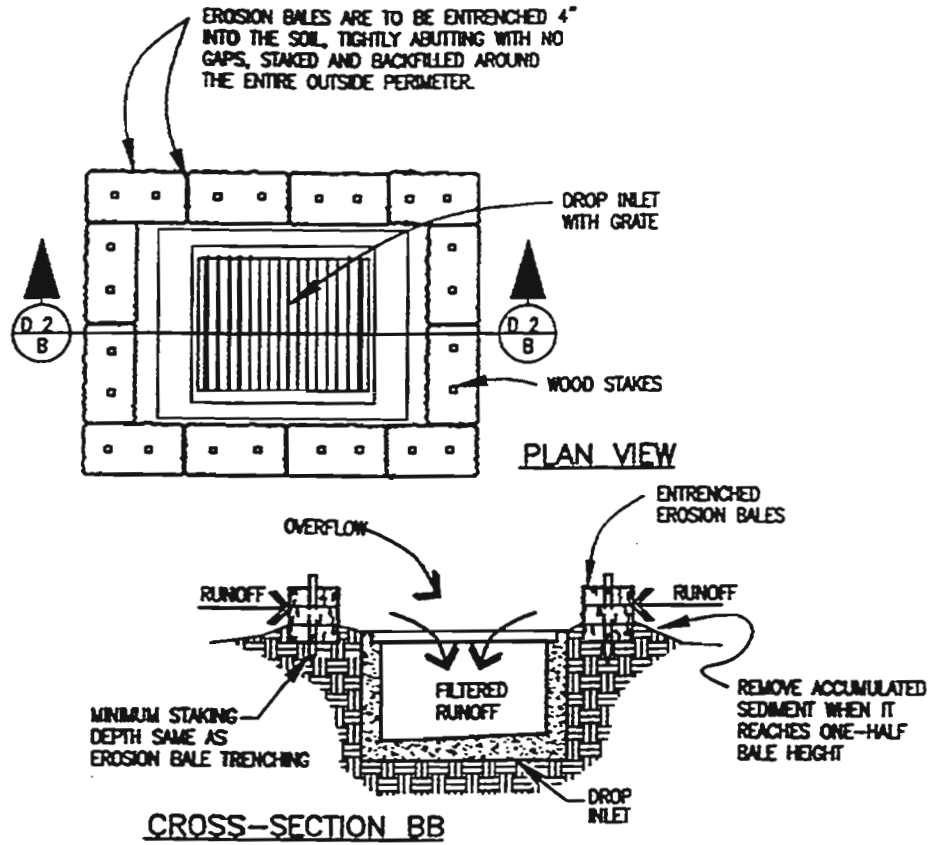
TEMPORARY EROSION CONTROL  
Issued By: Staff Design Branch  
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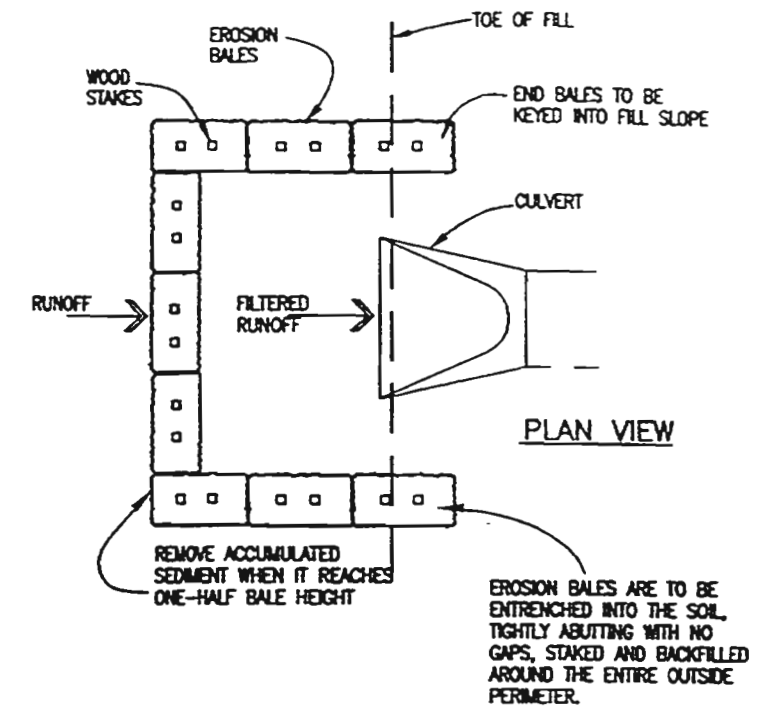
**DROP INLET BLOCK AND GRAVEL FILTER**



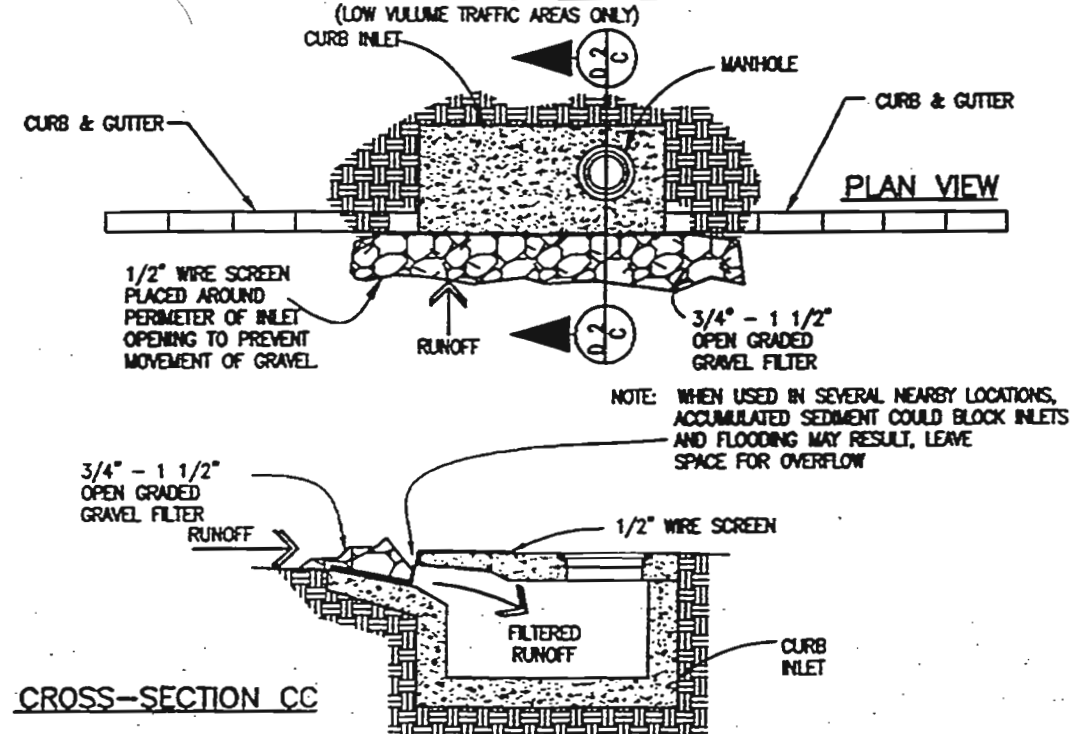
**DROP INLET EROSION BALE FILTER**



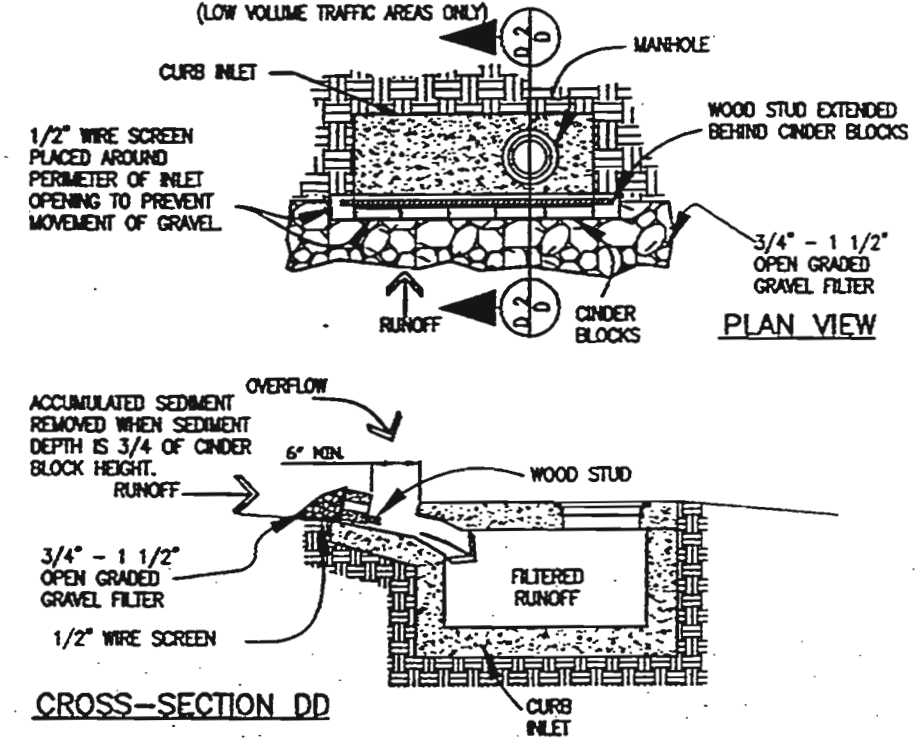
**CULVERT EROSION BALE INLET PROTECTION**



**CURB INLET GRAVEL AND WIRE MESH FILTER (LOW VOLUME TRAFFIC AREAS ONLY)**



**CURB INLET BLOCK AND GRAVEL FILTER (LOW VOLUME TRAFFIC AREAS ONLY)**



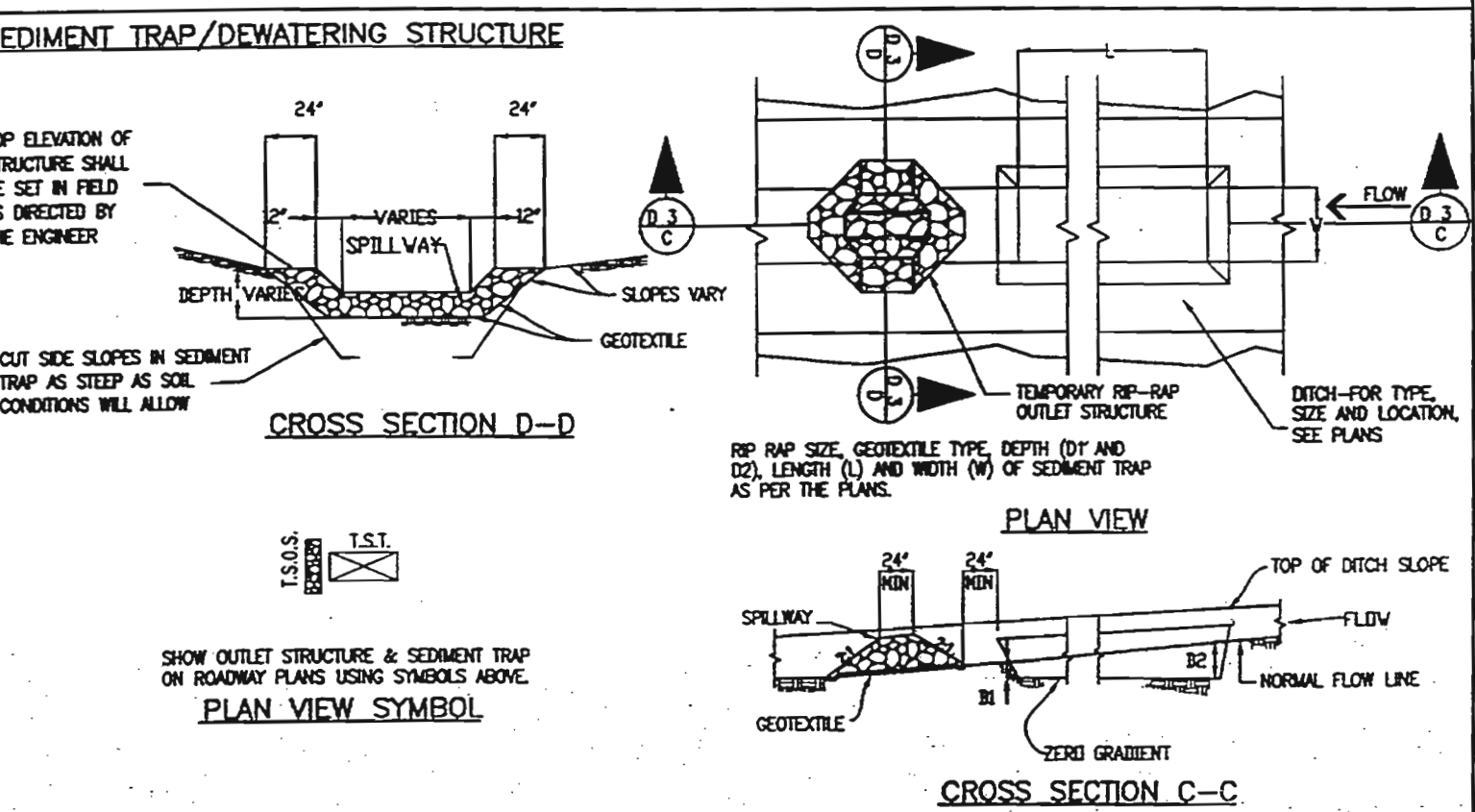
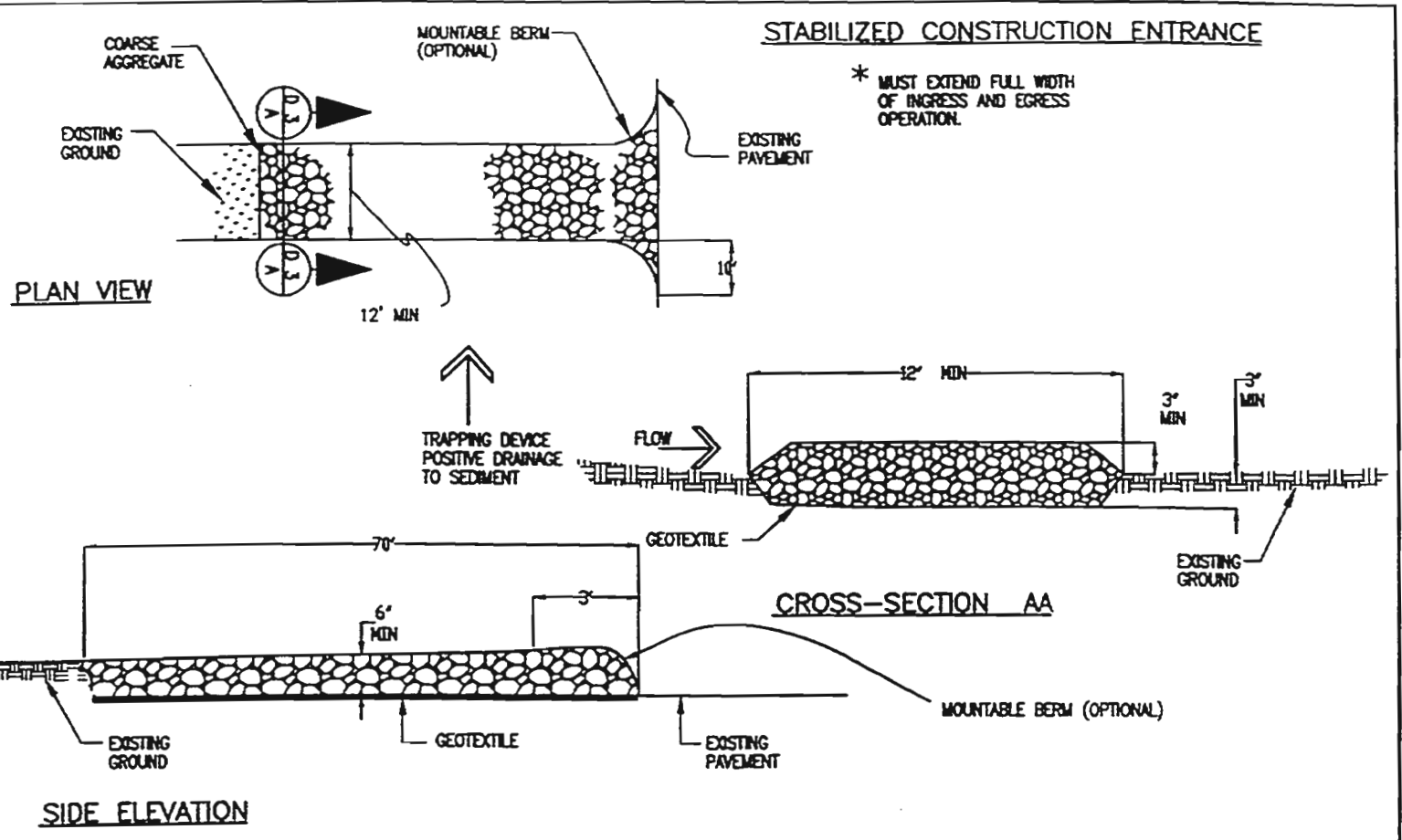
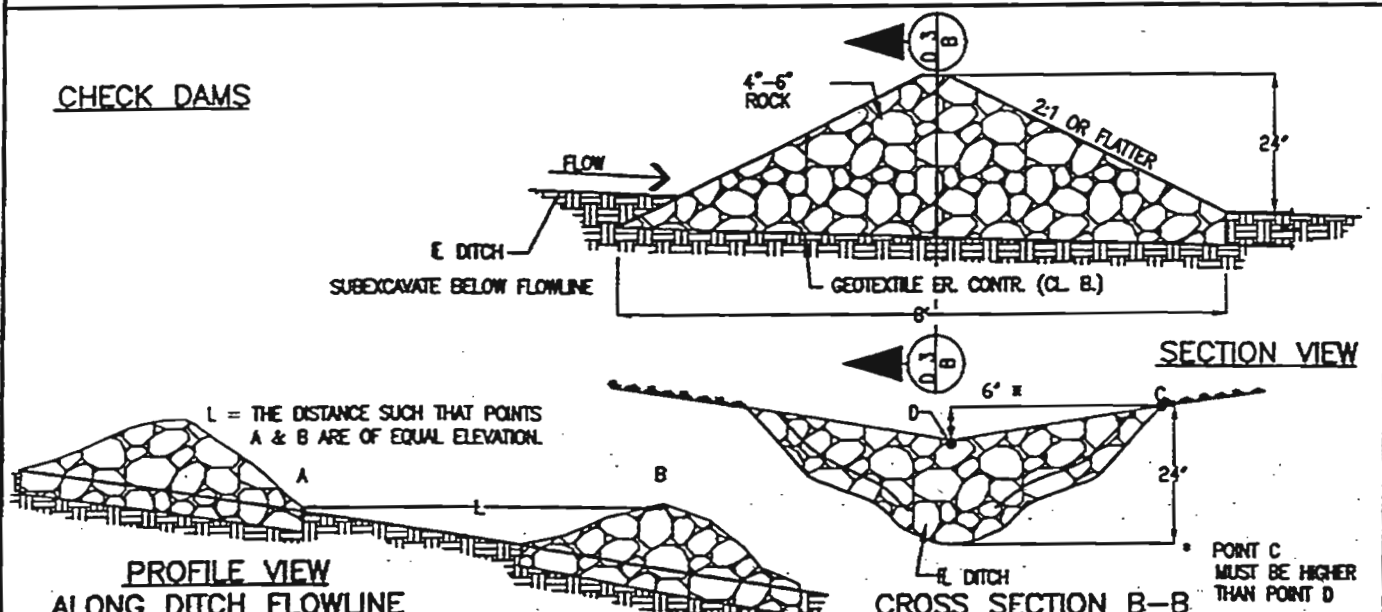
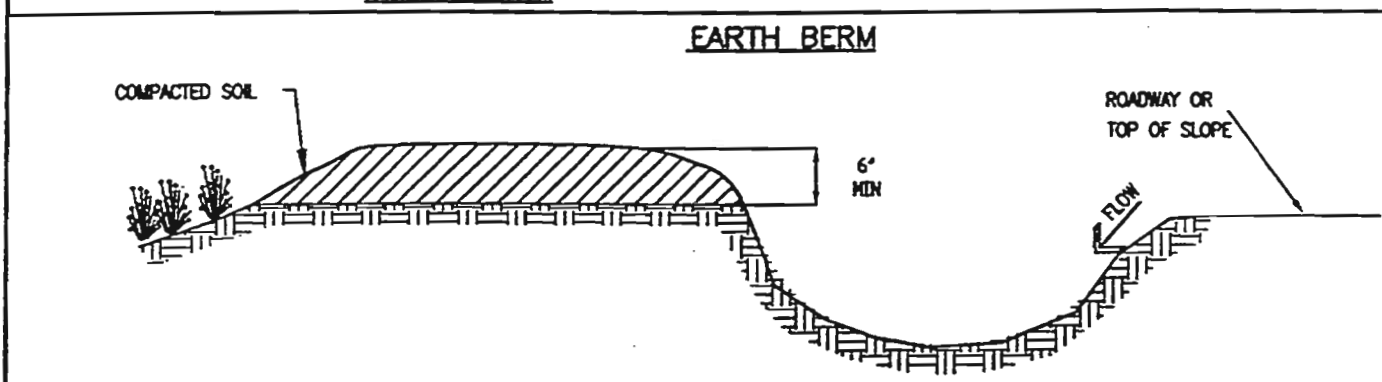
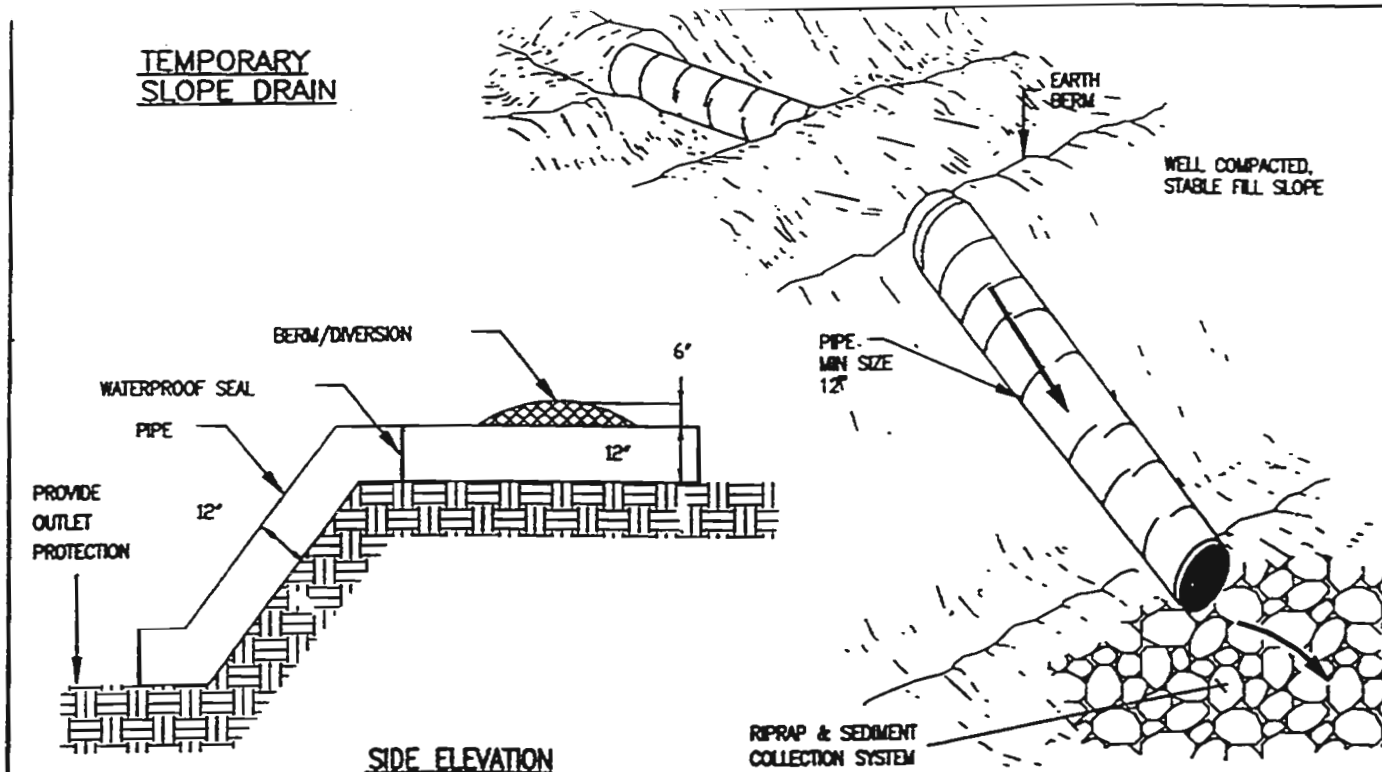
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Standard Plan Revised  
 Date: 3-24-97  
 Comments: Current Erosion Control Practices

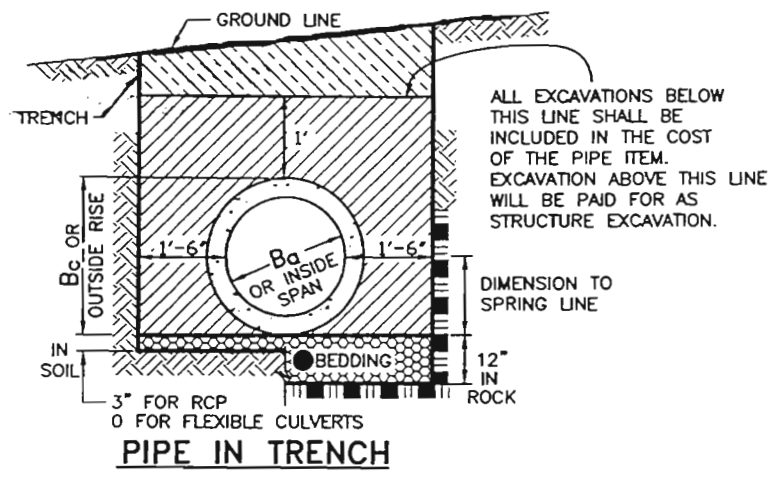
**TEMPORARY EROSION CONTROL**  
 Issued By: Staff Design Branch  
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**STANDARD PLAN NO. M-107-1**  
 Sheet No. 3 of 4

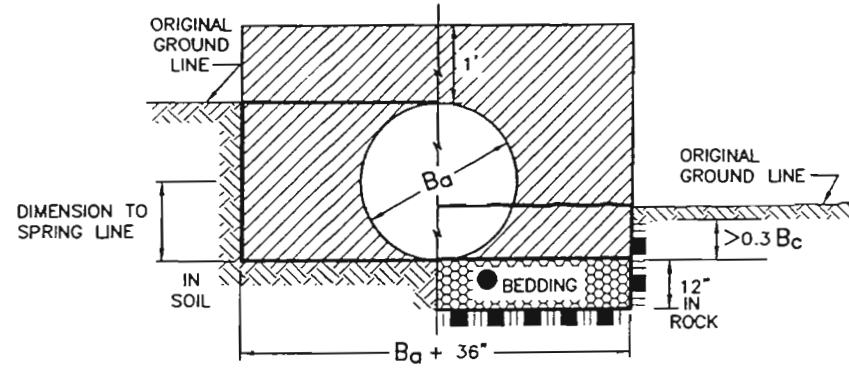


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	WRS	Issued By: Staff Design Branch November 1, 1992	





**PIPE IN TRENCH**



**CIRCULAR PIPE (ORIGINAL GROUND LINE BETWEEN 0.3 Bc AND Bc + 1 FT.)**

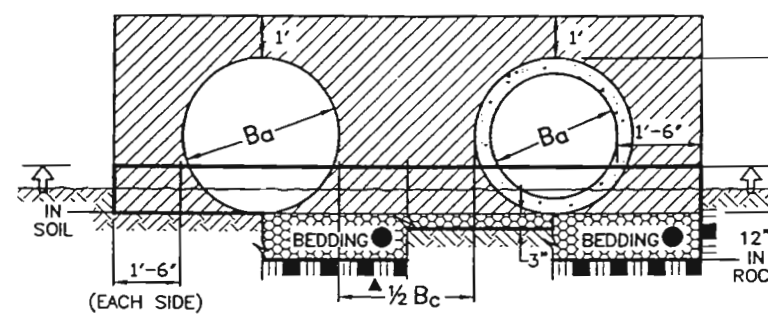
● BEDDING MATERIAL FOR RIGID PIPE IN SOIL SHALL BE 3 IN. THICKNESS OF LOOSE STRUCTURE BACKFILL, CLASS 1 OR 2 (NO BEDDING REQUIRED FOR FLEXIBLE PIPE IN SOIL).  
 BEDDING MATERIAL FOR RIGID OR FLEXIBLE PIPE IN ROCK SHALL BE 1 FT. THICKNESS LOOSE STRUCTURE BACKFILL, CLASS 1.

**GENERAL NOTES**

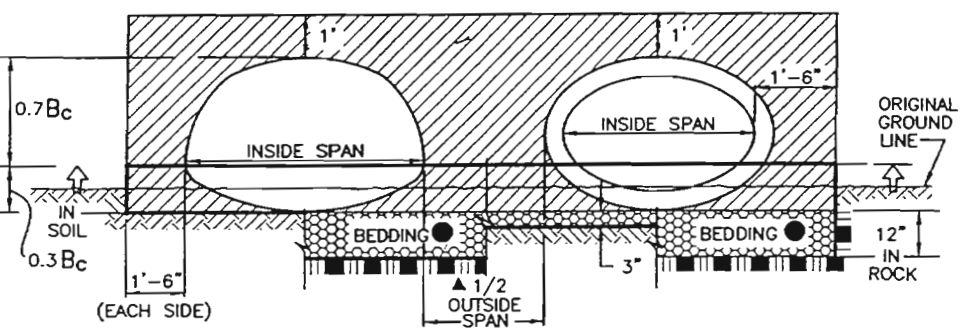
1. EXCAVATION AND BACKFILL PATTERNS DIFFERENT FROM THOSE INDICATED ON THESE SHEETS WILL BE SHOWN ELSEWHERE ON THE PLANS.
2. EXCAVATION FOR CHANNEL CHANGE OR CHANNEL IMPROVEMENT WILL BE EITHER UNCLASSIFIED EXCAVATION OR MUCK EXCAVATION AND WILL BE NOTED ON THE PLANS. EXCAVATION FROM THE CHANNEL FLOWLINE TO THE DEPTH REQUIRED FOR THE NEW STRUCTURE AND INCIDENTAL CHANNEL EXCAVATION WILL BE PAID FOR AS STRUCTURE EXCAVATION.
3. STRUCTURE FOOTINGS WHICH ARE LOCATED IN ROCK SHALL BE POURED OUT TO UNDISTURBED ROCK WITHOUT FORMING, ALL IN CONFORMANCE WITH 601.09.
4. STRUCTURAL PLATE CULVERTS WILL BE AS SHOWN IN THE PLANS.
5. FOR THIN WALLED PIPES IT IS ASSUMED THAT  $B_A = B_C$ .

**LEGEND**

- STRUCTURE EXCAVATION LIMITS
  - COMPACTED STRUCTURE BACKFILL, CLASS 1 OR CLASS 2 (IF ON-SITE CLASS 2 MATERIALS MEET CLASS 1 REQUIREMENTS) AS SHOWN ON PLANS
  - EMBANKMENT MATERIAL
  - EARTH
  - ROCK
  - BEDDING
  - CONCRETE
- ↑ = WHEN FLOW LINE OF CULVERT IS LESS THAN 0.3 Bc BELOW THE ORIGINAL GROUND LINE, EMBANKMENT SHALL BE BUILT UP TO 0.3 Bc ABOVE THE FLOW LINE AND TRENCH EXCAVATED TO BOTTOM OF PIPE OR AS SHOWN.

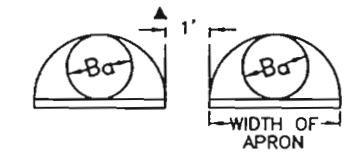


**CIRCULAR PIPE IN FILL**

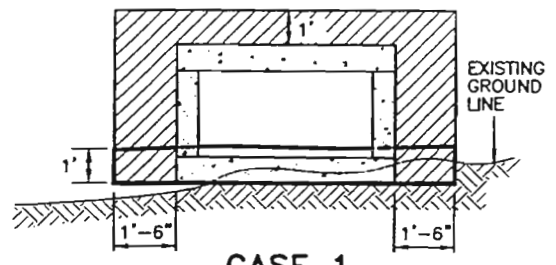


**ELLIPTICAL OR ARCH PIPE IN FILL**

▲ WHEN TWO OR MORE CONDUITS ARE LAID SIDE BY SIDE, THEY SHALL BE PLACED SO THAT THEY ARE 1/2 OUTSIDE DIAMETER, 1/2 OUTSIDE SPAN, OR 3 FT. APART, WHICHEVER IS LESS. HOWEVER, IF END SECTIONS ARE USED, THE MINIMUM SPACING SHALL BE 1 FT. BETWEEN THE END SECTIONS.

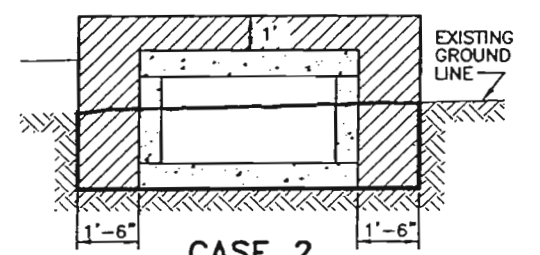


**CONDUIT WITH END SECTIONS**



**CASE 1**

USED WHEN THE EXISTING GROUND LINE IS LESS THEN 1 FT. ABOVE THE BOTTOM OF THE BOX CULVERT. THE EMBANKMENT SHALL BE BUILT UP TO 1 FT. ABOVE THE BOTTOM OF THE BOX CULVERT. THIS EMBANKMENT WILL NOT BE MEASURED AND PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE COST OF THE WORK.

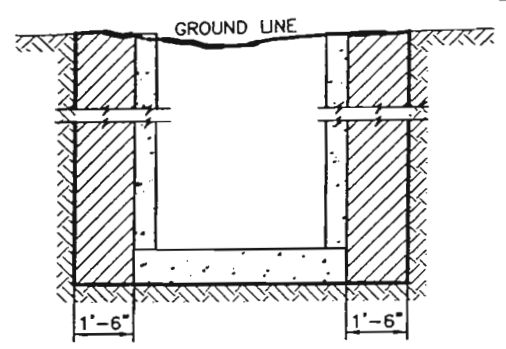


**CASE 2**

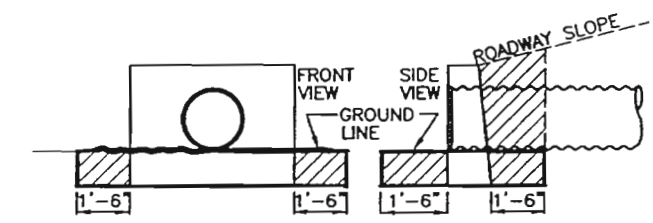
USED WHEN THE EXISTING GROUND LINE IS MORE THEN 1 FT. ABOVE THE BOTTOM OF THE BOX CULVERT.

**CONCRETE BOX CULVERT**

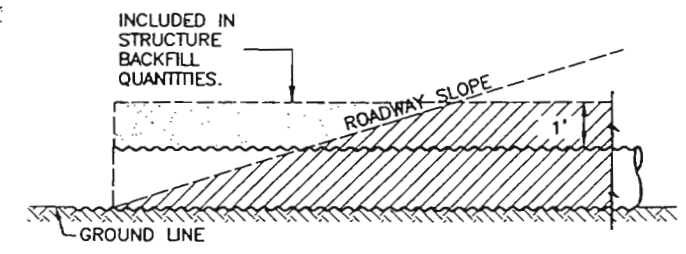
IN BOTH CASES, THE TRENCH (OUTLINED BY THE THICK SOLID LINE) SHALL THEN BE EXCAVATED TO ACCOMODATE CONSTRUCTION OF THE BOX CULVERT.



**DROP INLETS, DIVISION BOXES**



**HEADWALL**



**END OF PIPE**

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Computer File Information

Full Path: [www.dot.state.co.us/business/design/standards/mstandards/](http://www.dot.state.co.us/business/design/standards/mstandards/)  
 Drawing File Name: 2060101.dwg

WRS

Acad Version: R13 Scale: NA Units: English

Standard Plan Revised

Date: 05-07-99 Comments: Match Design Aid and Project Details

**EXCAVATION & BACKFILL FOR STRUCTURES**

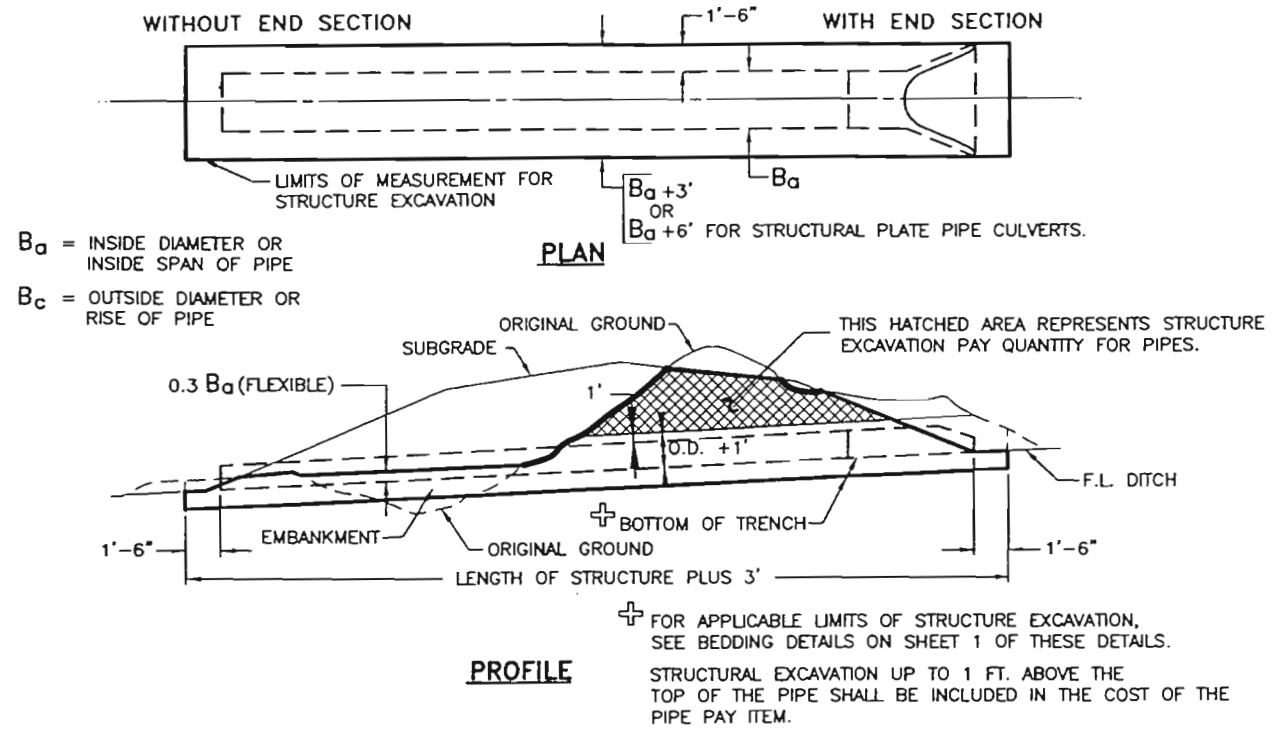
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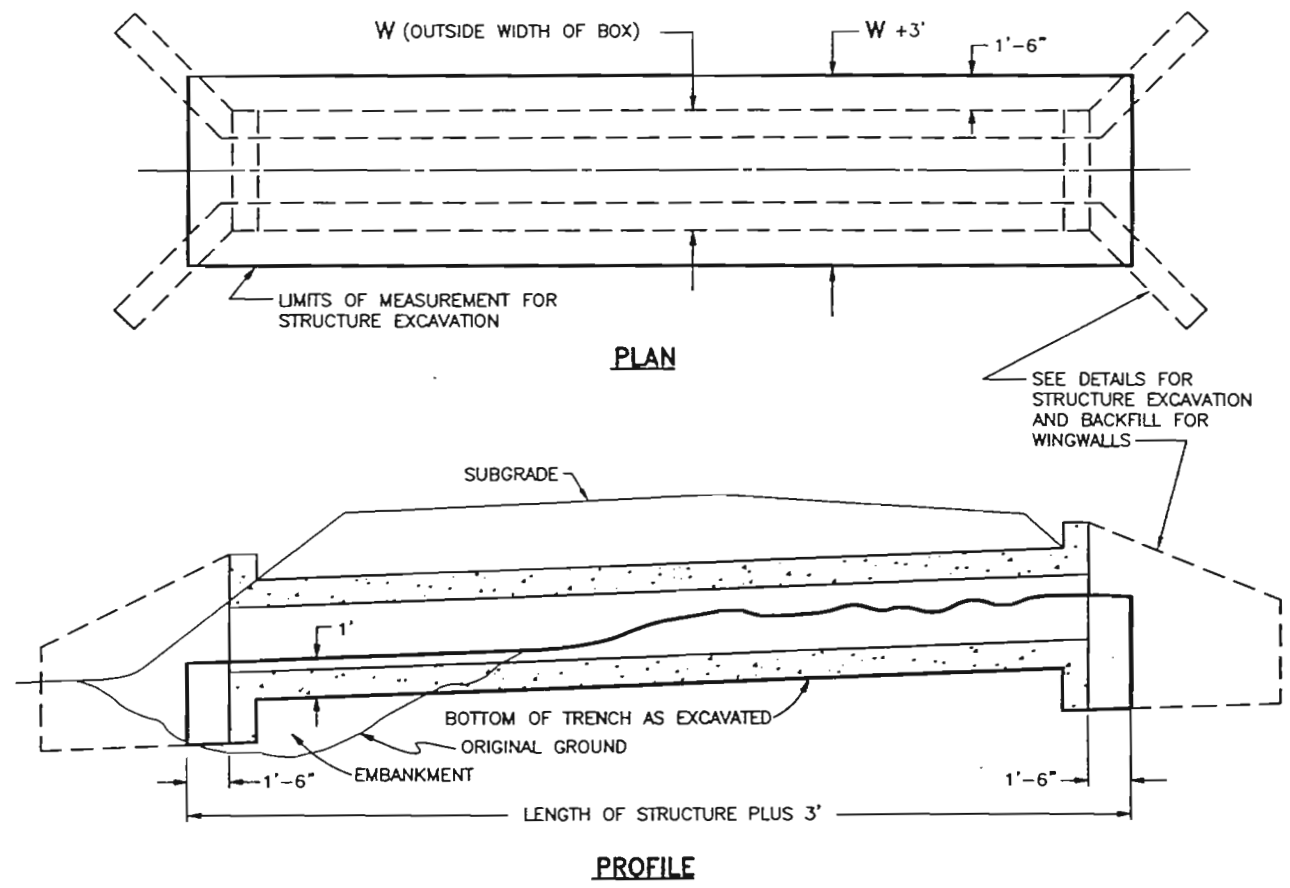
**STANDARD PLAN NO.**

M-206-1

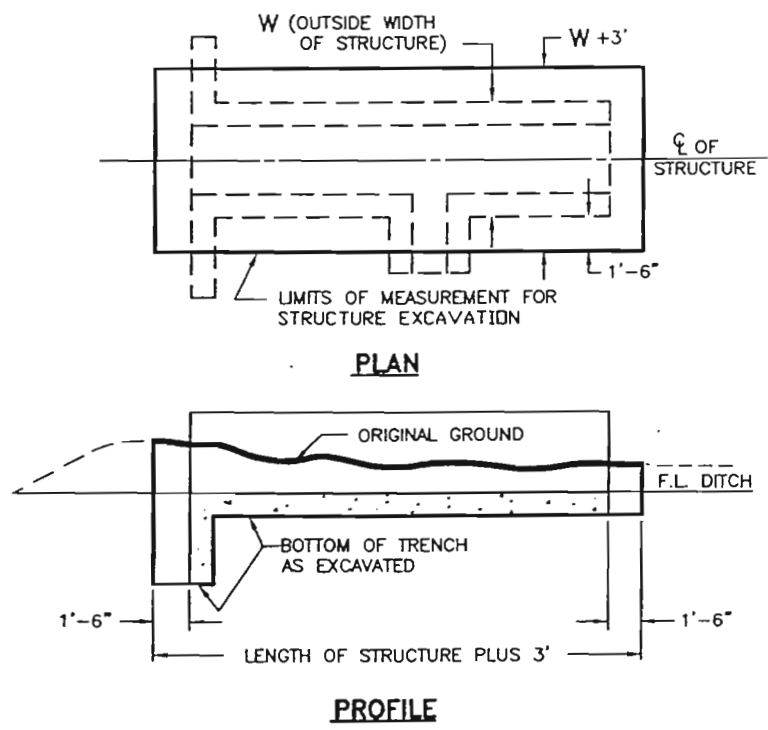
Sheet No. 1 of 2



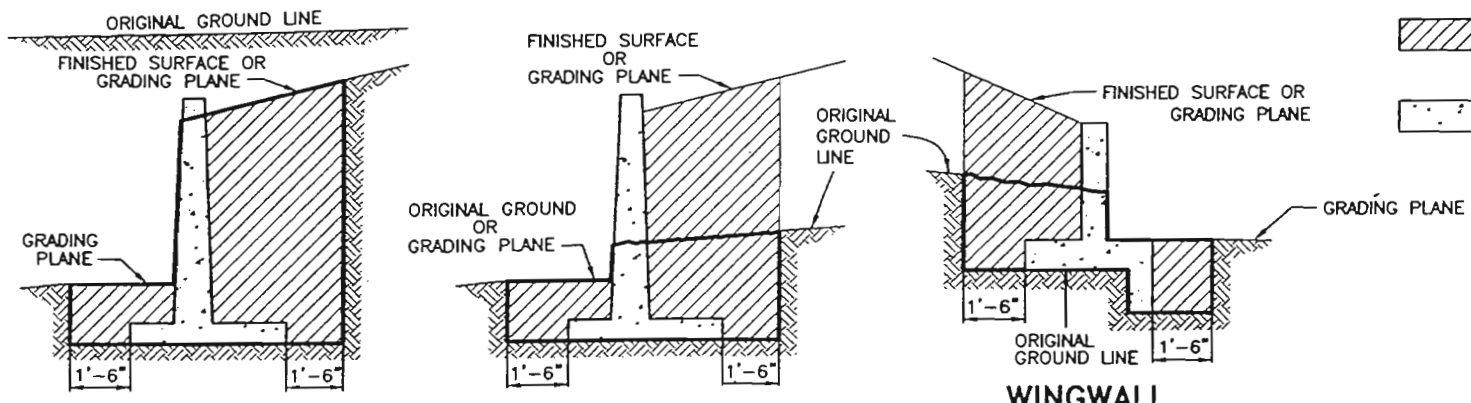
**STRUCTURE EXCAVATION MEASUREMENT FOR PIPE CULVERTS**



**STRUCTURE EXCAVATION MEASUREMENT FOR CONCRETE BOX CULVERTS**



**STRUCTURE EXCAVATION MEASUREMENT FOR DIVISION BOXES**



**RETAINING WALL IN CUT & IN PARTIAL CUT**

**WINGWALL**

**LEGEND**

	STRUCTURE EXCAVATION LIMITS
	COMPACTED STRUCTURE BACKFILL, CLASS 1 OR 2 AS SHOWN ON PLANS.
	CONCRETE

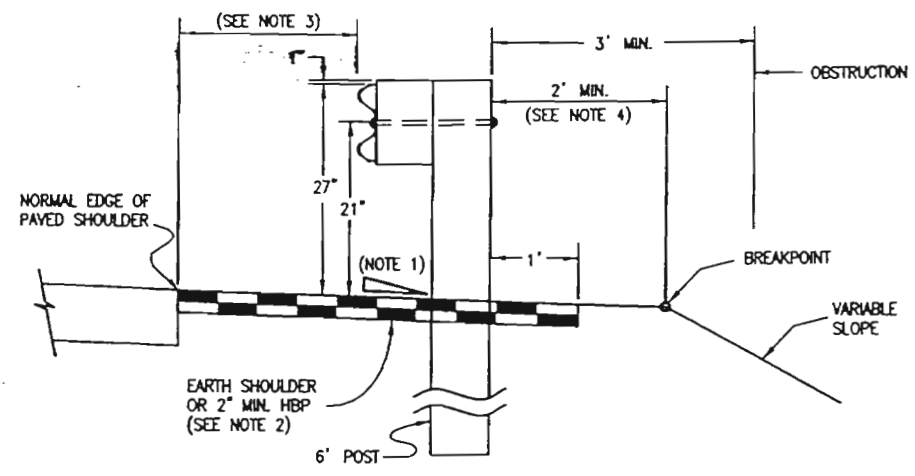
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Computer File Information  
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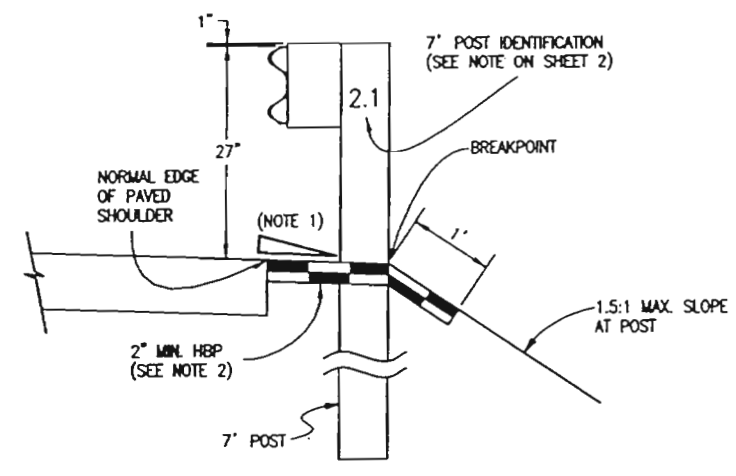
Standard Plan Revised  
 Date: 05-07-99  
 Comments: Match Design Aid and Project Details

**EXCAVATION & BACKFILL FOR STRUCTURES**  
 Issued By: Staff Design Branch November 1, 1992

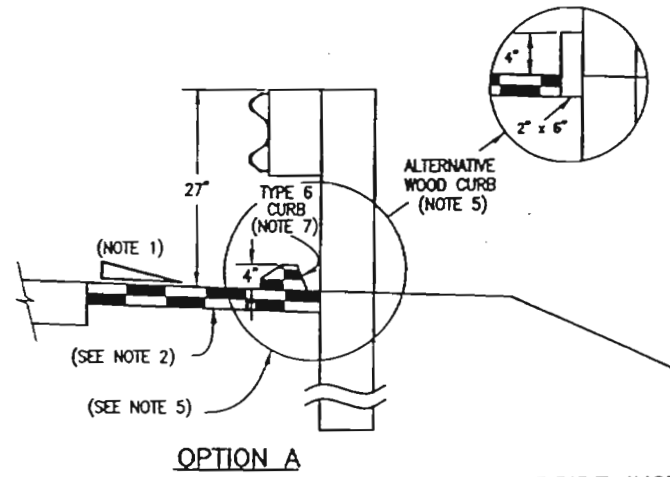
**STANDARD PLAN NO.**  
 M-206-1  
 Sheet No. 2 of 2



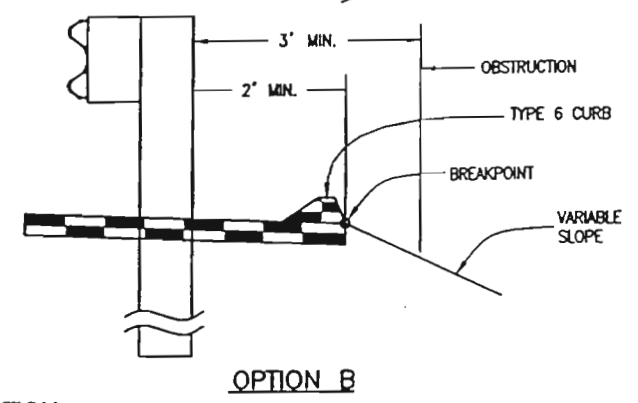
**NORMAL ROADSIDE INSTALLATION  
WHEN FILL REQUIRES GUARDRAIL**



**RESTRICTIVE ROADSIDE INSTALLATION  
WITH 7 FOOT GUARDRAIL POSTS  
(SEE NOTE 4)**

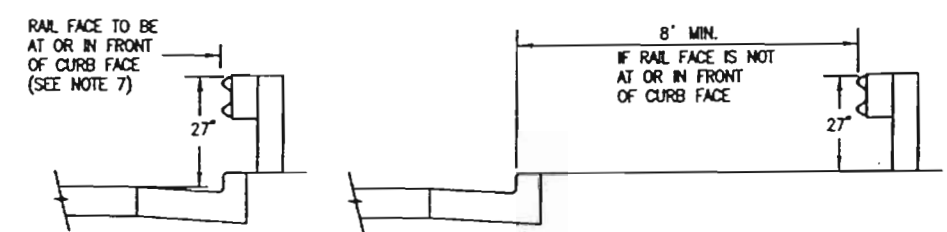


**OPTION A**

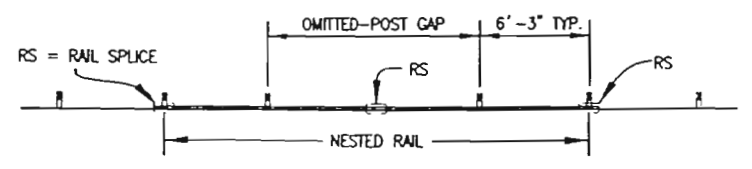


**OPTION B**

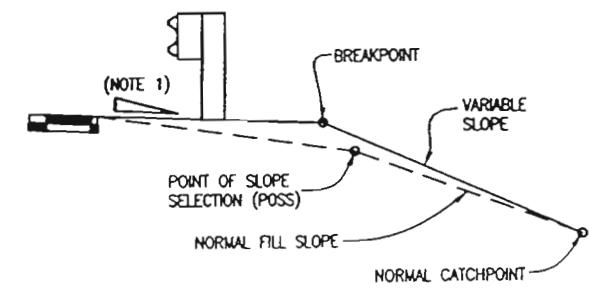
**ROADSIDE INSTALLATION  
WITH EROSION CONTROL CURB**



**URBAN ROADSIDE INSTALLATION WITH CURB AND GUTTER**



**NESTED RAIL AT OMITTED POST  
(SEE NOTE 6)**



**EMBANKMENT WITH GUARDRAIL**

(NOTE: THE CATCHPOINT REMAINS THE SAME AS THAT FOR "NORMAL" FILL SLOPE. FOR THE WIDER "Z" DISTANCES, THE VARIABLE SLOPE MAY "CATCH" AT THE POSS.)

**GENERAL NOTES**

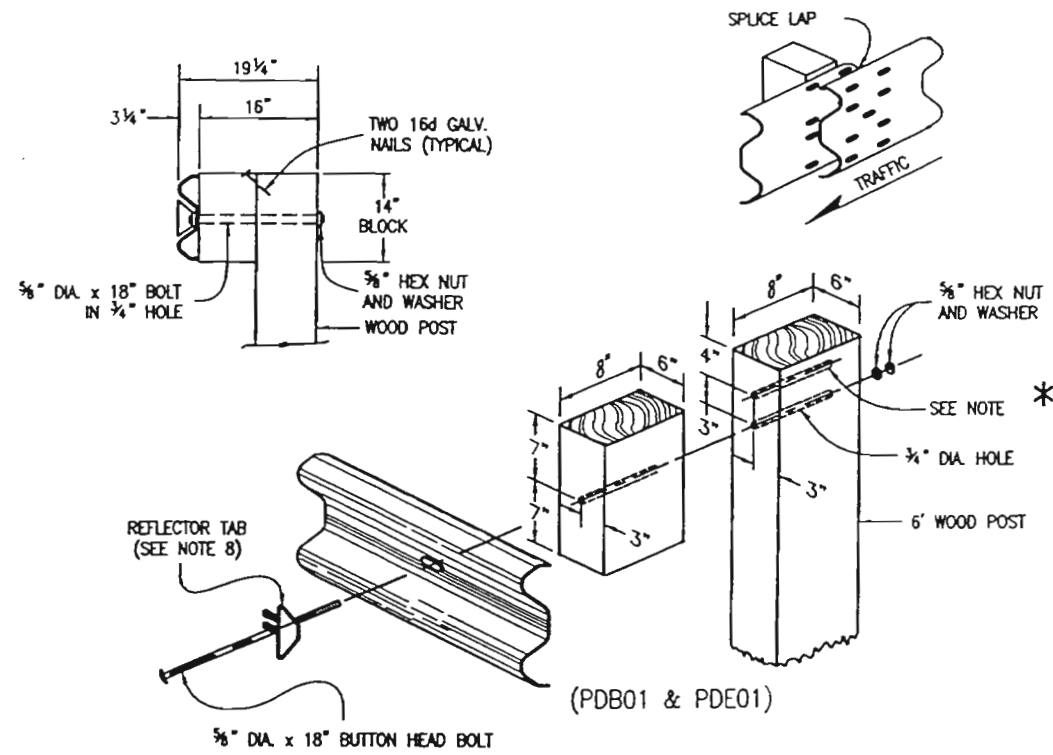
- RATE OF SLOPE DEPENDS ON GUARDRAIL LOCATION:
  - FOR GUARDRAIL FACE 2 FT. OR LESS FROM THE NORMAL EDGE OF PAVED SHOULDER, CONTINUE THE RATE OF SLOPE OF THE NORMAL PAVED SHOULDER TO THE BREAKPOINT.
  - FOR GUARDRAIL FACE MORE THAN 2 FT. FROM THE NORMAL EDGE OF THE PAVED SHOULDER, THE SLOPE SHALL BE 10:1 OR FLATTER.
- WHEN SPECIFIED ON THE PLANS, EXTEND A 2 IN. MINIMUM THICKNESS PAVED SURFACE TO 1 FT. BEHIND THE GUARDRAIL POSTS OR TO THE EROSION CONTROL CURB. ASPHALT CUTTING & PATCHING OR OTHER APPROVED METHOD SHALL BE USED TO MINIMIZE DAMAGE TO ALL PAVED SURFACES UNDER GUARDRAIL INSTALLATIONS. COST FOR ALL REPAIRS TO THE PAVED AREA WILL NOT BE MEASURED AND PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE COST OF THE WORK. A MINIMUM 3 IN. THICK FIBER REINFORCED CONCRETE PAVEMENT MAY BE ALSO BE USED FOR PAVING BENEATH THE GUARDRAIL. INSTALL POST IN A 1/2 IN. OVERSIZED FORMED HOLE FOR RAIL RUNS AND TERMINALS AS DIRECTED. PAYMENT FOR THIS PAVED SURFACE WILL BE MADE UNDER A PAVEMENT OR CONCRETE PAY ITEM WITH QUANTITIES SHOWN ON THE PLANS.
- THE MINIMUM GUARDRAIL OFFSET FROM PAVED SHOULDER EDGE SHALL BE:
  - 0 FT. FOR SHOULDERS 8 FT. OR WIDER
  - 2 FT. FOR SHOULDERS 6 FT. OR LESS
 THE ABOVE 2 FT. GUARDRAIL TO SHOULDER OFFSET IS DESIRABLE BUT NOT REQUIRED FOR:
  - EXISTING HIGHWAY WITH DESIGN SPEED OF LESS THAN 50 MPH. MINIMUM OFFSET OF RAIL IS 0 FT. FROM ANY WIDTH PAVED SHOULDER OR 4 FT. FROM TRAVELED WAY.
  - A ONE-WAY ONE-LANE RAMP AND:
    - THE NON-OFFSET GUARDRAIL BEGINS AT LEAST 100 FT. BEYOND RAMP NOSE.
    - THE NON-OFFSET GUARDRAIL IS NOT LOCATED ON THE RAMP EXIT OR ENTRANCE CURVE CONNECTION TO THE MAJOR HIGHWAY.
    - THE RAMP SHOULDERS ARE 4 FT. OR WIDER.
 USE OF GREATER THAN MINIMUM OFFSET DIMENSIONS IS ENCOURAGED TO MEET THE DESIRABLE GOAL OF PLACING THE GUARDRAIL AS FAR AS POSSIBLE FROM THE TRAVELED WAY, EVEN FOR SHORT DISTANCES, WHILE PROVIDING A SMOOTH CHANGE IN GUARDRAIL ALIGNMENT.
- IF 2 FT. CANNOT BE PROVIDED BETWEEN THE BACK OF THE GUARDRAIL POST AND THE BREAKPOINT, USE 7 FT. GUARDRAIL POSTS. REFER TO THE "RESTRICTIVE ROADSIDE INSTALLATION" DETAIL.
- WHEN SPECIFIED ON THE PLANS, INSTALL 4 IN. HIGH TYPE 6 CURB WITH ITS FACE AT OR BEHIND THE RAIL FACE. AS AN ALTERNATIVE WHEN SPECIFIED ON THE PLANS, INSTALL A 2 IN. x 6 IN. TREATED (AASHTO M 133) WOOD CURB FASTENED WITH A 4 IN. LAG BOLT AND WASHER AT EACH WOOD POST, OR WITH A 1/4 IN. DIA. BOLT WITH WASHER AND NUT AT EACH STEEL POST. IF THE 2 IN. x 6 IN. WOOD CURB IS SPECIFIED, IT WILL BE INCLUDED IN THE COST OF THE GUARDRAIL. IF APPROVED BY THE ENGINEER, A 2 IN. x 4 IN. TREATED WOOD CURB MAY BE SUBSTITUTED FOR THE 2" x 6" CURB AND SET ON TOP OF PAVEMENT SURFACE AND ATTACHED AS DESCRIBED ABOVE.
- ONE POST MAY BE OMITTED IN A GUARDRAIL RUN, SUCH AS AT A PIPE CULVERT WITH MINIMUM COVER. THE W-BEAM RAIL SPANNING THE OMITTED-POST GAP SHALL BE DOUBLED (ONE RAIL NESTED IN THE OTHER) AND SHALL EXTEND A MINIMUM OF 6 FT.-3 IN. ON EITHER SIDE OF THE GAP. USING 12 FT.-6 IN. RAIL SECTIONS. ONE OMITTED POST, DEPENDING ON SPLICE LOCATION, REQUIRES 25 FT. OR 37 FT. - 6 IN. OF NESTED RAIL. SEE NESTED RAIL AT OMITTED POST DETAIL ON THIS SHEET.
- SEE SHEET 6 FOR CURB TREATMENTS AT GUARDRAIL TERMINALS.

**NORMAL CENTER-TO-CENTER POST SPACING**

LOCATION	SPACING
ALL LOCATIONS EXCEPT BRIDGE RAIL LOCATIONS	6'-3"
BRIDGE OR STRUCTURE APPROACH	SEE SHEETS 7, 12, & 15

**GENERAL NOTES**

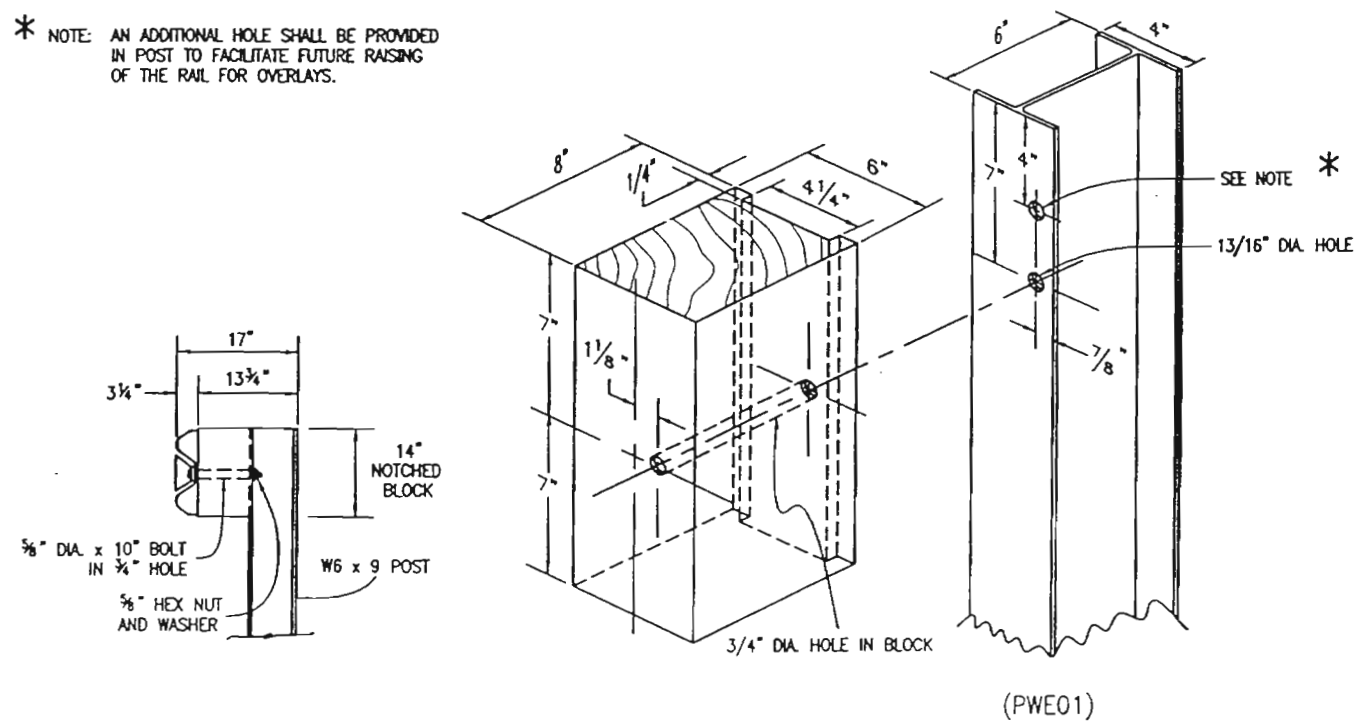
- ALL W-BEAM SPLICES, AND SPLICES OF TERMINAL CONNECTORS TO W-BEAM SHALL BE LAPPED IN THE DIRECTION OF TRAFFIC UNLESS OTHERWISE NOTED.
- MATERIAL TYPE AND SHAPE OF POSTS AND BLOCKS SHALL BE THE SAME THROUGHOUT THE PROJECT EXCEPT WHEN SPECIFIC POSTS AND BLOCKS ARE SPECIFIED SUCH AS AT END ANCHORAGES AND BOX CULVERTS.
- CONCRETE MAY BE READY-MIXED OR FIELD-MIXED AND SHALL CONSIST OF A MINIMUM OF 1 PART CEMENT TO 6 PARTS AGGREGATE BY VOLUME.
- WHEN SPECIFIED IN THE CONTRACT, 7 FT. POSTS SHALL BE INSTALLED INSTEAD OF THE STANDARD 6 FT. POSTS. 7 FT. POSTS SHALL BE MARKED WITH THE NUMBER 7 TO ENSURE PERMANENT IDENTIFICATION. THE NUMBER 7 SHALL BE A MINIMUM 2 IN. HEIGHT AND LOCATED AS SHOWN IN THE ELEVATION VIEWS ON SHEET 1.
- THE STANDARD 3" x 1 1/4" x 3/16" RECTANGULAR WASHER USED UNDER POST BOLT HEADS IN THE PAST MAY REMAIN IN EXISTING INSTALLATIONS BUT SHALL NOT BE USED IN NEW CONSTRUCTION, REPAIRS, OR RESETTING OF RAIL THERE ARE EXCEPTIONS WHERE RECTANGULAR WASHER LOCATIONS ARE SPECIFICALLY IDENTIFIED ON THIS STANDARD PLAN.
- STANDARD GALVANIZED ROUND STEEL WASHERS SHALL BE USED UNDER ALL NUTS IN CONTACT WITH WOOD POSTS.
- REFLECTOR TABS SHALL BE INSTALLED AT 25 FT. INTERVALS (EXCEPTION BELOW). REFLECTOR TABS WILL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE COST OF THE GUARDRAIL. THE TABS SHALL BE MOUNTED SO THAT THE BOLT SLOT FACES AWAY FROM TRAFFIC AND THE REFLECTORIZED SURFACE FACES THE APPROACHING TRAFFIC FOR ONE-WAY ROADS. FOR TWO-WAY ROADS, BOTH SIDES OF THE TABS SHALL BE REFLECTORIZED SO THAT DELINEATION IS PROVIDED FOR BOTH DIRECTIONS OF TRAVEL. REFLECTORIZATION COLOR SHALL MATCH THE COLOR OF THE ADJACENT TRAVELED WAY EDGE LINE. SEE TAB DETAIL ON SHEET 3.
- AT THE TIME A POST OR BLOCK IS INSTALLED, NO SEASONING CHECK WILL BE PERMITTED WHICH EXCEEDS 1/4 IN. IN WIDTH WHEN THE CHECK EXTENDS THE FULL LENGTH OF THE PIECE.
- WOOD BLOCKS SHALL BE CUT FROM THE SAME CROSS-SECTION, SPECIES, AND GRADE AND SHALL RECEIVE THE SAME PRESERVATIVE TREATMENT AS THE POSTS WHEN WOOD POSTS ARE USED.
- REFERENCES SUCH AS "PDB01", "PDE01", AND "PWE01" IN THIS STANDARD SPECIFY HARDWARE DETAILS ARE FROM "A GUIDE TO STANDARDIZED HIGHWAY BARRIER HARDWARE" PREPARED BY THE AASHTO-AGC-ARTBA JOINT COOPERATIVE COMMITTEE.
- NOTCHED RAIL BLOCKOUTS MANUFACTURED FROM SYNTHETIC MATERIAL WILL BE ACCEPTED AS ALTERNATIVES TO WOOD NOTCHED BLOCKS FOR USE WITH STEEL POSTS PROVIDED THAT THE BLOCKOUTS HAVE RECEIVED FHWA APPROVAL AND ARE CERTIFIED AS IDENTICAL TO THE SPECIMENS USED FOR TESTING AND APPROVAL.
- WOOD POSTS SHALL BE MADE OF TIMBER WITH AN EXTREME FIBER STRESS IN BENDING OF 1200 psi. STRESS GRADING AND POST DIMENSIONS SHALL BE IN ACCORDANCE WITH THE RULES OF THE WEST COAST INSPECTION BUREAU OR THE SOUTHERN PINE BUREAU OR THE WESTERN WOOD PRODUCTS ASSOCIATION. TIMBER FOR POSTS SHALL BE EITHER ROUGH SAWN (UNPLANED) OR S4S (SURFACED FOUR SIDES) WITH NOMINAL DIMENSIONS INDICATED. ONLY ONE TYPE OF SURFACE FINISH SHALL BE USED FOR POSTS AND BLOCKOUTS IN ANY ONE CONTINUOUS LENGTH OF GUARDRAIL.
- PRESSURE TREATMENT OF POSTS AND BLOCKS SHALL BE IN ACCORDANCE WITH AASHTO M133 EXCEPT THAT BLOCKS NEED NOT BE INCISED. PERSERVATION ASSAY RETENTION REPORTS SHALL BE FORWARDED TO THE ENGINEER. THE CONTRACTOR SHALL CERTIFY THE SPECIES AND GRADE MEET THE REQUIREMENTS OF THE CONTRACT.
- W-BEAM AND THREE-BEAM GUARDRAIL POSTS SHALL BE MANUFACTURED USING AASHTO M270 (ASTM A709) GRADE 36 STEEL UNLESS CORROSION RESISTANT STEEL IS REQUIRED IN WHICH CASE THE POST SHALL BE MANUFACTURED FROM AASHTO M270 (ASTM A709) GRADE 50W STEEL. THE DIMENSIONS OF THE CROSS-SECTION SHALL CONFORM TO A W6 x 9 SECTION AS DEFINED IN AASHTO M160 (ASTM A6). W6 x 8.5 WIDE FLANGE POSTS ARE AN ACCEPTABLE ALTERNATIVE THAT IS CONSIDERED EQUIVALENT TO THE W6 x 9.
- AFTER THE SECTION IS CUT AND ALL HOLES ARE DRILLED OR PUNCHED THE COMPONENT SHALL BE ZINC-COATED ACCORDING TO AASHTO M111 (ASTM A123) UNLESS CORROSION RESISTANT STEEL IS USED. WHEN CORROSION RESISTANT STEEL IS USED THE PORTION OF THE POST TO BE EMBEDDED IN SOIL SHALL BE ZINC-COATED ACCORDING TO AASHTO M111 (ASTM A123) AND THE PORTION ABOVE THE SOIL SHALL NOT BE ZINC-COATED, PAINTED OR OTHERWISE TREATED.



**WOOD POST & BLOCK**

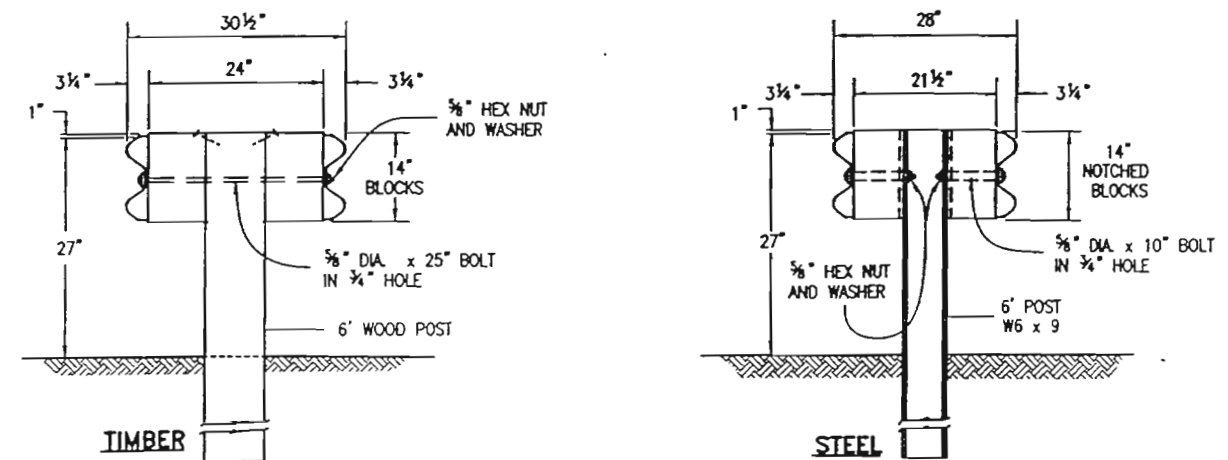
(DIMENSIONS SHOWN ARE FOR NOMINAL 6" x 8" POSTS & BLOCKS)

\* NOTE: AN ADDITIONAL HOLE SHALL BE PROVIDED IN POST TO FACILITATE FUTURE RAISING OF THE RAIL FOR OVERLAYS.




**STEEL POST & NOTCHED BLOCK**

(NOMINAL DIMENSIONS ARE SHOWN FOR THE POSTS & BLOCKS)



**DOUBLE BLOCK AND RAIL MEDIAN BARRIER  
GUARDRAIL TYPE 3 (DOUBLE)**

Colorado Department of Transportation  
  
 4201 East Arkansas Avenue  
 Denver, Colorado 80222  
 Phone: (303) 757-9083 FAX: (303) 757-9868  
 Staff Design

Computer File Information  
 Full Path: www.dot.state.co.us/business/design/standards/mstandards/  
 Drawing File Name: 60601021.dwg  
 Acad Version: R13 Scale: NA Units: English

Standard Plan Revised  
 Date: 04-06-98 Comments: Safety/Design Improvements  
 05-07-99 Safety/Proprietary Improvements

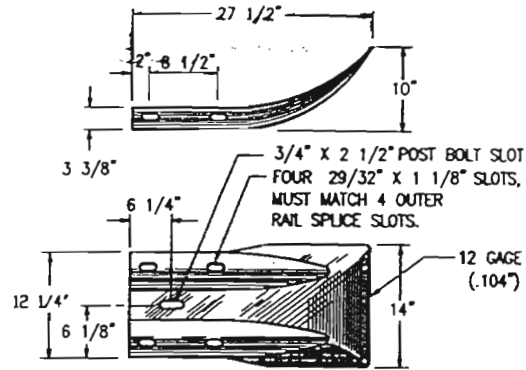
**GUARDRAIL TYPE 3  
W - BEAM**  
 Issued By: Staff Design Branch  
 November 1, 1992

**STANDARD PLAN NO.  
M-606-1**  
 Sheet No. 2 of 15

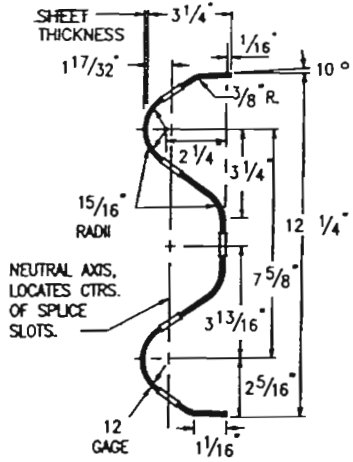


# HARDWARE DETAILS AND SPECIFICATIONS

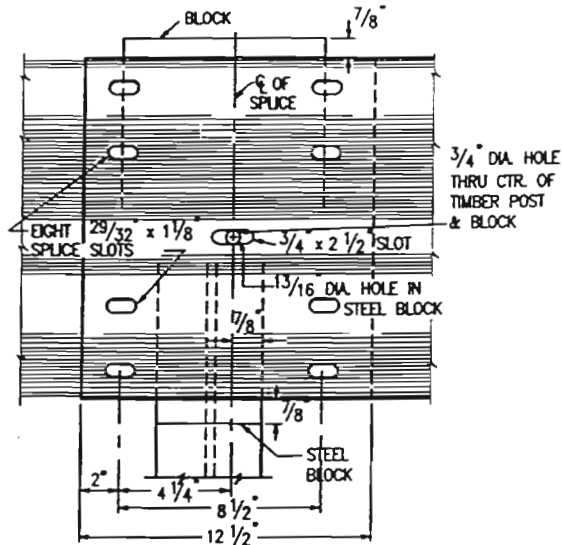
TRAFFIC DIRECTION FOR THE SPLICE LAP SHOWN



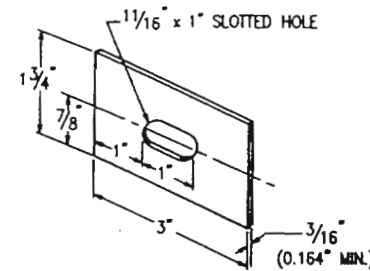
TERMINAL SECTION (FLARED)



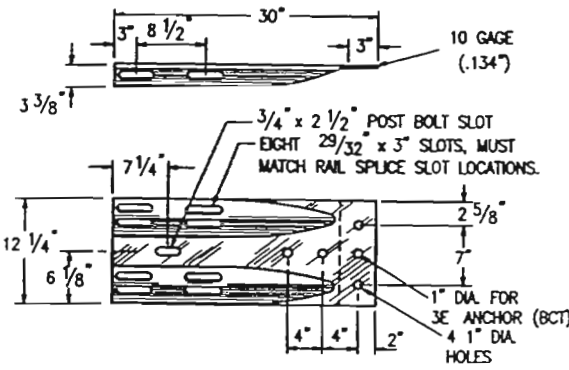
W-BEAM RAIL SECTION



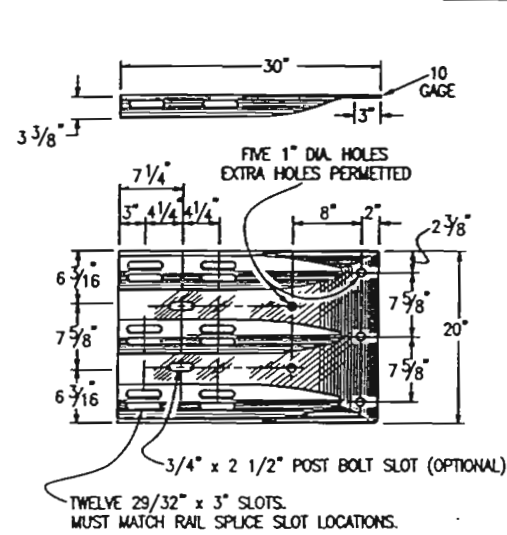
RAIL SPLICE



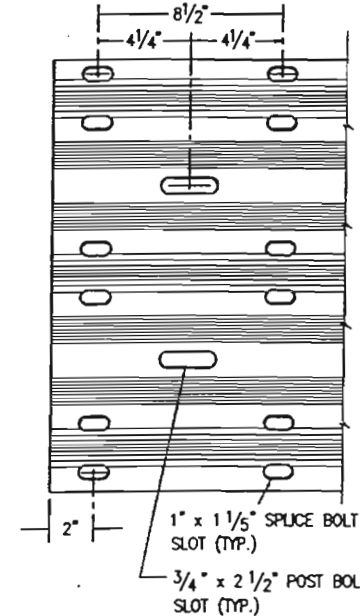
RECTANGULAR WASHER (TO BE USED ONLY WHERE SPECIFIED.)



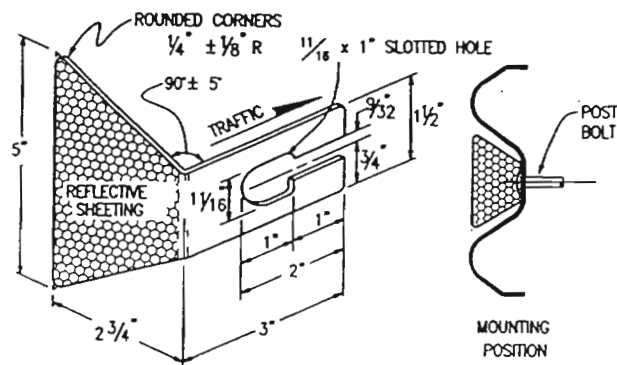
TERMINAL SECTION (CONNECTOR)



THREE BEAM TERMINAL SECTION (CONNECTOR)

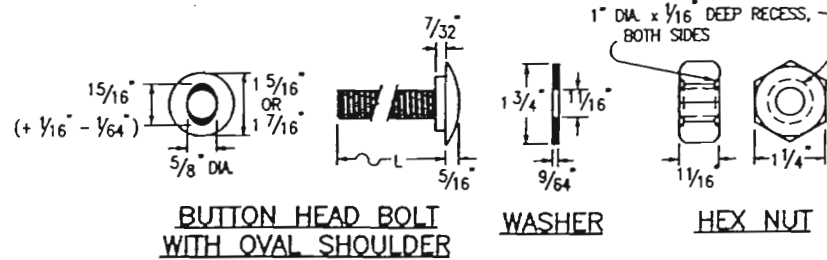


THREE BEAM DETAIL



REFLECTOR TAB

REFLECTOR TABS SHALL BE MANUFACTURED FROM 12 TO 14 GAUGE STEEL. REFLECTIVE SHEETING SHALL CONFORM TO ASTM D4956 TYPE III. SEE NOTES ON SHEET 2.



BUTTON HEAD BOLT WITH OVAL SHOULDER

WASHER

HEX NUT

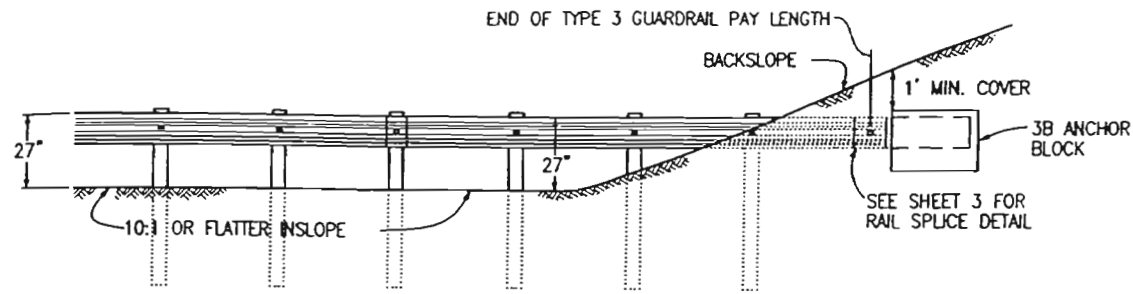
DIAMETER & TYPE (INCHES)	LENGTH L (INCHES)	THREAD LENGTH (INCHES)	INTENDED USE	AASHTO-ACC-ARTBA STANDARD NUMBER	NO. BOLTS, NUTS & WASHERS
5/8	1 1/4	FULL (1 1/2)	ALL RAIL SPLICES	FBB01	8 PER SPLICE*
OVAL	18	MIN. 2 1/2	SINGLE BLOCK & POST (TIMBER)	FBB04	1 PER POST
SHLDR.	25	MIN. 2	DOUBLE BLOCK & POST (TIMBER)	FBB05	1 PER POST
	10	MIN. 2	FASTEN NOTCHED BLOCK TO STEEL POST	FBB03	1 PER BLOCK

\* WASHERS NOT USED AT RAIL SPLICES

PART	MATERIAL SPEC.	GALVANIZING SPEC.	CORROSION-RESISTANT SPEC.
W-BEAM RAIL & TERMINAL SECTIONS	AASHTO M 180, CLASS A OR B	AASHTO M 180, TYPE 1 OR 2	AASHTO M 180, TYPE 4
BASE PLATE	ASTM A 36	AASHTO M 111	N.A.
NUTS, BOLTS & STUDS FOR GENERAL USE	ASTM A 307		
HIGH STRENGTH BOLTS & NUTS	ASTM A 325		AASHTO M 232, CLASS C
HIGH STRENGTH STUDS & NUTS	ASTM A 449		OR
ROUND STEEL WASHERS	ASTM F 436		ASTM B 695 CLASS 50
RECTANGULAR WASHERS	AASHTO M 180		
OTHER FITTINGS	ASTM A 36	AASHTO M 111	

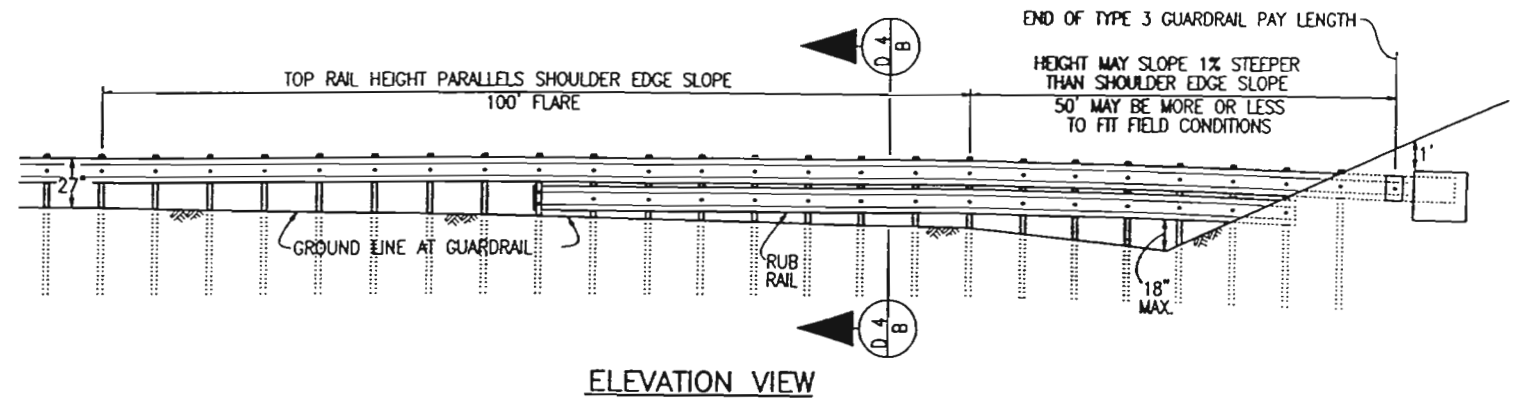
THE TABULATION OF GUARDRAIL WILL SPECIFY THE TYPE OF CORROSION PROTECTION: GALVANIZED OR CORROSION-RESISTANT STEEL.

STEEL POSTS SHALL HAVE THE SAME CORROSION PROTECTION AS SPECIFIED FOR THE METAL BEAM RAIL PUNCHING, DRILLING, OR CUTTING WILL NOT BE PERMITTED AFTER GALVANIZING.

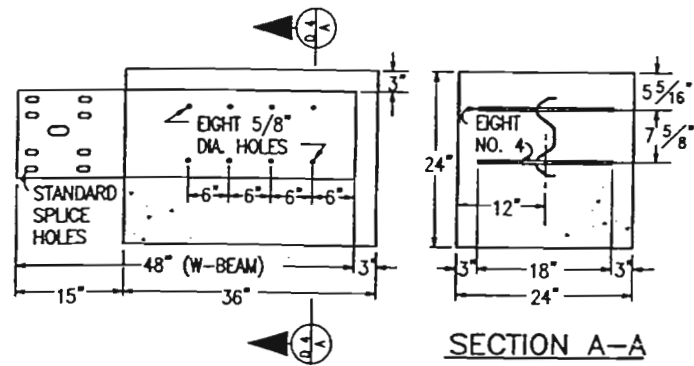


SEE TYPE 3B (RUB RAIL) PLAN VIEW FOR ALIGNMENT. THE 100 FT. FLARE LENGTH MAY BE SHORTENED IF THE INSLOPE IS LESS THAN 8 FT. WIDE.

**END ANCHORAGE TYPE 3B**  
(WITHOUT ROADSIDE DITCH AT GUARDRAIL)

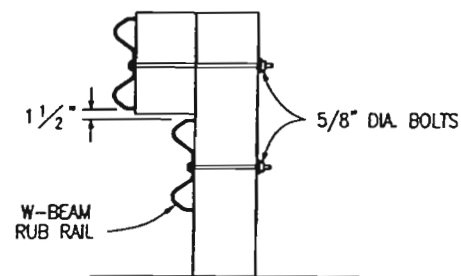


**ELEVATION VIEW**



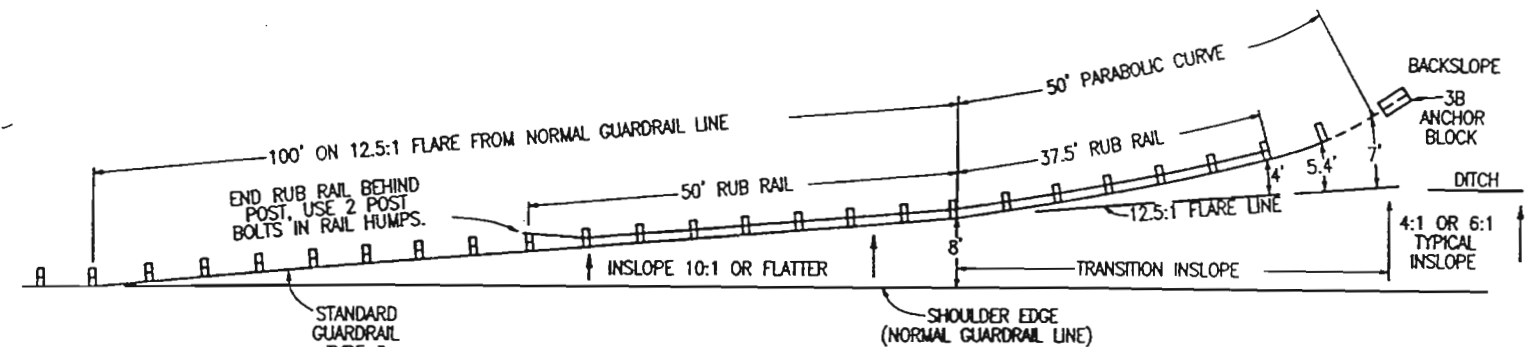
**SECTION A-A**

**TYPE 3B ANCHOR BLOCK DETAIL**



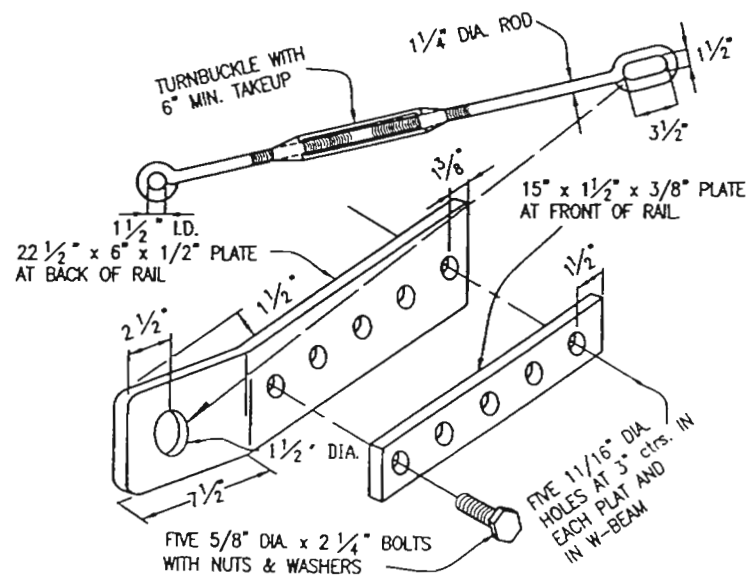
**SECTION B-B**

MOUNT A W-BEAM RUB RAIL 1-1/2 IN. BELOW THE TOP RAIL WHEN THE TOP RAIL HEIGHT EXCEEDS 30 IN. ABOVE THE GROUND.



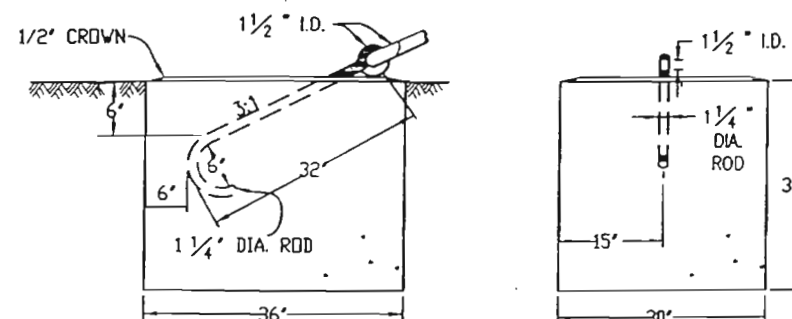
**PLAN VIEW**

**END ANCHORAGE TYPE 3B (RUB RAIL)**  
(WITH ROADSIDE DITCH AT GUARDRAIL)



**TYPE 3D HARDWARE DETAILS**

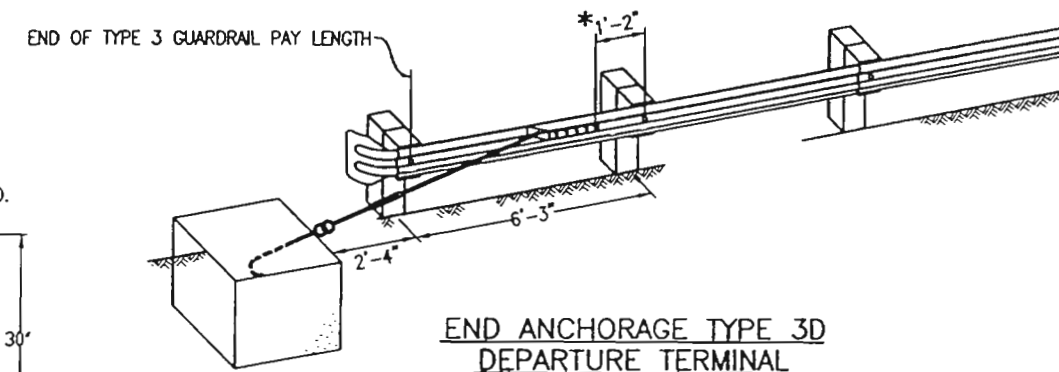
NOTE: ALL PARTS SHALL BE GALVANIZED



**Front**

**End**

**TYPE 3D ANCHOR BLOCK DETAIL**



**END ANCHORAGE TYPE 3D**  
**DEPARTURE TERMINAL**

\* THIS DIMENSION LOCATES FIRST HOLE IN W-BEAM AND THE TYPE 3D HARDWARE 1 FT.-2 IN. C. TO C. FROM POST BOLT HOLE.

Colorado Department of Transportation



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Computer File Information

Full Path: [www.dot.state.co.us/business/design/standards/mstandards/](http://www.dot.state.co.us/business/design/standards/mstandards/)

Drawing File Name: 60601041.dwg

Acad Version: R13 Scale: NA Units: English

Standard Plan Revised

Date:	Comments:
04-06-98	Safety/Design Improvements
05-07-99	Safety/Proprietary Improvements

**GUARDRAIL TYPE 3**  
**W - BEAM**

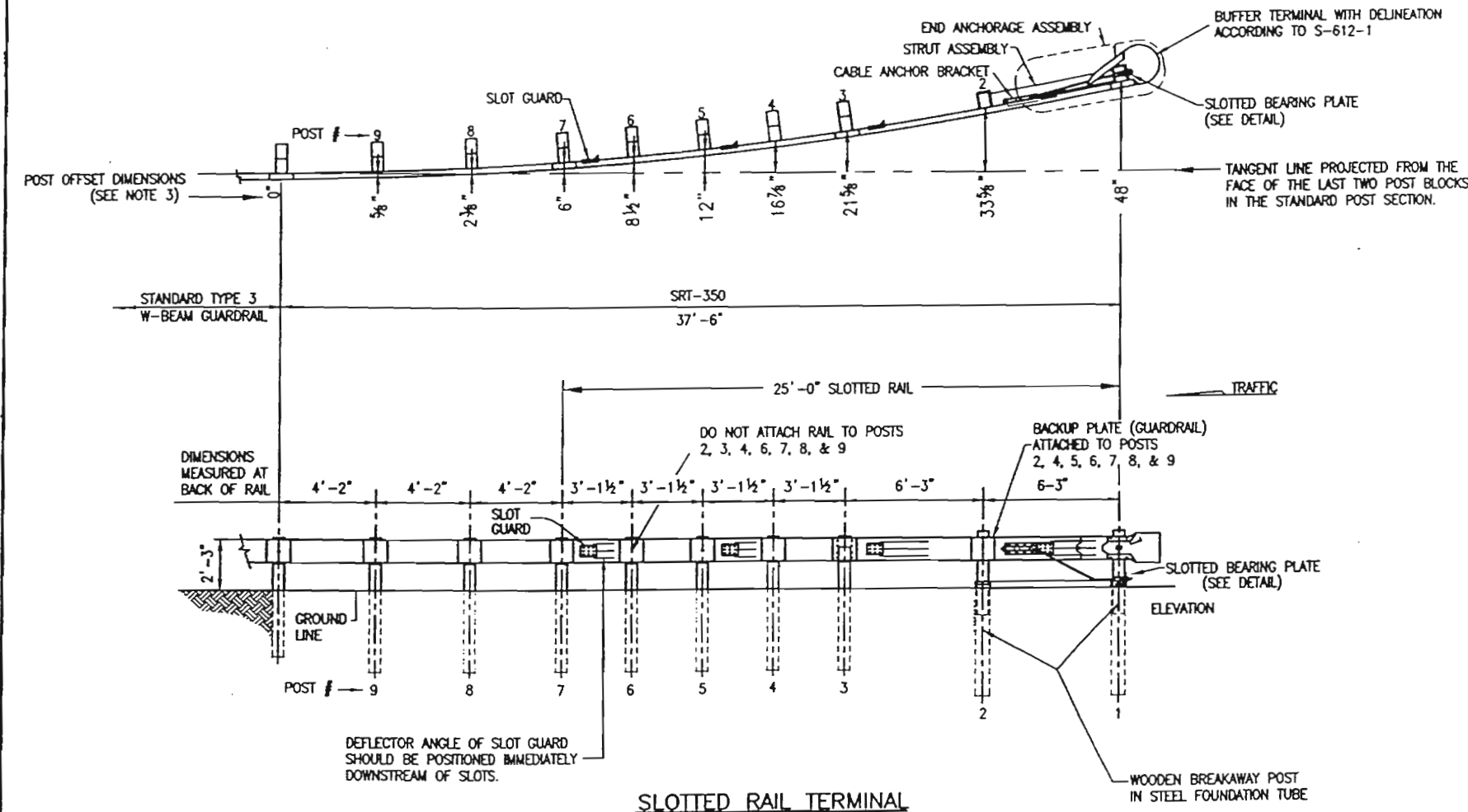
Issued By: Staff Design Branch

November 1, 1992

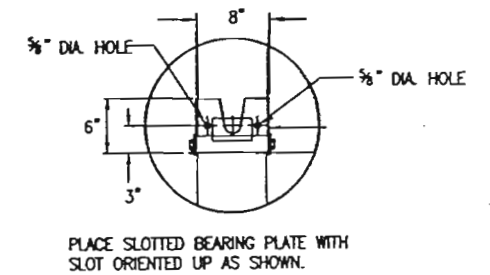
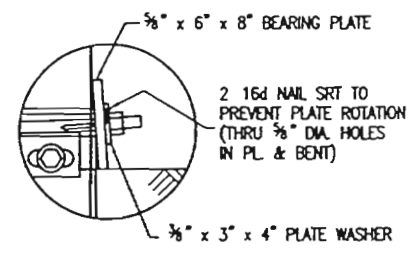
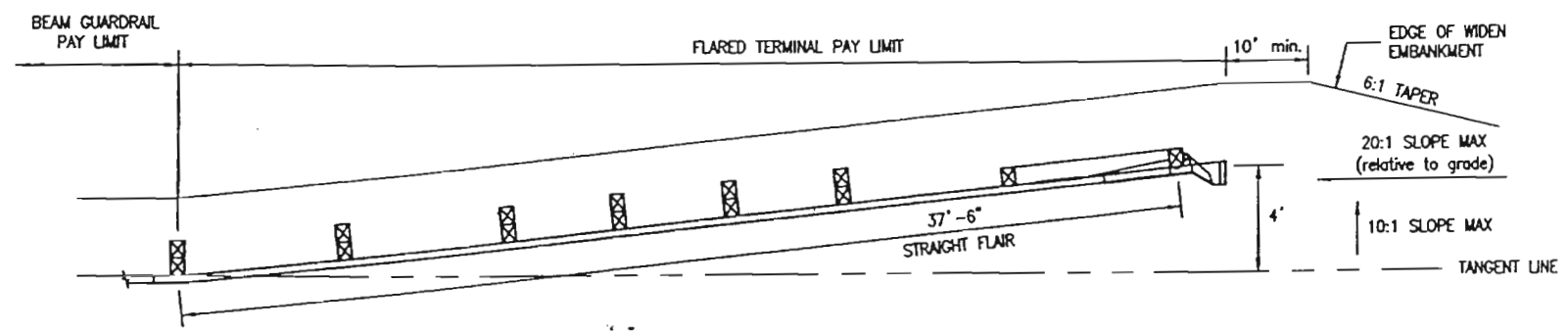
**STANDARD PLAN NO.**

**M-606-1**

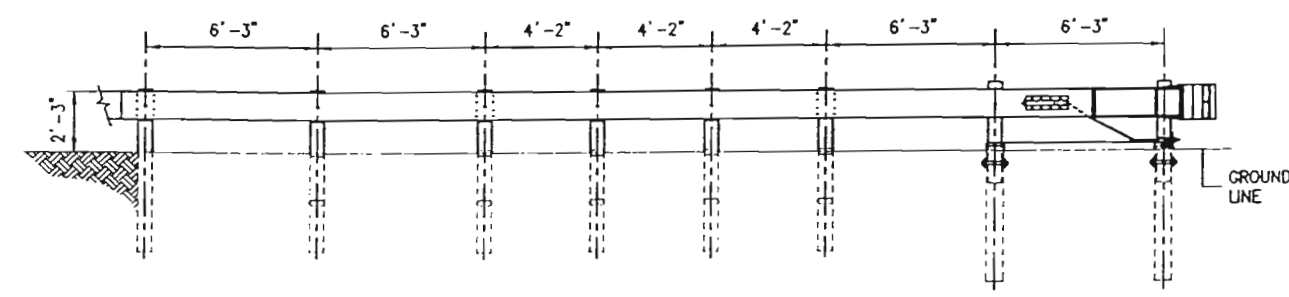
Sheet No. 4 of 15



**SLOTTED RAIL TERMINAL**



**SLOTTED BEARING PLATE DETAIL**



**GENERAL NOTES**

1. THE FLARED TERMINAL SHALL BE THE SLOTTED RAIL TERMINAL (SRT-350) GUARDRAIL END TREATMENT AS MANUFACTURED BY THE SYRO/TRINITY STEEL COMPANY, CENTERVILLE, UTAH (TELEPHONE #: 801-292-4461) OR THE FLEAT-350 AS MANUFACTURED BY ROAD SYSTEMS INC. (TELEPHONE #: 815-464-5917). ONE FLARED TERMINAL SHALL INCLUDE ALL POST, RAIL, AND HARDWARE ITEMS REQUIRED FOR A COMPLETE UNIT. THE END TREATMENT SHALL BE INSTALLED ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS. THE CONTRACTOR SHALL PROVIDE A COPY OF THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND PARTS LIST TO THE ENGINEER PRIOR TO INSTALLATION OF THE DEVICE.
2. IN HEAVY SNOW LOCATIONS, TRIM POSTS #1 & #2 FLUSH WITH RAIL TOP AND TREAT END WITH SEALANT, IN ACCORDANCE WITH AASHTO M133.
3. THE POST OFFSET DIMENSIONS ARE GIVEN TO THE CENTER OF THE TRAFFIC FACE OF THE BLOCKOUTS FROM THE PROJECTED RAIL TANGENT LINE, EXCEPT AT THE FIRST TWO POSTS WHERE THE DIMENSION IS TO THE CENTER OF THE TRAFFIC FACE OF THE POST. OFFSET POINTS ARE TO BE LOCATED BY CHORD MEASUREMENTS AT THE BACK OF THE RAIL EQUAL TO THE NOMINAL POST SPACINGS SHOWN. POSTS ARE TO BE SET APPROXIMATELY RADIAL TO THE RAILING AT EACH POST LOCATION.
4. THE SRT SLOTTED BEARING PLATE SHALL BE INSTALLED WITH THE SLOT FACING UP.
5. POSTS SHALL BE DRILLED FOR BREAKAWAY ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.
6. SEE SHEETS 1, 2 AND 3 FOR STANDARD TYPE 3 GUARDRAIL AND INSTALLATION DETAILS.
7. DO NOT USE REFLECTOR TABS ON POSTS 1 THROUGH 9.
8. THE SRT SHALL BE SUPPLIED IN THREE 12 FT. - 6 IN. RAIL LENGTHS.

Colorado Department of Transportation

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Staff Design

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Computer File Information

Full Path: [www.dot.state.co.us/business/design/standards/mstandards/](http://www.dot.state.co.us/business/design/standards/mstandards/)

Drawing File Name: 60601051.dwg

Acad Version: R13 Scale: NA Units: English

Standard Plan Revised

Date:	Comments:
04-06-98	Safety/Design Improvements
05-07-99	Safety/Proprietary Improvements

**GUARDRAIL TYPE 3**

**W - BEAM**

Issued By: Staff Design Branch

November 1, 1992

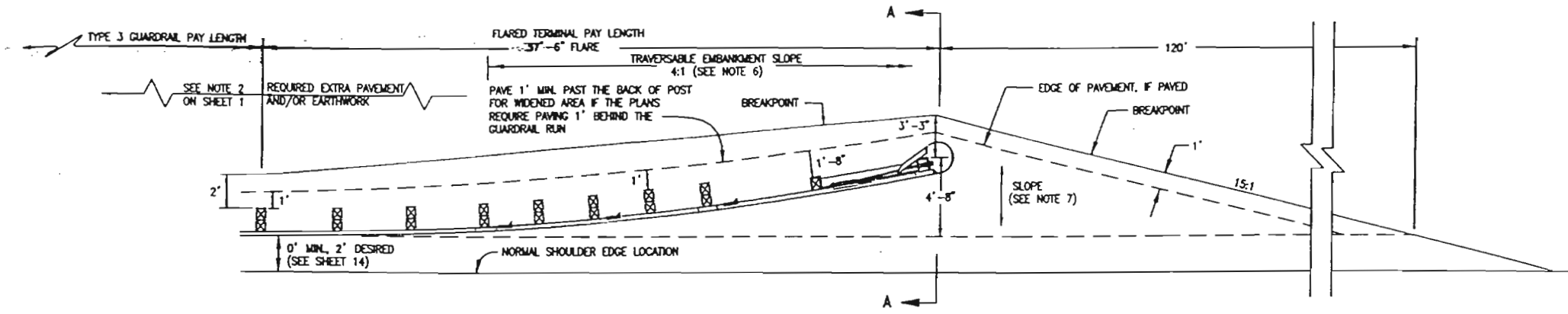
**STANDARD PLAN NO.**

**M-606-1**

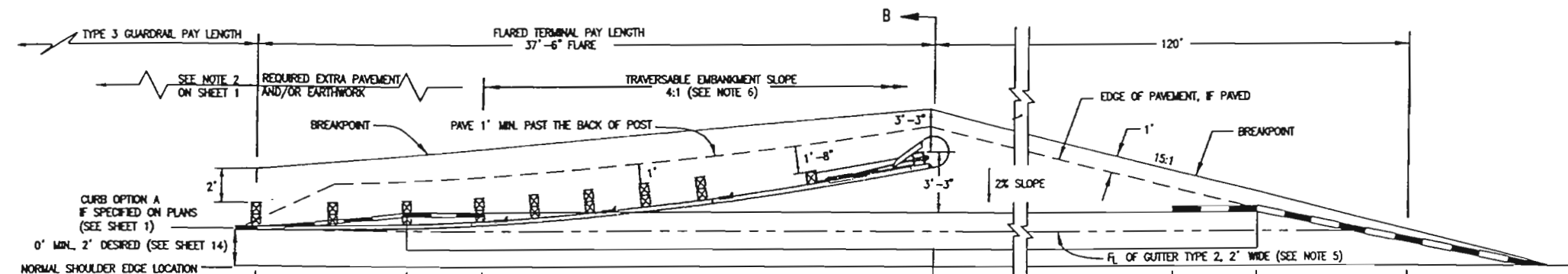
Sheet No. 5 of 15

**GENERAL NOTES**

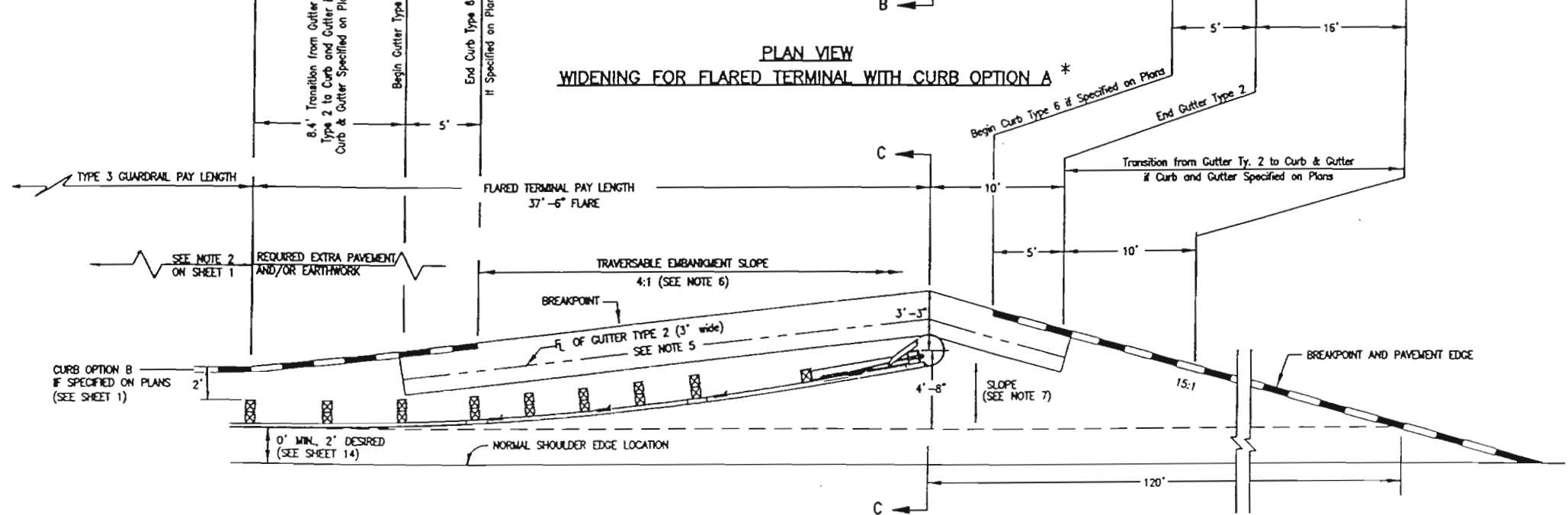
- PAYMENT FOR THE ADDED EMBANKMENT (APPROXIMATELY 65 CU. YDS.) FOR THE FLARE SHALL BE AS FOLLOWS:  
 -UNDER PAY ITEM 203 WHEN THE CONTRACT PLAN INCLUDES PAY ITEM 203  
 -INCLUDED IN THE COST OF THE SRT ITEM 606 PAY ITEM WHEN THE CONTRACT PLAN DOES NOT INCLUDE PAY ITEM 203  
 WHEN THE WIDENED AREA IS PAVED, PAYMENT FOR THE PAVEMENT (APPROX. 60 SQ. YDS.) SHALL BE AS FOLLOWS:  
 -UNDER PAY ITEM 403 OR 601 WHEN THE CONTRACT PLAN INCLUDES PAY ITEM 403 OR 601  
 -INCLUDED IN THE COST OF THE NONFLARED TERMINAL PAY ITEM WHEN THE CONTRACT PLAN DOES NOT INCLUDE PAY ITEM 403 OR 601  
 (SEE SHEET 1, NOTE 2 FOR PAVEMENT TYPES)
  - CONCRETE PAVED AREAS SHALL HAVE THEIR TAPERED ENDS SQUARED OFF AS DIRECTED BY THE ENGINEER.
  - WHEN OVERLAY PAVING, THE FINISHED SURFACE AT EACH POST SHALL NOT BE ABOVE THE POSTS' TOP BREAKWAY HOLE OR STRUT ASSEMBLY. THE WIDENED AREA AT THE FLARED TERMINAL SHOULD NOT BE OVERLAYED UNLESS PAVEMENT CONDITIONS WARRANT IT BEING OVERLAYED. ANY OVERLAY PAVEMENT ABUTTING THE FLARED TERMINAL SHALL BE TAPERED TO PREVENT A DROP IN THE PAVED SURFACE BELOW THE RAIL.
  - SEE SHEETS 1, 2 AND 3 FOR STANDARD TYPE 3 GUARDRAIL AND INSTALLATION DETAILS.
  - THE COST OF THE GUTTER SHALL BE PAID FOR AS "GUTTER TYPE 2 (2 FT.)" FOR A LENGTH OF 134 FT. OR "GUTTER TY. 2 (3 FT.)" FOR A LENGTH OF 40 FT.
  - INLETS OR RUNDOWNS MAY BE USED INSTEAD OF THE GUTTER IF SPECIFIED ON THE PLANS. NO ADDITIONAL CURB SHALL BE ADDED IN THE VICINITY OF THE END TREATMENT.
  - 4:1 OR FLATTER SLOPES SHALL BE USED BEHIND THE TERMINAL IF THIS IS NOT POSSIBLE, A MINIMUM 3:1 SLOPE MAY BE USED IF APPROVED BY THE ENGINEER.
  - THE WIDENED AREA, EXCEPT FOR CURB OPTION A, SHALL HAVE THE SAME GRADING AS THE ADJACENT GUARDRAIL: 10:1 OR FLATTER IF MORE THAN 2 FT. FROM SHOULDER, SLOPE EQUAL TO ROADWAY SLOPE IF 2 FT. OR LESS FROM SHOULDER.
- \* THIS PLAN VIEW SHOWS ONLY THE SRT. THE FLEAT-350 USES THE SAME WIDENING DETAILS.



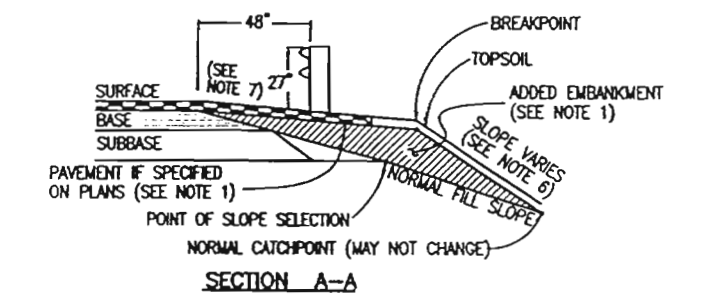
**PLAN VIEW  
WIDENING FOR FLARED TERMINAL \***



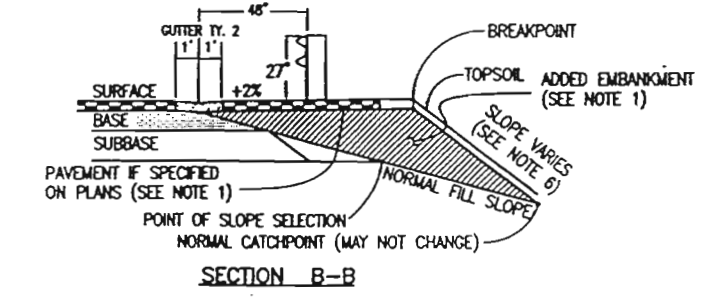
**PLAN VIEW  
WIDENING FOR FLARED TERMINAL WITH CURB OPTION A \***



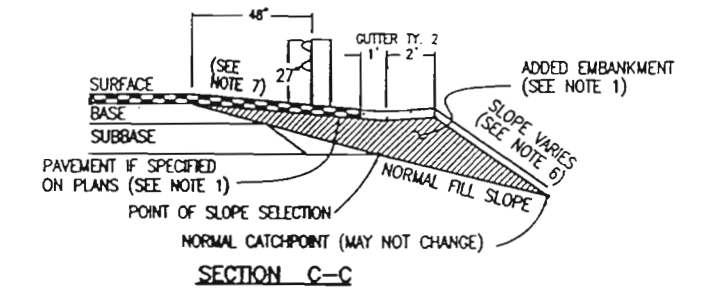
**PLAN VIEW  
WIDENING FOR FLARED TERMINAL WITH CURB OPTION B \***




**SECTION A-A**



**SECTION B-B**



**SECTION C-C**

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Computer File Information	
Full Path: <a href="http://www.dot.state.co.us/business/design/standards/mstandards/">www.dot.state.co.us/business/design/standards/mstandards/</a>	Drawing File Name: 60601061.dwg
Acad Version: R13	Scale: NA Units: English

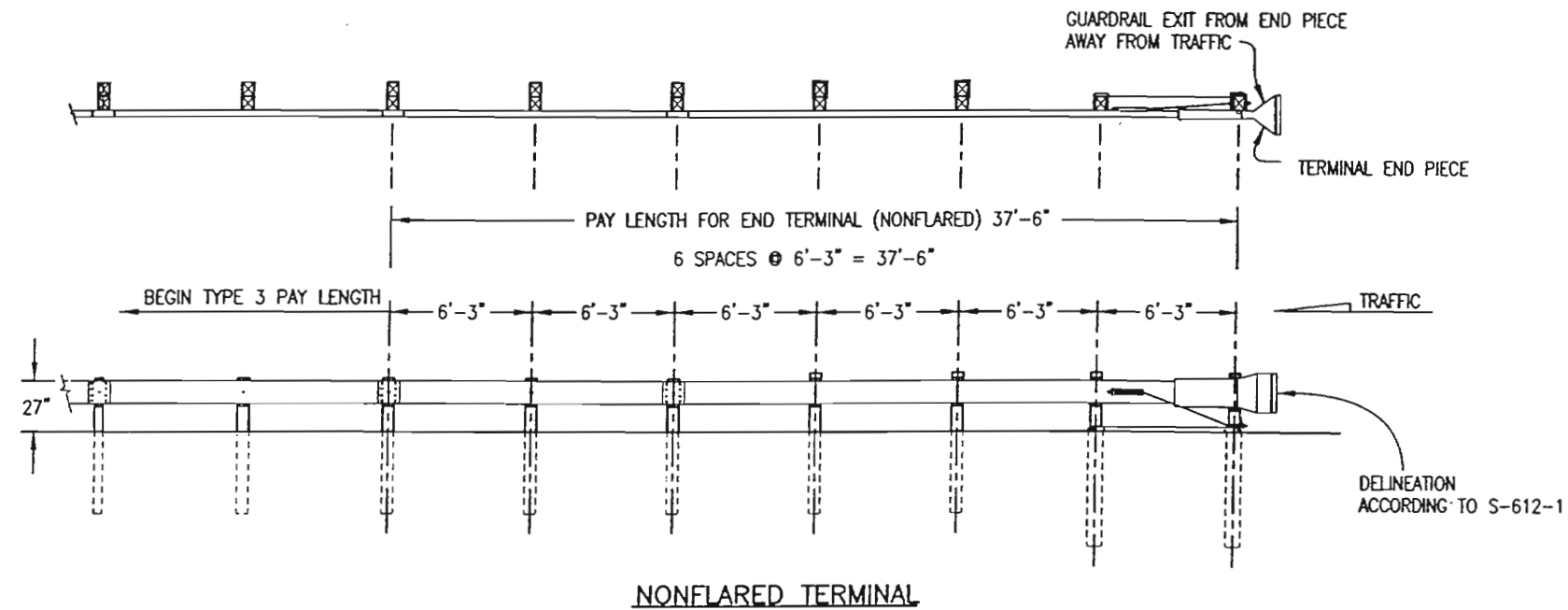
Standard Plan Revised	
Date:	Comments:
04-06-98	Safety/Design Improvements
05-07-99	Safety/Proprietary Improvements

**GUARDRAIL TYPE 3  
W - BEAM**  
 Issued By: Staff Design Branch November 1, 1992

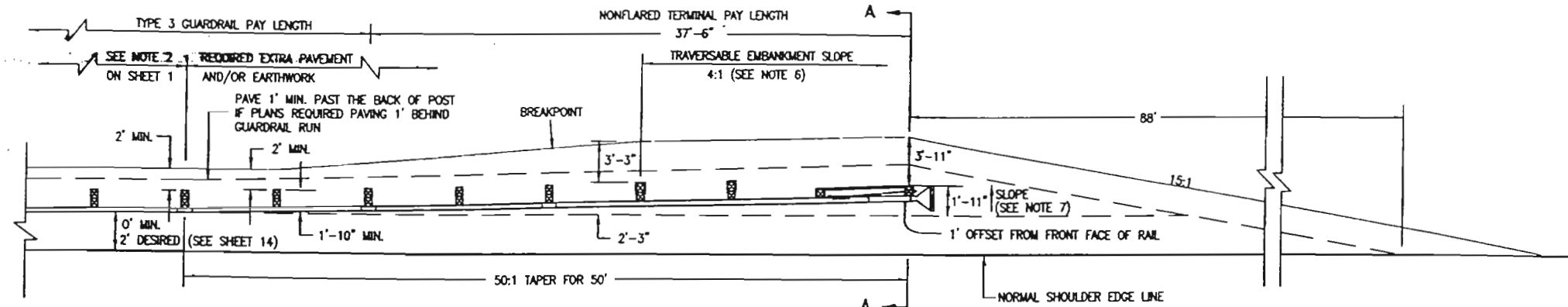
**STANDARD PLAN NO.  
M-606-1**  
 Sheet No. 6 of 15

**GENERAL NOTES**

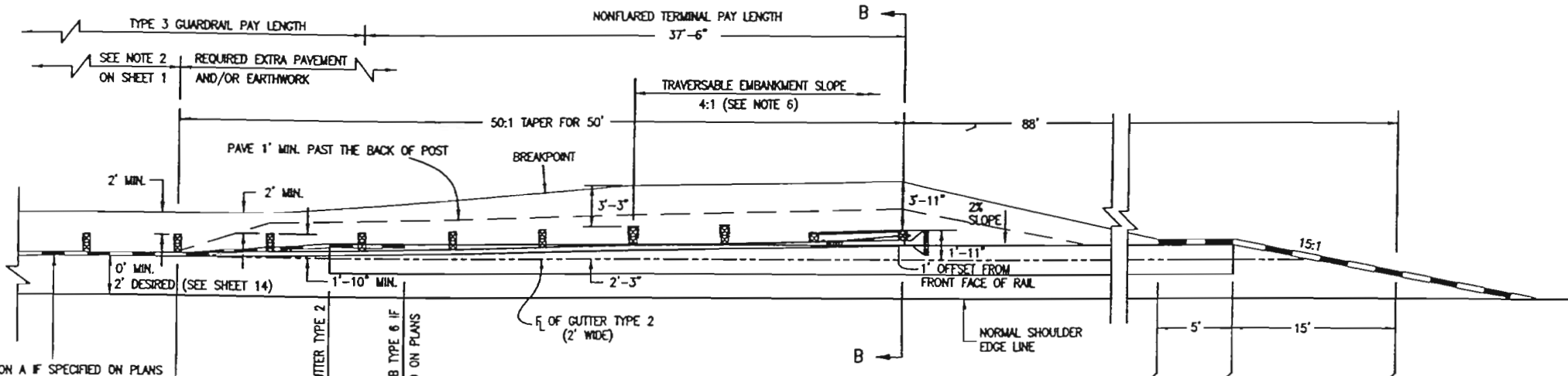
1. THE END TREATMENT SHALL BE THE ET2000-LET GUARDRAIL END TREATMENT AS MANUFACTURED BY THE SYRO STEEL COMPANY, CENTERVILLE, UTAH (TEL: 801-292-4461), THE SKT GUARDRAIL END TREATMENT AS MANUFACTURED BY UNIVERSAL INDUSTRIAL SALES, INC., OF PLEASANT GROVE, UTAH (TEL: 800-424-9825), OR AN APPROVED EQUAL ONE. NONFLARED TERMINAL SHALL INCLUDE ALL POST, RAIL, AND HARDWARE ITEMS REQUIRED FOR A COMPLETE UNIT. THE END TREATMENT SHALL BE INSTALLED ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS. THE CONTRACTOR SHALL PROVIDE A COPY OF THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND PARTS LISTS TO THE ENGINEER PRIOR TO THE INSTALLATION OF THE DEVICE.
2. POSTS SHALL BE DRILLED FOR BREAKAWAY ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.
3. DO NOT USE REFLECTOR TABS ON THE LAST 7 POSTS OF THE NONFLARED TERMINAL.



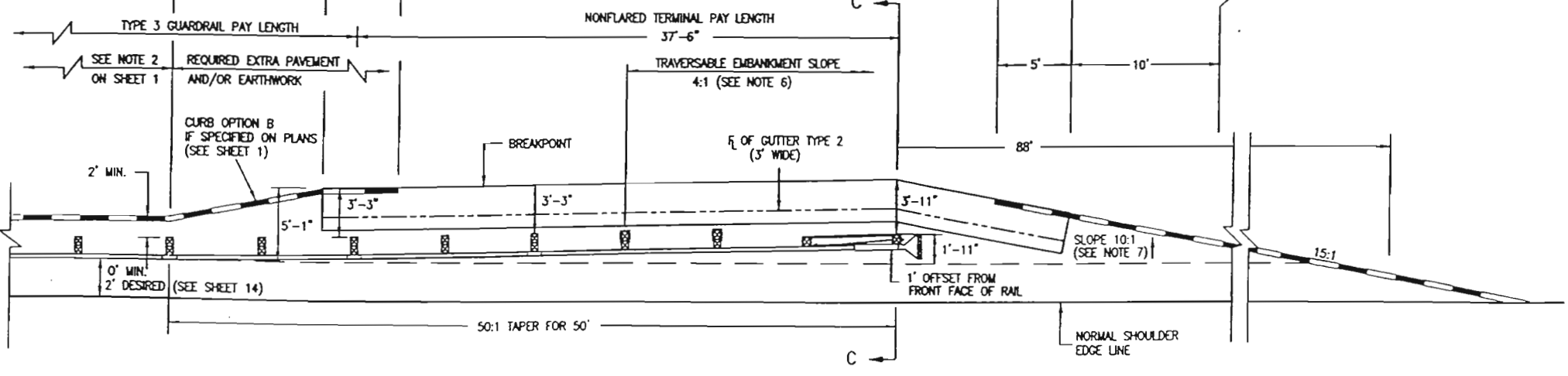
<p align="center">Colorado Department of Transportation</p> 4201 East Arkansas Avenue Denver, Colorado 80222 Phone: (303) 757-9083 FAX: (303) 757-9868  Staff Design <span style="float: right;">WRS</span>	Computer File Information	Standard Plan Revised		<h2 style="margin: 0;">GUARDRAIL TYPE 3</h2> <h2 style="margin: 0;">W - BEAM</h2>	STANDARD PLAN NO.	
	Full Path: <a href="http://www.dot.state.co.us/business/design/standards/mstandards/">www.dot.state.co.us/business/design/standards/mstandards/</a>	Date: 04-06-98	Comments: Safety/Design Improvements		M-606-1	
	Drawing File Name: 60601071.dwg	Date: 05-07-99	Comments: Safety/Proprietary Improvements		Sheet No. 7 of 15	
Acad Version: R13    Scale: NA    Units: English	Issued By: Staff Design Branch		November 1, 1992			



WIDENED AREA FOR NONFLARED TERMINAL  
PLAN VIEW

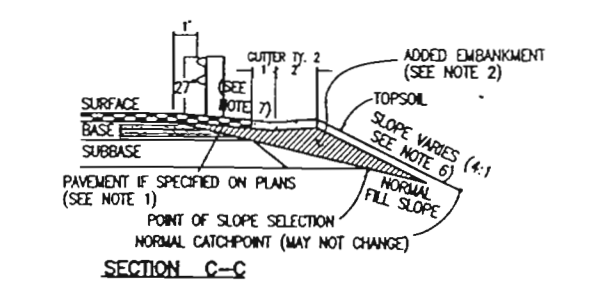
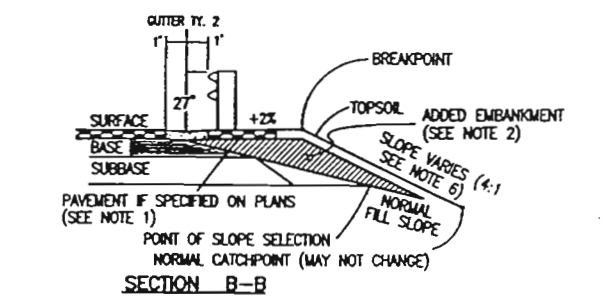
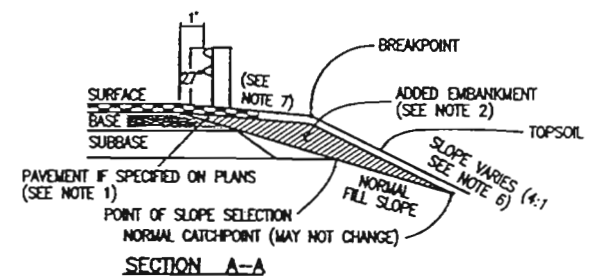


WIDENED AREA FOR NONFLARED TERMINAL WITH CURB OPTION A  
PLAN VIEW



WIDENED AREA FOR NONFLARED TERMINAL WITH CURB OPTION B  
PLAN VIEW

- GENERAL NOTES**
- PAYMENT FOR THE ADDED EMBANKMENT (APPROXIMATELY 40 CU. YDS.) FOR THE FLARE SHALL BE AS FOLLOWS:  
 -UNDER PAY ITEM 203 WHEN THE CONTRACT PLAN INCLUDES PAY ITEM 203  
 -INCLUDED IN THE COST OF THE NONFLARED TERMINAL ITEM 606 PAY ITEM WHEN THE CONTRACT PLAN DOES NOT INCLUDE PAY ITEM 203  
 WHEN THE WIDENED AREA IS PAVED, PAYMENT FOR THE PAVEMENT (APPROX. 41 SQ. YDS.) SHALL BE AS FOLLOWS:  
 -UNDER PAY ITEM 403 OR 601 WHEN THE CONTRACT PLAN INCLUDES PAY ITEM 403 OR 601  
 -INCLUDED IN THE COST OF THE NONFLARED TERMINAL PAY ITEM WHEN THE CONTRACT PLAN DOES NOT INCLUDE PAY ITEM 403 OR 601  
 (SEE SHEET 1, NOTE 2 FOR PAVEMENT TYPES)
  - WHEN OVERLAY PAVING, THE FINISHED SURFACE AT EACH POST SHALL NOT BE ABOVE THE POSTS' TOP BREAKWAY HOLE OR STRUT ASSEMBLY. THE WIDENED AREA AT THE NONFLARED TERMINAL SHALL NOT BE OVERLAYED UNLESS PAVEMENT CONDITIONS WARRANT IT BEING OVERLAYED. ANY OVERLAY PAVEMENT ABUTTING THE NONFLARED TERMINAL SHALL BE TAPERED TO PREVENT A DROP IN THE PAVED SURFACE BELOW THE RAIL.
  - SEE SHEETS 1, 2 AND 3 FOR STANDARD TYPE 3 GUARDRAIL AND INSTALLATION DETAILS.
  - THE COST OF THE GUTTER SHALL BE PAID FOR AS "GUTTER TYPE 2 (2 FT.)" FOR A LENGTH OF 103 FT. OR "GUTTER TY. 2 (3 FT.)" FOR A LENGTH OF 50 FT.
  - INLETS OR RUNDOWNS MAY BE USED INSTEAD OF THE GUTTER IF SPECIFIED ON THE PLANS. NO ADDITIONAL CURB SHALL BE ADDED IN THE VICINITY OF THE END TREATMENT.
  - 4:1 OR FLATTER SLOPES SHALL BE USED BEHIND THE TERMINAL IF THIS IS NOT POSSIBLE, A MINIMUM 3:1 SLOPE MAY BE USED WHEN APPROVED BY THE ENGINEER.
  - THE WIDENED AREA, EXCEPT FOR CURB OPTION A, SHALL HAVE THE SAME GRADING AS BENEATH THE ADJACENT GUARDRAIL: 10:1 OR FLATTER IF MORE THAN 2 FT. FROM SHOULDER, SLOPE EQUAL TO ROADWAY SLOPE IF 2 FT. OR LESS FROM SHOULDER.



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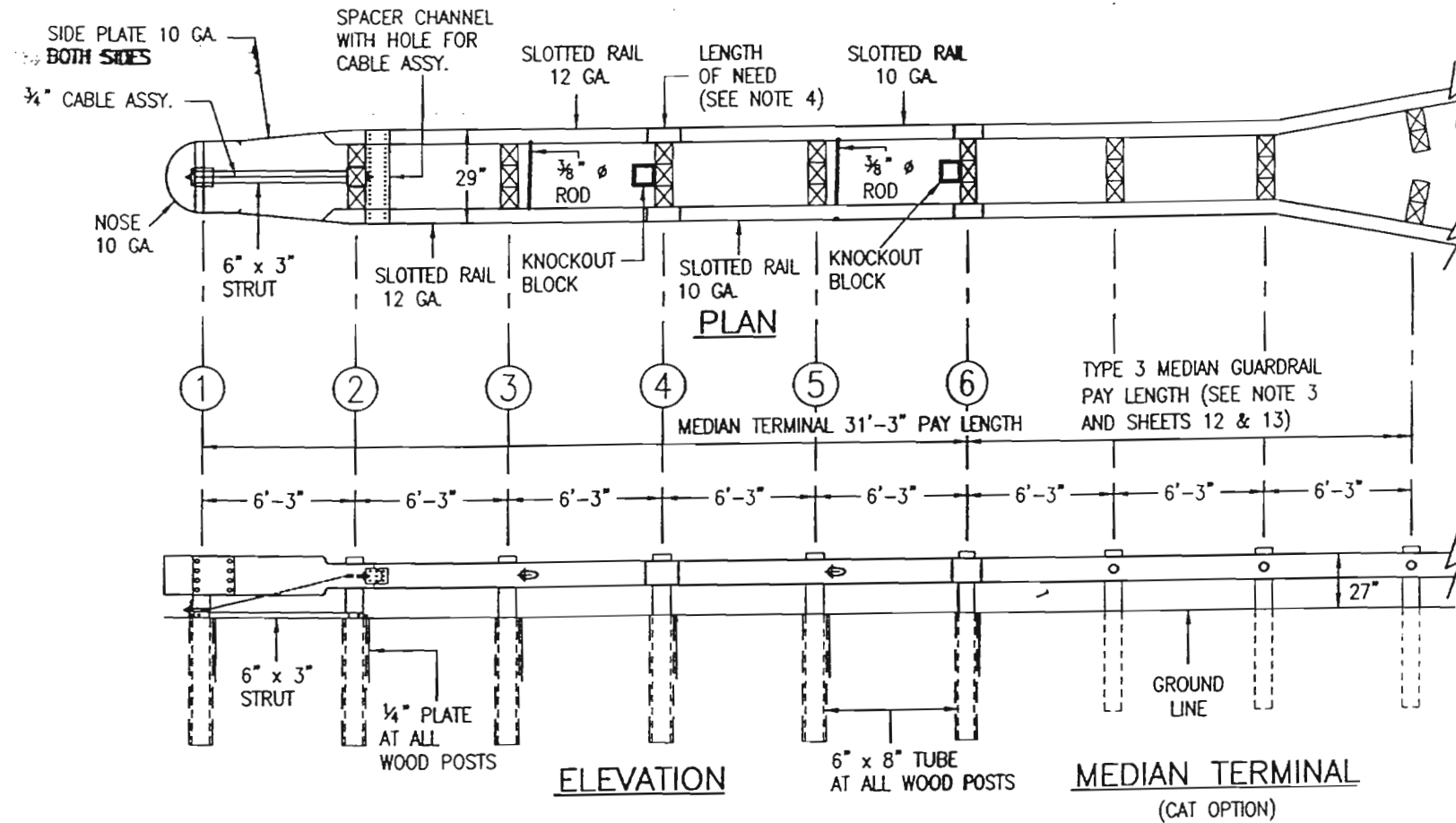
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Standard Plan Revised	
Date:	Comments:
04-06-98	Safety/Design Improvements
05-07-99	Safety/Proprietary Improvements

**GUARDRAIL TYPE 3**  
**W - BEAM**  
 Issued By: Staff Design Branch  
 November 1, 1992

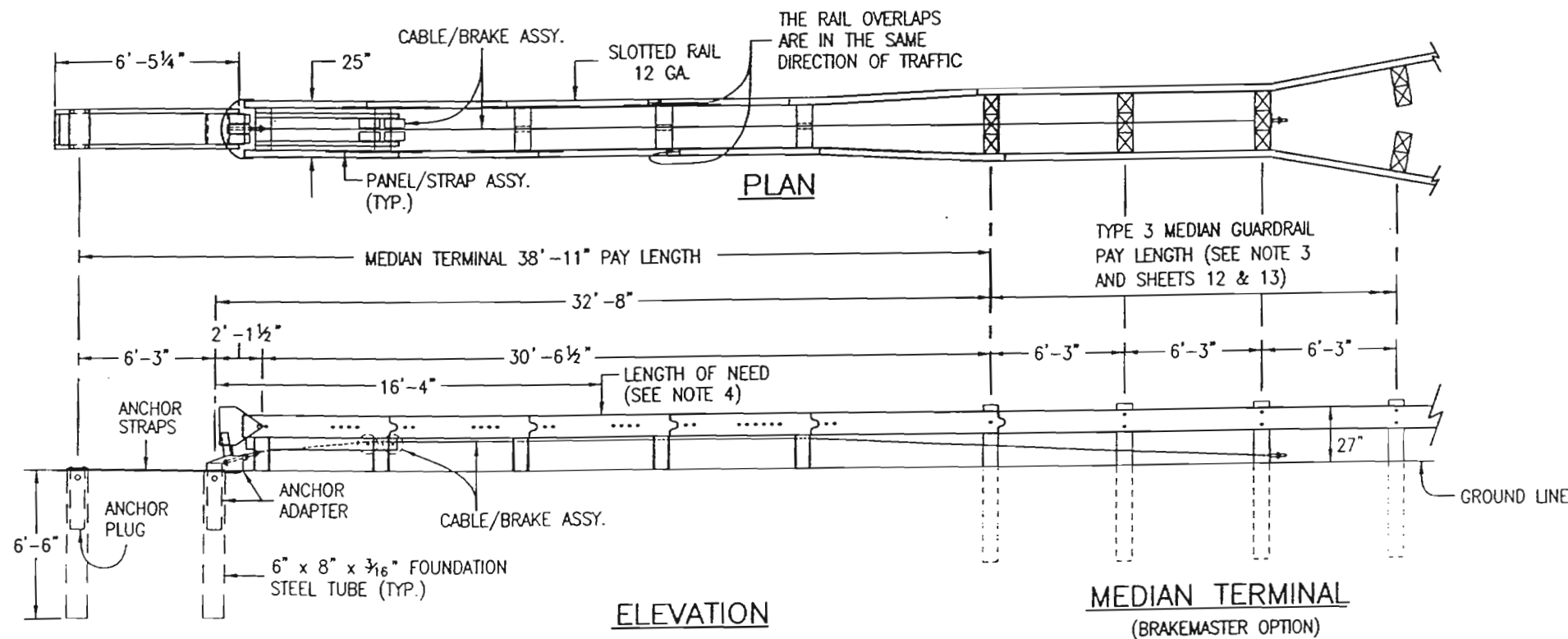
**STANDARD PLAN NO.**  
**M-606-1**  
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**GENERAL NOTES**

1. THE MEDIAN TERMINAL SHALL BE THE C-A-T AS MANUFACTURED BY THE SYRO STEEL COMPANY, CENTERVILLE, UTAH (TEL: 801-292-4461), OR THE BRAKEMASTER AS MANUFACTURED BY ENGERY ABSORPTION SYSTEMS, INC. AND DISTRIBUTED BY INTERWEST SAFETY SUPPLY (TEL: 303-733-8447), OR AN APPROVED EQUAL. ONE MEDIAN TERMINAL SHALL INCLUDED ALL POST, RAIL, AND HARDWARE ITEMS REQUIRED FOR A COMPLETE UNIT. THE DEVICE SHALL BE INSTALLED ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS. THE CONTRACTOR SHALL PROVIDE A COPY OF THE MANUFACTURER'S INSTALLATIONS INSTRUCTIONS AND PARTS LISTS TO THE ENGINEER PRIOR TO THE INSTALLATION OF THE DEVICE.
2. UNLESS OTHERWISE SPECIFIED ON THE PLANS, THE MEDIAN TERMINAL SHALL BE INSTALLED FOR BIDIRECTIONAL TRAFFIC USE.
3. MEDIAN GUARDRAIL POSTS MAY BE STEEL OR WOOD.
4. VEHICLES IMPACTING DOWNSTREAM OF THE LENGTH OF NEED POINT WILL BE REDIRECTED.
5. EACH INSTALLATION SHALL BE SUPERVISED AND CERTIFIED AS CORRECT UPON COMPLETION BY A REPRESENTATIVE OF THE DEVICE MANUFACTURER OR BY AN EMPLOYEE OF THE CONTRACTOR WHO IS A CERTIFIED INSTALLER. THE CERTIFIED INSTALLER SHALL HAVE COMPLETED DEVICE TRAINING AND SHALL BE REGISTERED WITH THE MANUFACTURE AS A CERTIFIED INSTALLER.



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Drawing File Name: 60601091.dwg

Acad Version: R13 Scale: NA Units: English

Standard Plan Revised

Date:	Comments:
04-06-98	Safety/design improvements
05-07-99	Safety/Proprietary improvements

**GUARDRAIL TYPE 3**  
**W - BEAM**

Issued By: Staff Design Branch

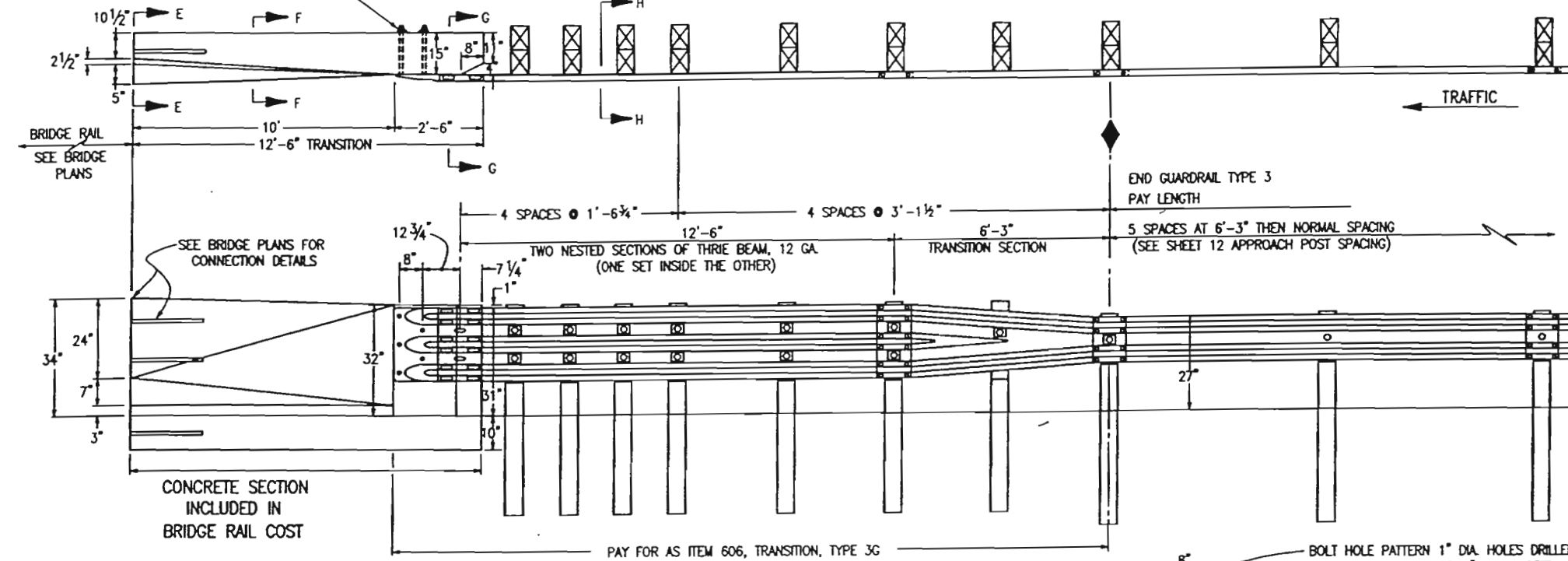
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**STANDARD PLAN NO.**

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Sheet No. 9 of 15

FIVE 7/8" DIA. HIGH ST. HEX HD. BOLTS EACH WITH NUT AND 2 3/4" x 3" x 7/8" WASHER WITH TYPE 3G TRANSITION

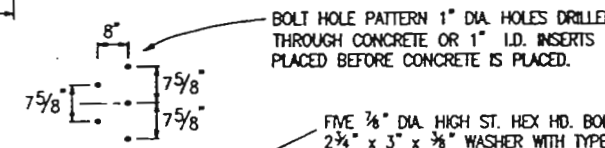
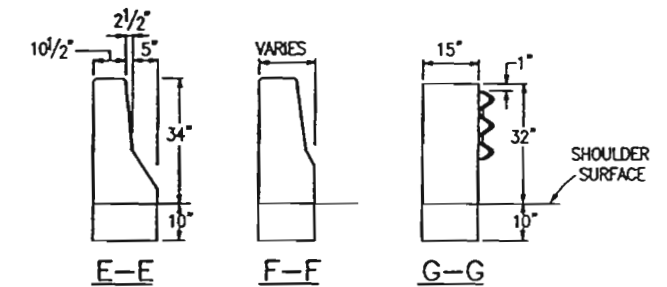


**TYPE 3G TRANSITION**

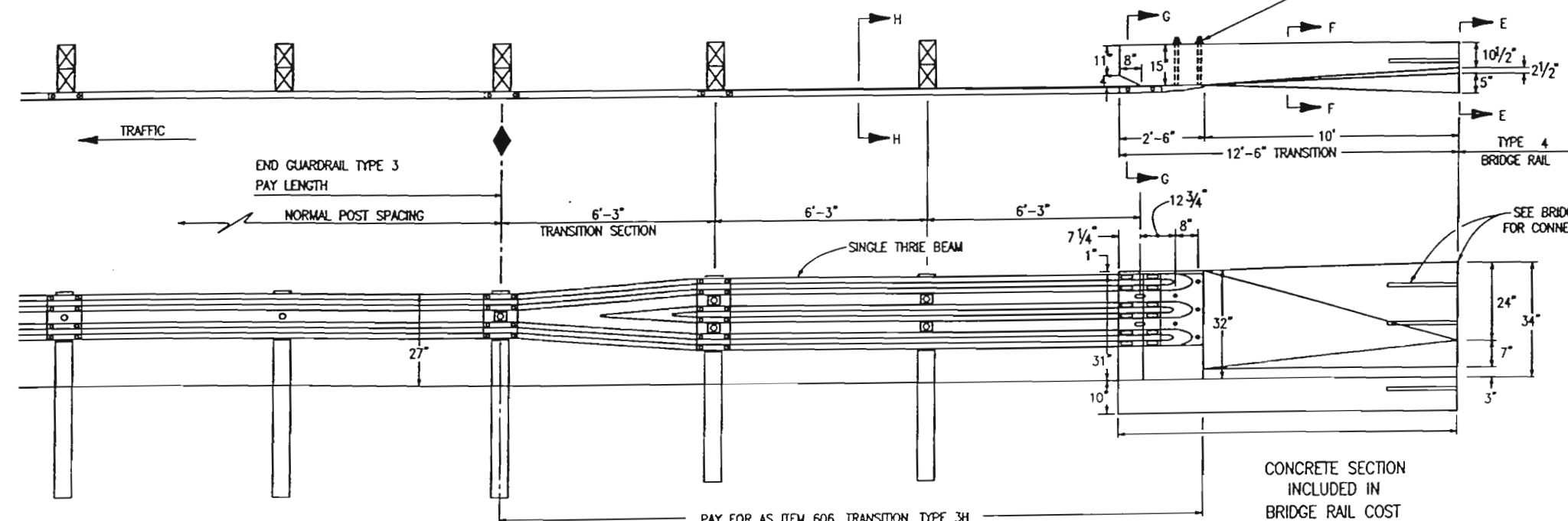
PAY FOR AS ITEM 606, TRANSITION, TYPE 3G

**NOTES FOR TYPES 3G AND 3H**

1. TYPE 3G TRANSITION IS FOR USE AT BOTH ENDS OF BRIDGES ON TWO-WAY ROADS AND AT THE APPROACH END OF BRIDGES ON ONE-WAY ROADS.
2. TYPE 3H TRANSITION IS FOR USE AT THE TRAILING END OF BRIDGES ON ONE-WAY ROADS.
3. THE 12 FT.-6 IN. CONCRETE TRANSITION IS BETWEEN TYPE 3 GUARDRAIL AND TYPE 4 BRIDGE RAIL. SEE STD. PLAN M-606-12 FOR THE TRANSITION BETWEEN TYPE 3 GUARDRAIL AND TYPE 4 GUARDRAIL.
4. TYPE 3G AND TYPE 3H TRANSITION ARE ALSO USED TO CONNECT TO TYPE 8 AND TYPE 10 BRIDGE RAIL. SEE BRIDGE PLANS FOR CONNECTION DETAILS.
5. BACKUP PLATE NOT REQUIRED AT POSTS ON TYPE 3G AND 3H.
6. THIS SHOWS RECTANGULAR WASHER IS REQUIRED UNDER POST BOLT HEAD.



FIVE 7/8" DIA. HIGH ST. HEX HD. BOLTS EACH WITH NUT AND 2 3/4" x 3" x 7/8" WASHER WITH TYPE 3H TRANSITION

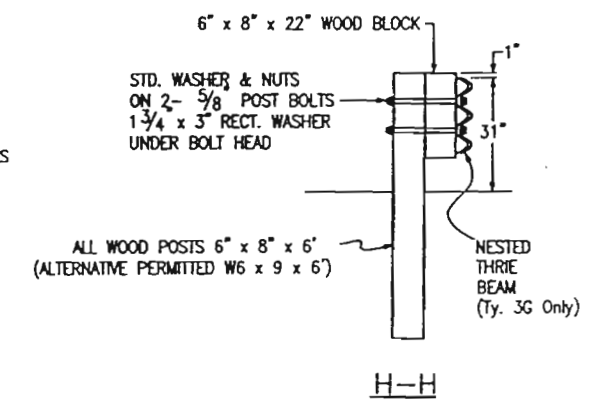


**TYPE 3H TRANSITION**

(For use at trailing end of bridges on one-way roadways)

PAY FOR AS ITEM 606, TRANSITION, TYPE 3H

CONCRETE SECTION INCLUDED IN BRIDGE RAIL COST



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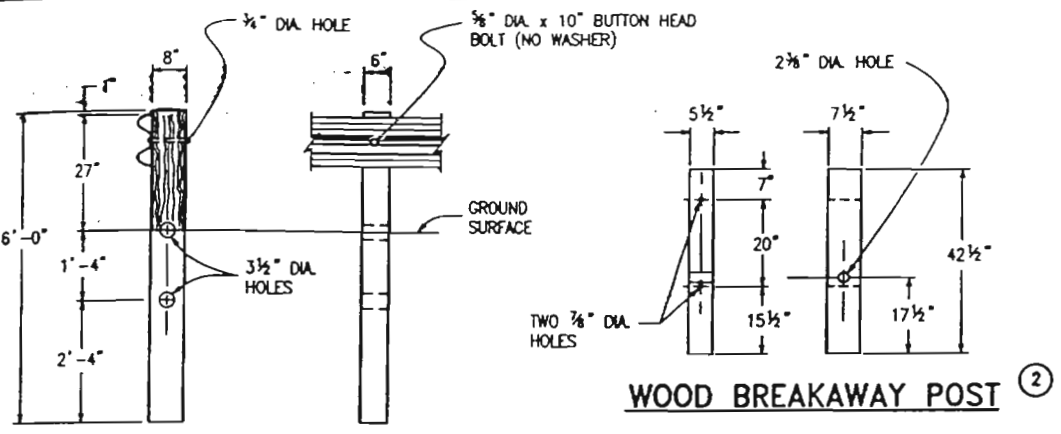
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Standard Plan Revised  
 Date: 04-06-98 Comments: Safety/Design Improvements  
 05-07-99 Safety/Proprietary Improvements

**GUARDRAIL TYPE 3**  
**W - BEAM**  
 Issued By: Staff Design Branch November 1, 1992

**STANDARD PLAN NO.**  
**M-606-1**  
 Sheet No. 10 of 15



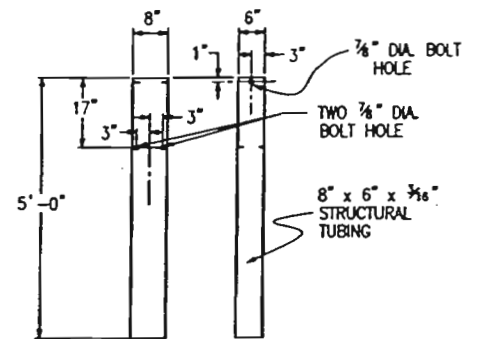


**WOOD BREAKAWAY POST (2)**

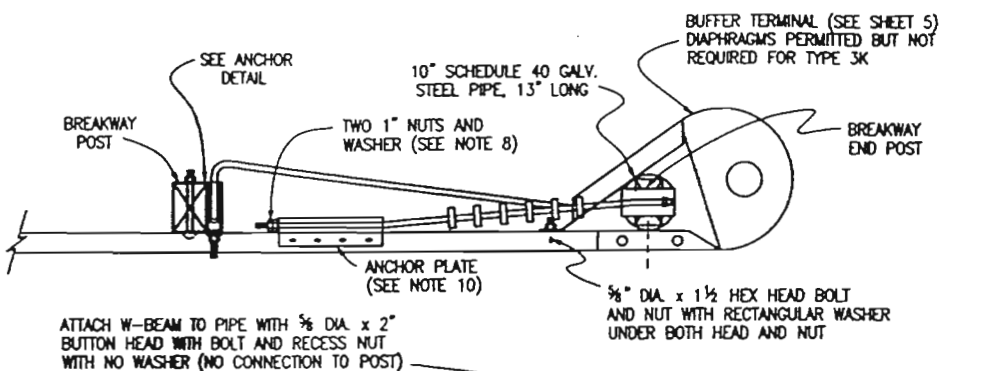
**CONTROLLED RELEASING TERMINAL (CRT) POST (1)**

POST	DIMENSIONS	TYPE
①	6" x 8" x 6"	CRT
②	5 1/2" x 7 1/2" x 42 1/2"	BREAKAWAY

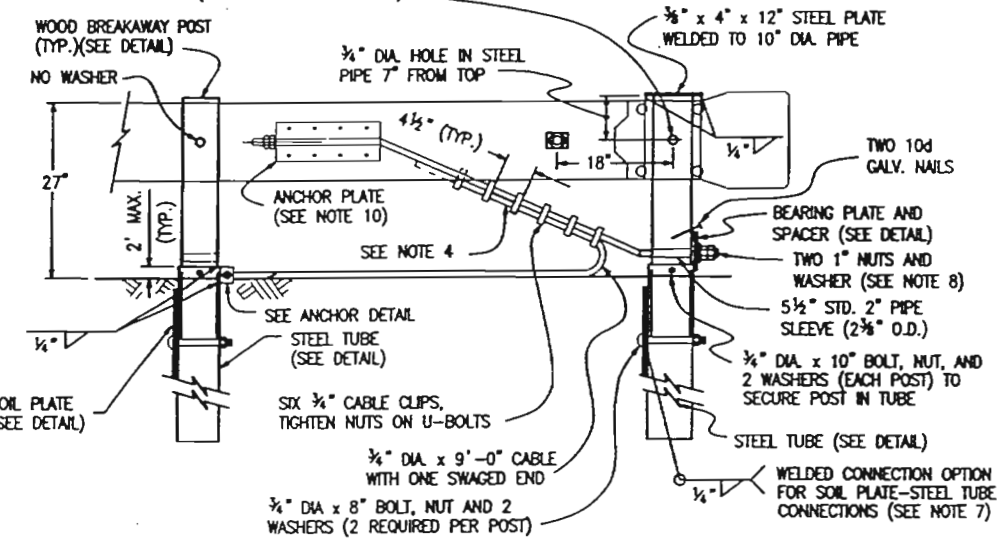
**POSTS**



**STEEL TUBE**

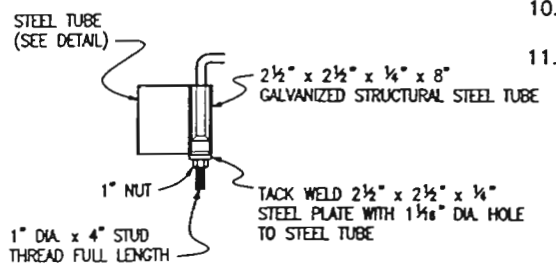


**LOW SPEED TERMINAL - TYPE 3K**

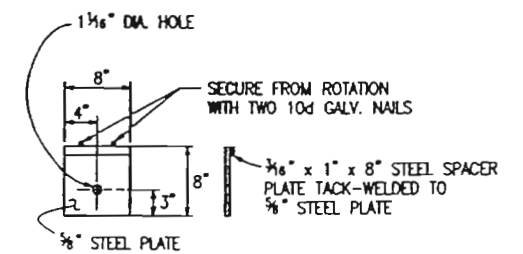


**TYPE 3J APPLICATION**

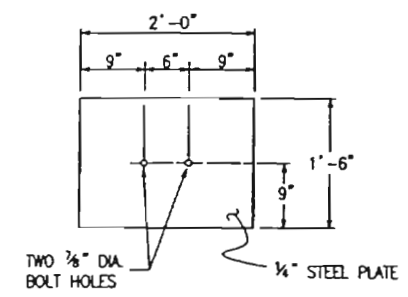
RADIUS	ANGLE	NO. CRT POSTS	AREA FREE OF FIXED OBJECTS		CURVED RAIL FOR ANGLE		
			L	W	75%	90%	105%
8'-6"	75%-105%	5	25'	15'	11'	13'	15'
	75%-90%	6					
17'	91%-105%	7	30'	15'	22'	27'	31'
	75%-85%	7					
25'-6"	86%-95%	8	40'	20'	33'	40'	47'
	96%-105%	9					
35'	75%-85%	9					
	86%-95%	10	50'	20'	46'	55'	64'
	96%-105%	11					



**ANCHOR DETAIL**

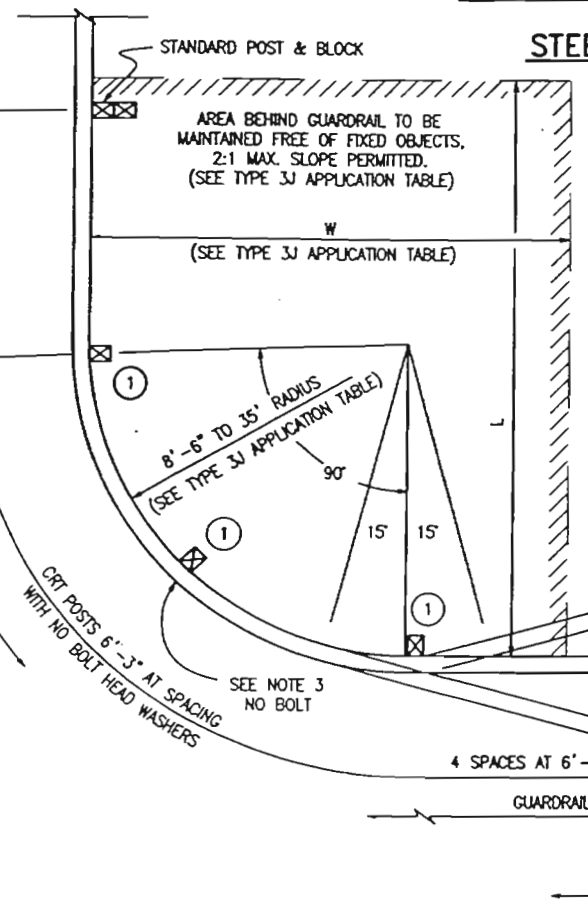


**BEARING PLATE FOR STEEL TUBE**



**SOIL PLATE**

GUARDRAIL TYPE 3 OR 18'-9" FOR ANCHORAGE TYPE 3J OR TYPE 3K (SEE PLANS)

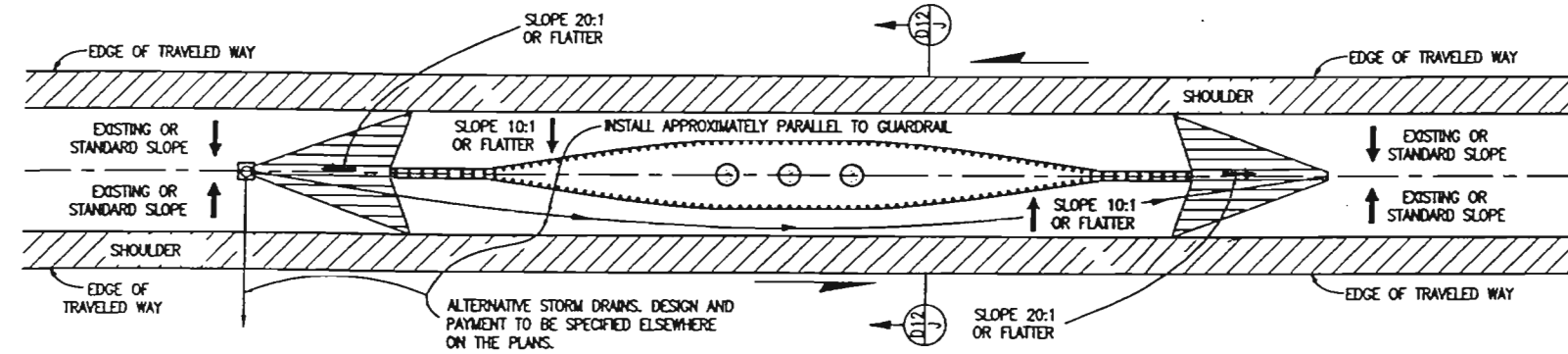
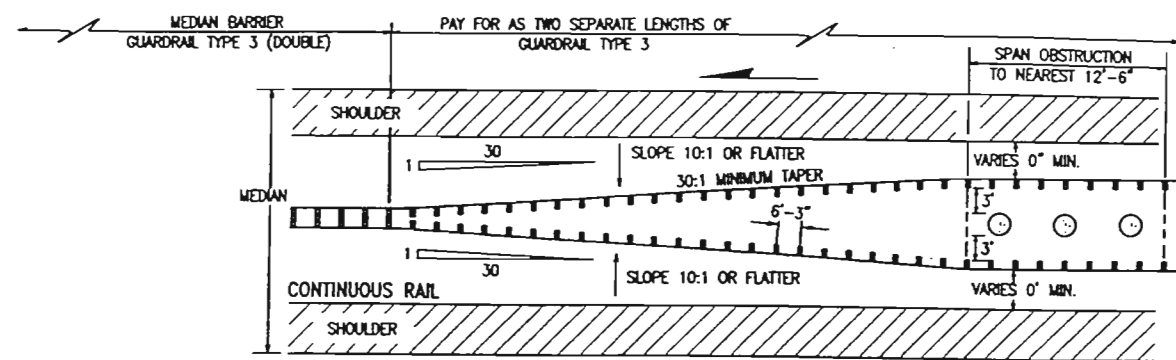
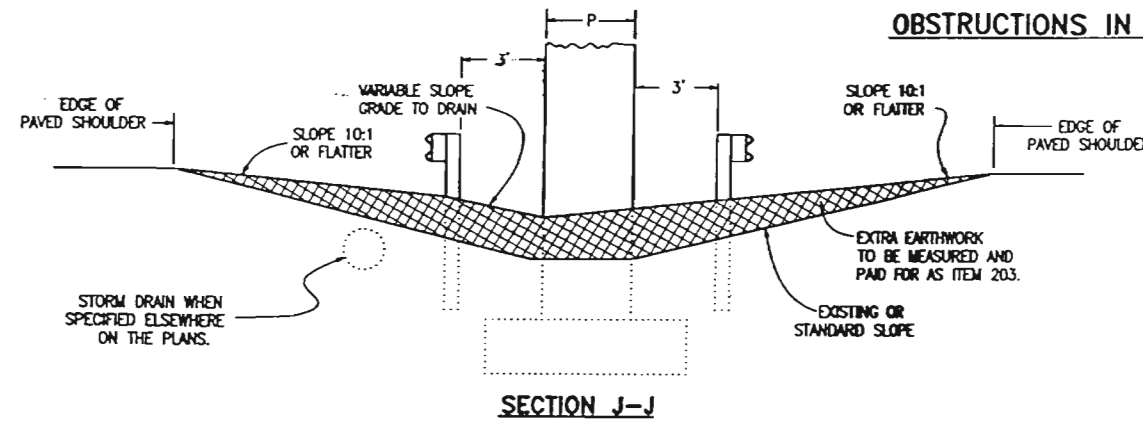


**INTERSECTING ROADWAYS TRANSITION - TYPE 3J END ANCHORAGE**

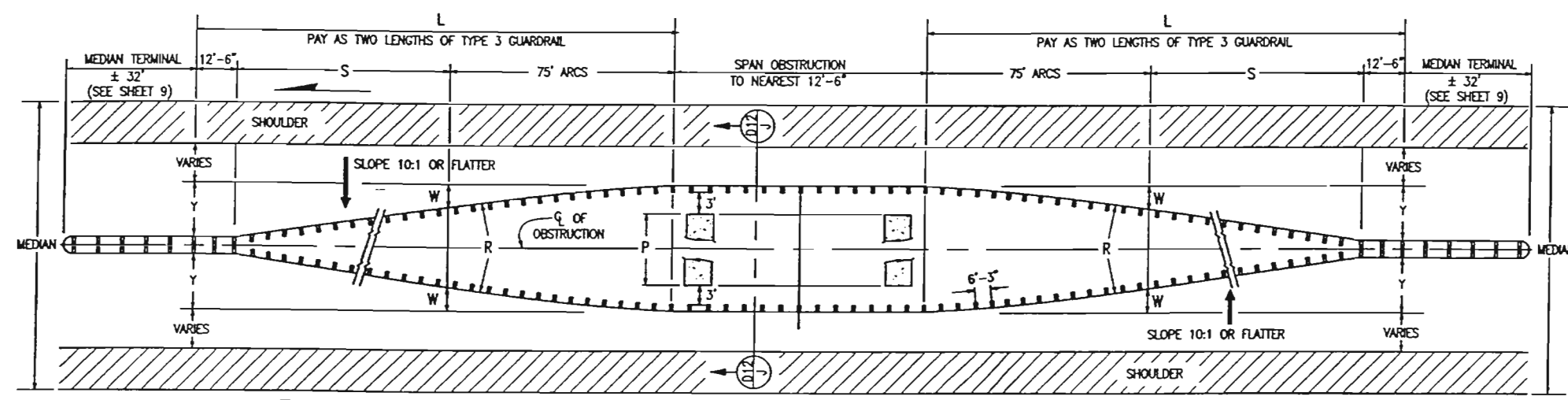
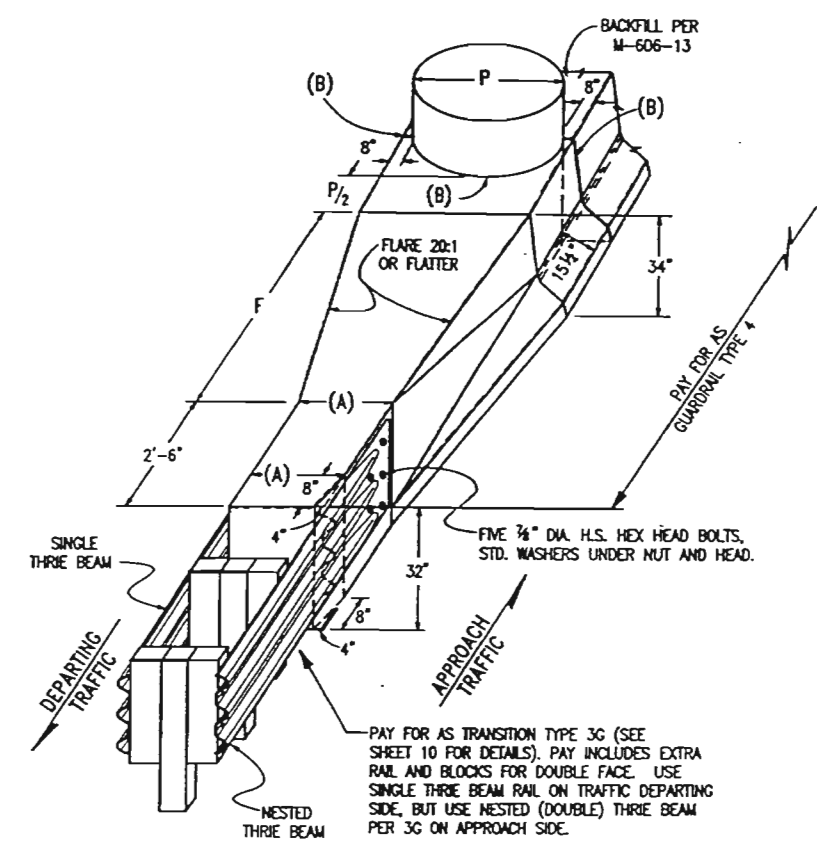
**GENERAL NOTES**

- APPLICATION: THE TYPE 3J END ANCHORAGE MAY BE USED TO SHIELD HAZARDS AT THE INTERSECTION OF TWO ROADWAYS. TYPICAL APPLICATIONS INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
  - CANAL SERVICE ROADS AT BRIDGE ENDS.
  - INTERRUPTIONS IN GUARDRAIL RUNS BY INTERSECTING ROADWAYS, ETC..
 THE LOW SPEED TYPE 3K END ANCHORAGE SHALL BE USED ONLY ON DRIVEWAYS AND LOW SPEED SERVICE ROADS. WHENEVER AN APPROVED CRASH-TESTED END TREATMENT IS REQUIRED, USE THE FLARED OR NONFLARED TERMINAL WITH 37 FT.-6 IN. LENGTH.
- GRADING AND PAVING FOR THE 3J & 3K SHALL MATCH THE GRADING AND PAVING OF THE GUARDRAIL THAT THEY ARE ATTACHED TO AND SHALL BE IN ACCORDANCE WITH SHEET ONE OF THIS STANDARD. MAX. FILL SLOPE SHALL BE 2:1.
- THE RAIL IS NOT BOLTED TO THE CRT POST AT THE CENTER OF THE CURVE FOR THE 8 FT.-6 IN., 17 FT., AND 25 FT.-6 IN. RADII. PLATES SHALL CONFORM TO ASTM A 36M, AND THE STRUCTURAL TUBING TO ASTM A 500.
- THE 3/4 IN. GALVANIZED WIRE ROPE (CABLE) SHALL CONFIRM TO THE REQUIREMENTS OF AASHTO M 30 TYPE II.
- PLATES SHALL CONFORM TO ASTM A 36, AND STRUCTURAL TUBING TO ASTM A 500. WELDING SHALL MEET ALL REQUIREMENTS OF THE AMERICAN WELDING SOCIETY.
- ALL STRUCTURAL STEEL SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A 123. NO PUNCHING, DRILLING, CUTTING OR WELDING WILL BE PERMITTED AFTER GALVANIZING.
- WHEN THE SOIL PLATE WELDED OPTION IS SELECTED, SOIL PLATE CONNECTION BOLT HOLES ARE NOT REQUIRED.
- OUTSIDE NUT SHALL BE TORQUED AGAINST INSIDE NUT WITH THE CABLE INSTALLED TAUT BETWEEN THE ANCHOR PLATE AND FIRST POST.
- ALL CURVED GUARDRAIL SHALL BE SHOP BENT.
- SEE SHEET 5 FOR ANCHOR PLATE AND OTHER DETAILS.
- THE STEEL TUBE MAY BE DRIVEN WITH WOOD POST INSERTED IF NO DAMAGE OCCURS TO THE POST OR BOLTS.

**OBSTRUCTIONS IN MEDIANS**



**OBSTRUCTION IN MEDIAN 30 FT. WIDE OR LESS**



P	1'	2'	3'	4'	5'	6'	7'	8'	9'	10'	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'	21'	22'	
Y	4.1'	4.6'	5.1'	5.6'	6.1'	6.6'	7.1'	7.6'	8.1'	8.6'	9.1'	9.6'	10.1'	10.6'	11.1'	11.6'	12.1'	12.6'	13.1'	13.6'	14.1'	14.6'	
W	1.4'	1.9'	2.4'	2.9'	3.4'	3.9'	3.3'	3.7'	4.1'	3.6'	3.9'	3.5'	3.7'	4.0'	3.6'	3.8'	4.0'	3.7'	3.9'	3.6'	3.8'	4.0'	
R	2009'	1480'	1171'	969'	827'	720'	852'	760'	685'	781'	720'	803'	760'	702'	781'	739'	702'	760'	720'	781'	739'	702'	
S	25'		37'-6"					50'			62'-6"			75'			87'-6"			100'			
L	112'-6"						125'			137'-6"			150'			162'-6"			175'			187'-6"	

P	F
1'	10'
2'	18'
3'	28'
4'	38'
5'	48'

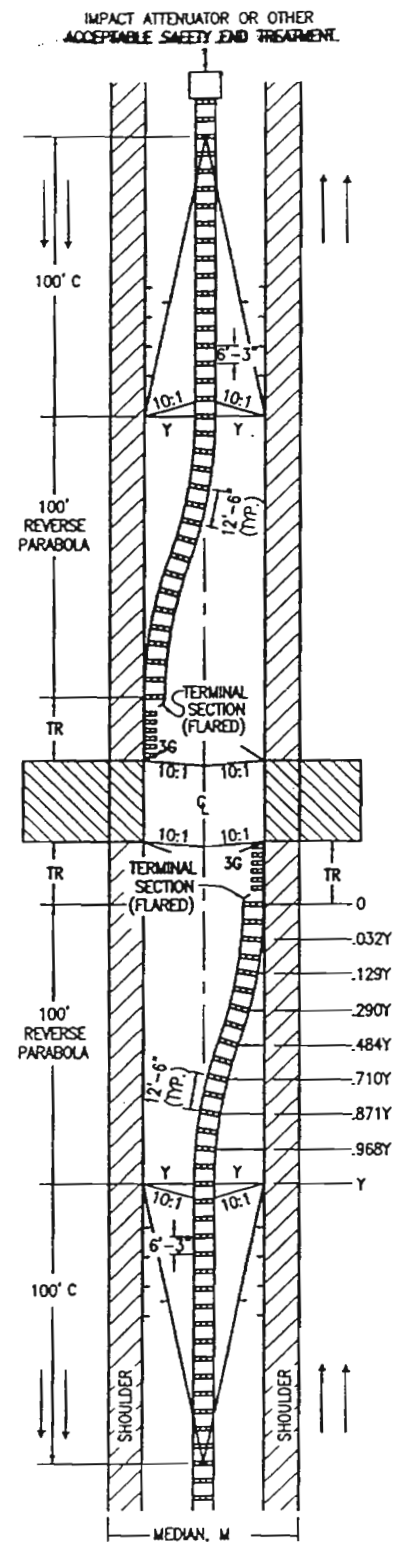
- (A). TIMBER POSTS 2 FT., STEEL POSTS 1 FT.-6 IN.
- (B). 1/2 IN. PREFORMED JOINT MATERIAL

**NARROW MEDIAN DETAIL**  
USUALLY LESS THAN 30 FT. WIDE MEDIAN WITH ALL PAVED SURFACE

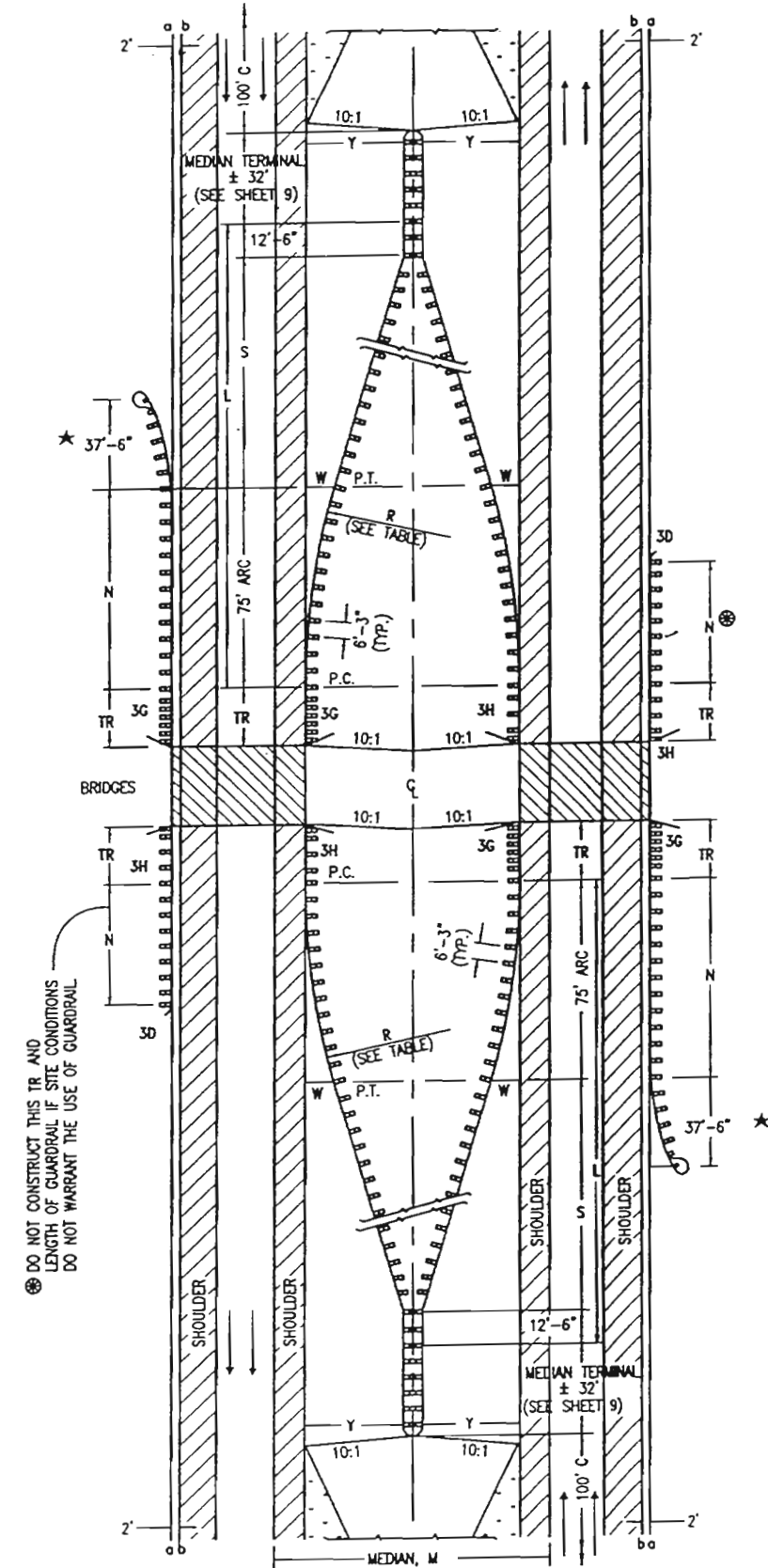
**GUARDRAIL FOR OBSTRUCTION IN MEDIANS WIDER THAN 30 FT.**

NOTE: FOR OBSTRUCTIONS WIDER THAN 22 FT. USE THE DETAILS SHOWN ON SHEET 13 FOR MEDIANS WIDER THAN 30 FT.

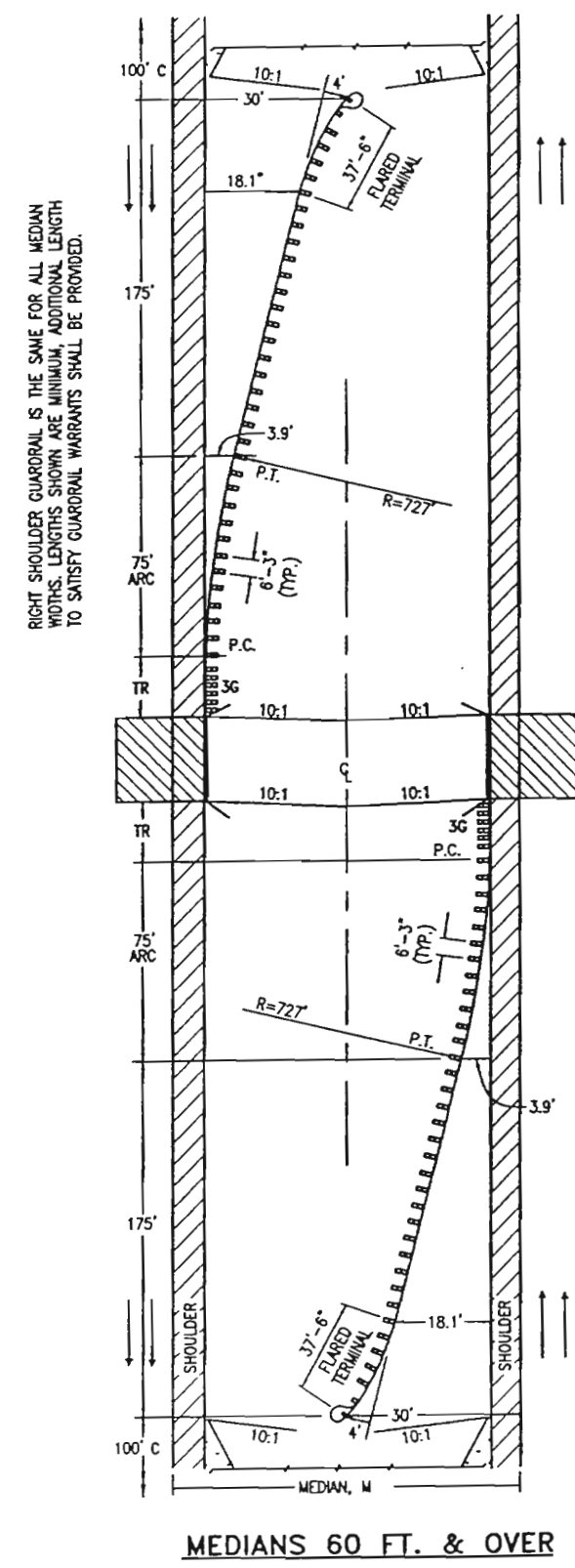
<p>Colorado Department of Transportation 4201 East Arkansas Avenue Denver, Colorado 80222 Phone: (303) 757-9083 FAX: (303) 757-9868 Staff Design WRS</p>	<p>Computer File Information</p> <p>Full Path: <a href="http://www.dot.state.co.us/business/design/standards/mstandards/">www.dot.state.co.us/business/design/standards/mstandards/</a></p> <p>Drawing File Name: 60601121.dwg</p> <p>Acad Version: R13 Scale: NA Units: English</p>	<p>Standard Plan Revised</p> <p>Date: 04-06-98 Comments: Safety/Design Improvements</p> <p>05-07-99 Safety/Proprietary Improvements</p>	<p><b>GUARDRAIL TYPE 3</b> <b>W - BEAM</b></p> <p>Issued By: Staff Design Branch November 1, 1992</p>	<p><b>STANDARD PLAN NO.</b> <b>M-606-1</b> Sheet No. 12 of 15</p>
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21 FT. - 30 FT. MEDIANS



31 FT. - 59 FT. MEDIANS



MEDIANS 60 FT. & OVER

31 FT. - 59 FT. MEDIANS

MEDIAN M FT.	END Y FT.	ARC. W FT.	RADIUS R FT.	EXTENS. S FT.	LENGTH L FT.
31	10.5	3.9	720	62.5	150.0
32	11.0	4.2	669		
33	11.5	3.8	739		
34	12.0	4.0	702	75.0	162.5
35	12.5	4.2	669		
36	13.0	3.9	720	87.5	175.0
37	13.5	4.1	685		
38	14.0	3.8	739		
39	14.5	3.9	720	100.0	187.5
40	15.0	4.1	685		
41	15.5	3.9	720		
42	16.0	4.0	702	112.5	200.0
43	16.5	4.2	669		
44	17.0	3.9	720	125.0	212.5
45	17.5	4.0	702		
46	18.0	3.8	739		
47	18.5	4.0	702	137.5	225.0
48	19.0	4.1	685		
49	19.5	3.9	720		
50	20.0	4.0	702	150.0	237.5
51	20.5	4.1	685		
52	21.0	3.0	720	162.5	250.0
53	21.5	4.0	702		
54	22.0	3.9	739		
55	22.5	4.0	702	175.0	262.5
56	23.0	4.1	685		
57	23.5	3.0	739		
58	24.0	4.0	702	187.5	275.0
59	24.5	4.1	685		

- ⊗ = DO NOT CONSTRUCT THE TR AND GUARDRAIL ON THE TRAILING BRIDGE ENDS IF SITE CONDITIONS DO NOT WARRANT RAIL THERE.
- N = SHOWN ON PLANS. LENGTH TO SHIELD ALL HAZARDS IS BASED ON GUARDRAIL'S LENGTH OF NEED COMPUTATION, SEE AASHTO ROADWAY DESIGN GUIDE. MINIMUM 12 FT. - 6 IN., WHERE SITE CONDITIONS ALLOW. THE TOTAL LENGTH OF NEED WILL INCLUDE THE LENGTH OF TRANSITION, THE LENGTH OF RAIL (N), AND ANY REDIRECTIVE LENGTH IN THE RAIL END TREATMENT.
- ▽ = THE TABLE IS BASED ON 4 FT. SHOULDER.
- a = EDGE OF 8 FT. OR 10 FT. SHOULDER.
- b = EDGE OF 6 FT. OR LESS SHOULDER.
- C = CHANGE: 100 FT. TRANSITION TO NORMAL SLOPE.
- R = RADIUS OF 75 FT. ARC.
- S = STRAIGHT EXTENSION, TANGENT TO ARC, FROM W TO GUARDRAIL TYPE 3 (DOUBLE) ATTACHED TO MEDIAN TERMINAL.
- TR = 18 FT. - 9 IN. FOR 3G AND 3H.
- W = OFFSET AT END OF ARC.
- Y = FINAL OFFSET AT END.
- L = TOTAL LENGTH PAID FOR AS GUARDRAIL TYPE 3.
- M = WIDTH OF MEDIAN.
- ★ = CAN USE FLARED OR NONFLARED TERMINAL.

MULTILANE DIVIDED HIGHWAYS - (DEPRESSED MEDIAN)

Colorado Department of Transportation



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Computer File Information

Full Path: [www.dot.state.co.us/business/design/standards/mstandards/](http://www.dot.state.co.us/business/design/standards/mstandards/)  
 Drawing File Name: 60601131.dwg

Acad Version: R13 Scale: NA Units: English

Standard Plan Revised

Date: 04-06-98  
 Comments: Safety/Design Improvements  
 05-07-99 Safety/Proprietary Improvements

GUARDRAIL TYPE 3  
 W - BEAM

Issued By: Staff Design Branch

STANDARD PLAN NO.

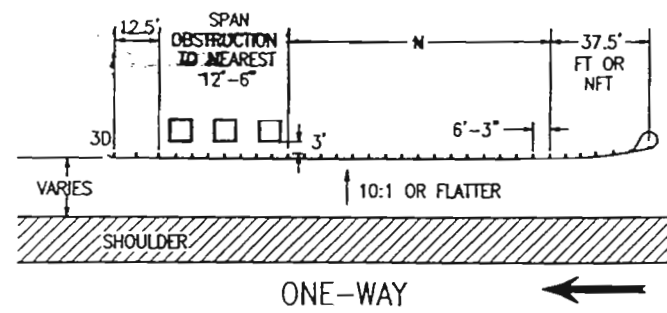
M-606-1

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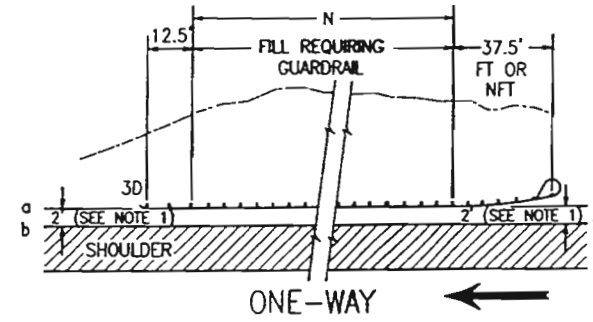
November 1, 1992

### GENERAL NOTES

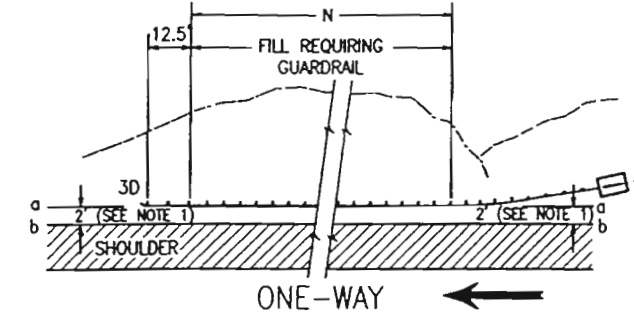
1. THE 2 FT. OFFSET FROM THE EDGE OF THE PAVED SHOULDER TO THE FACE OF THE GUARDRAIL (FOR SHOULDERS 6 FT. OR LESS IN WIDTH) IS DESIRABLE BUT NOT MANDATORY WHEN THE ROADWAY DESIGN SPEED IS LESS THAN 50 MPH. THE MINIMUM OFFSET OF GUARDRAIL FROM THE EDGE OF TRAVELED WAY IS 4 FT. "a" IS THE EDGE OF AN 8 FT. OR 10 FT. SHOULDER. "b" IS THE EDGE OF AN 6 FT. OR LESS SHOULDER. SEE NOTES AND DETAILS ON SHEETS 1, 13, & 15.
2. THE TYPE 3G OR 3H TRANSITIONS (SHEET 10) SHALL BE USED TO CONNECT A TYPE 3 W-BEAM TO A TYPE 4 CONCRETE BARRIER OR TO A TYPE 4, 8, OR 10 BRIDGE RAIL. FOR A TRANSITION FROM A ROADWAY TYPE 3 W-BEAM TO A BRIDGE RAIL TYPE 3 WITH BACKING TUBES, THE TYPE 3L TRANSITION SHOWN ON SHEET 15 SHALL BE USED.
3. "TR" WILL BE 18 FT.-9 IN. FOR THE TRANSITIONS TYPE 3G AND 3H, AND 25 FT. FOR THE TYPE 3L TRANSITION.
4. "FT" IS THE FLARED TERMINAL AND "NFT" IS THE NONFLARED TERMINAL.
5. THE GUARDRAIL LENGTH DIMENSION "N" IS THE LENGTH AS DETERMINED BY THE LENGTH OF NEED COMPUTATION AND IS SHOWN ON THE PLANS. THE MINIMUM IS 12 FT.-6 IN. WHERE SITE CONDITIONS ALLOW. THE OVERALL REQUIRED LENGTH OF NEED CAN INCLUDE THE LENGTH OF TRANSITION, THE LENGTH OF RAIL (N), AND ANY REDIRECTIVE LENGTH IN THE RAIL END TREATMENT.



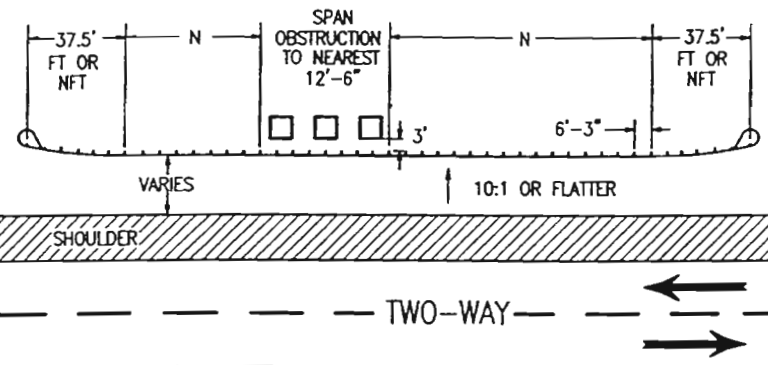
ONE-WAY



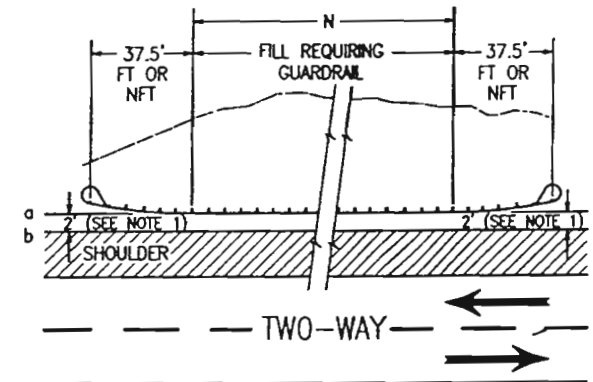
ONE-WAY



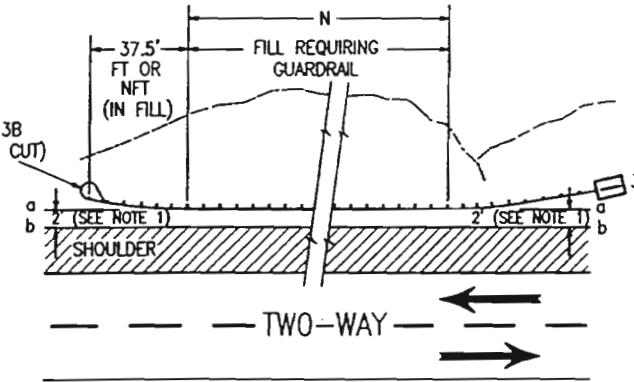
ONE-WAY



TWO-WAY



TWO-WAY

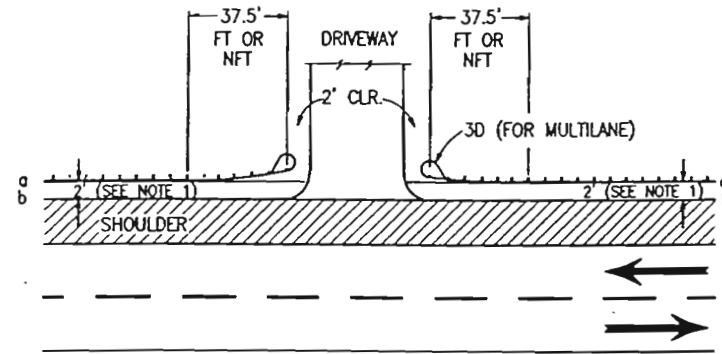


TWO-WAY

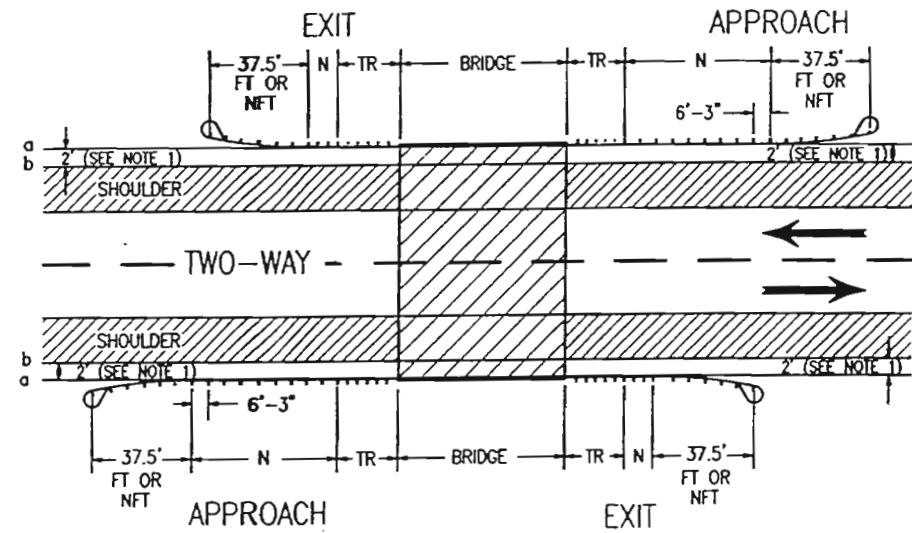
GUARDRAIL FOR ROADSIDE OBSTRUCTIONS

GUARDRAIL FOR ROADSIDE FILL CONSTRUCTION

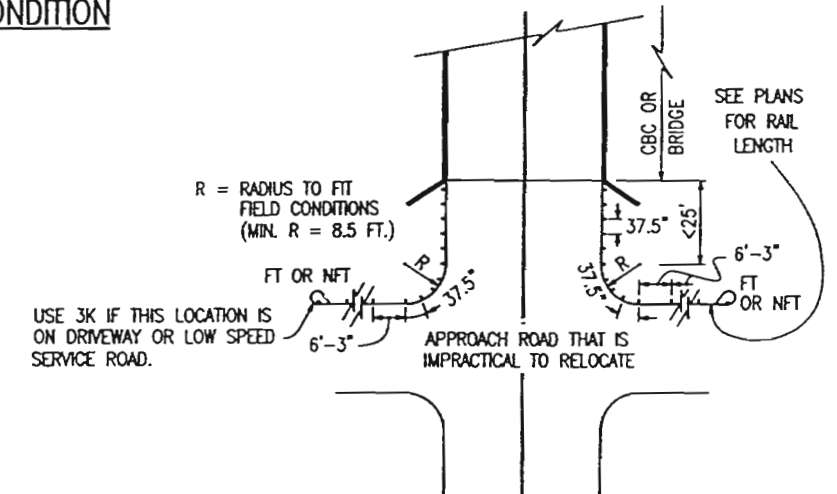
GUARDRAIL FOR ROADSIDE CUT-TO-FILL CONDITION



LAYOUT FOR DRIVEWAY APPROACH



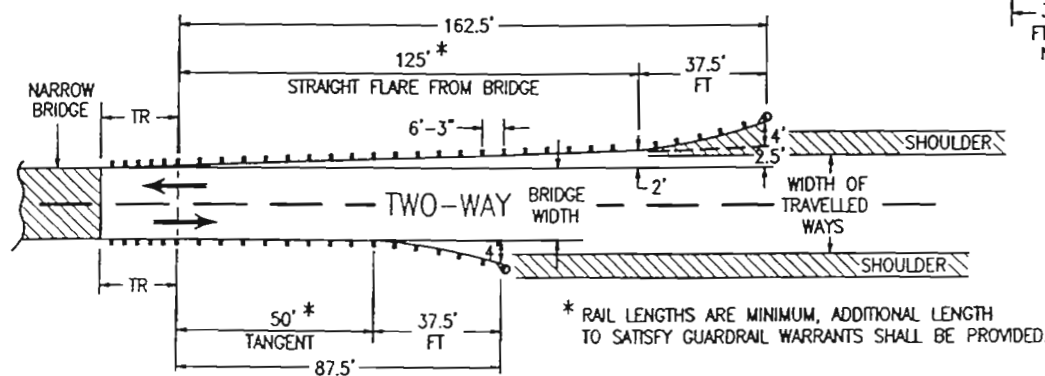
2-WAY NORMAL BRIDGE APPLICATION



TYPE 3 GUARDRAIL WITH BLOCKED OUT POSTS SPACED AT 37 FT.-1/2 IN. FROM STRUCTURE AROUND CURVE.

INTERRUPTED STRUCTURE APPROACH

(USE TYPE 3J ON SHEET 11 WHEN PRACTICAL)



2-WAY NARROW APPLICATION

\* RAIL LENGTHS ARE MINIMUM, ADDITIONAL LENGTH TO SATISFY GUARDRAIL WARRANTS SHALL BE PROVIDED.

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Drawing File Name: 60601141.dwg

Acad Version: R13 Scale: NA Units: English

Standard Plan Revised

Date: 04-06-98  
Comments: Safety/Design Improvements  
05-07-99 Safety/Proprietary Improvements

GUARDRAIL TYPE 3  
W - BEAM

Issued By: Staff Design Branch

STANDARD PLAN NO.

M-606-1

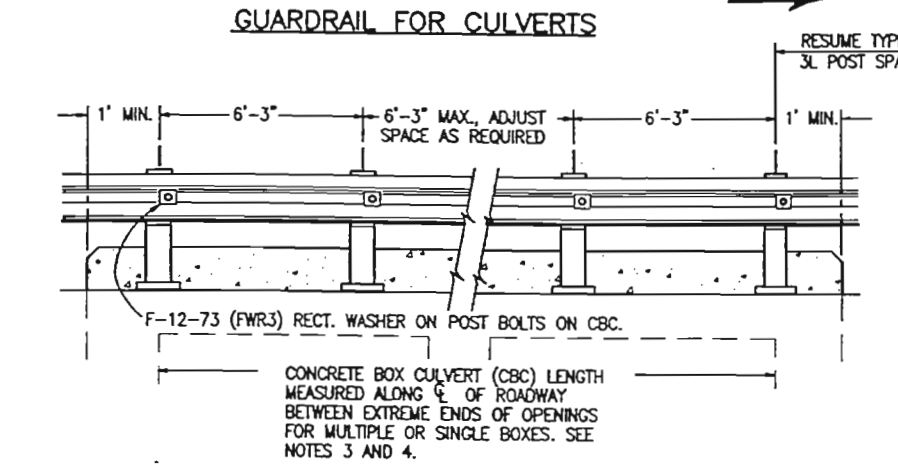
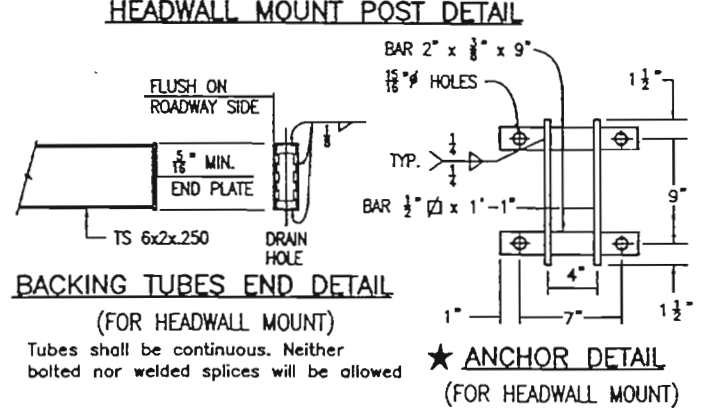
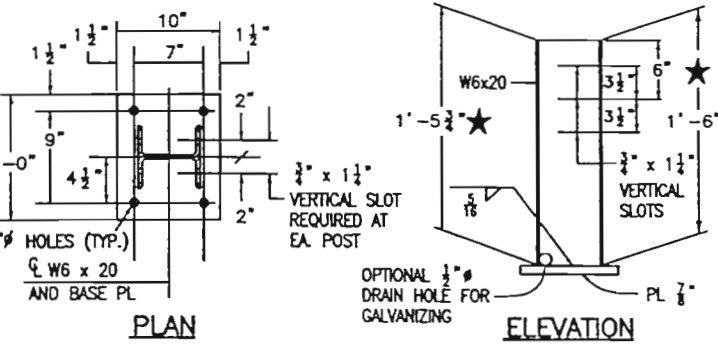
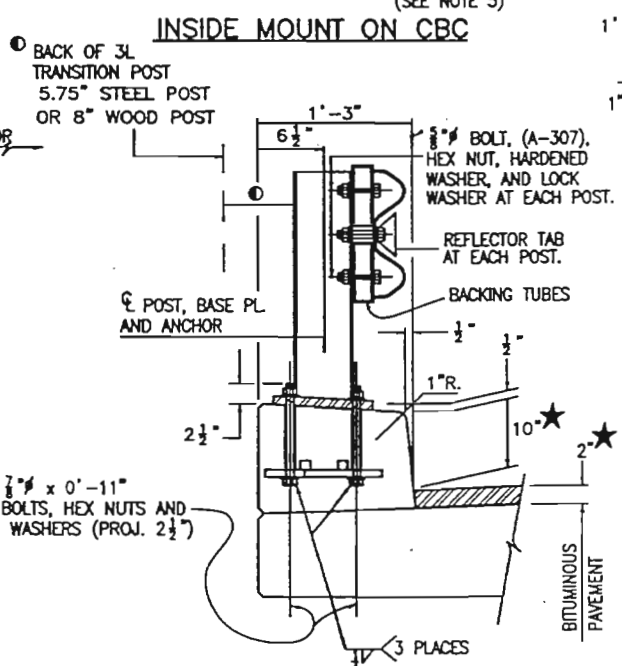
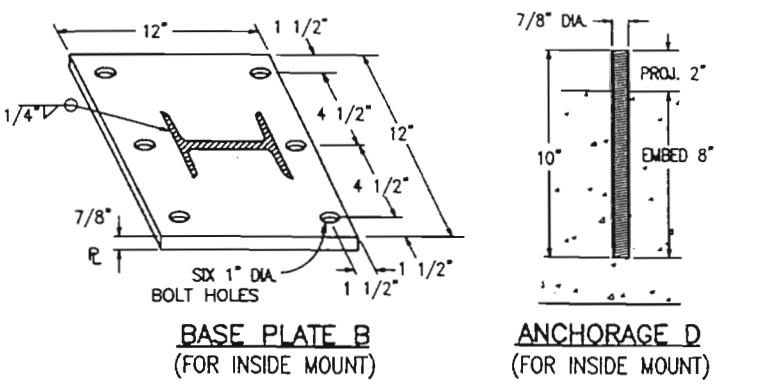
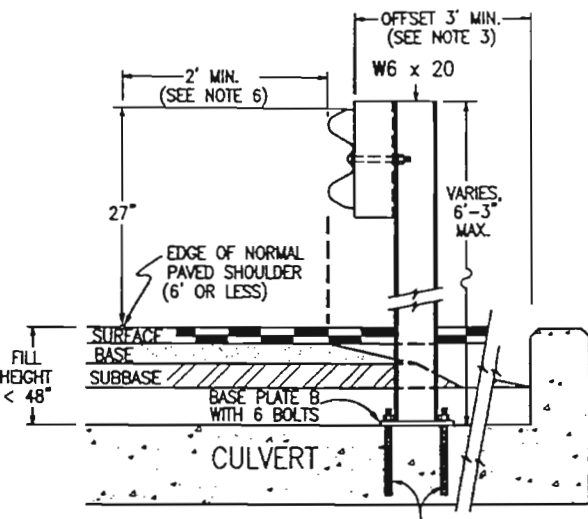
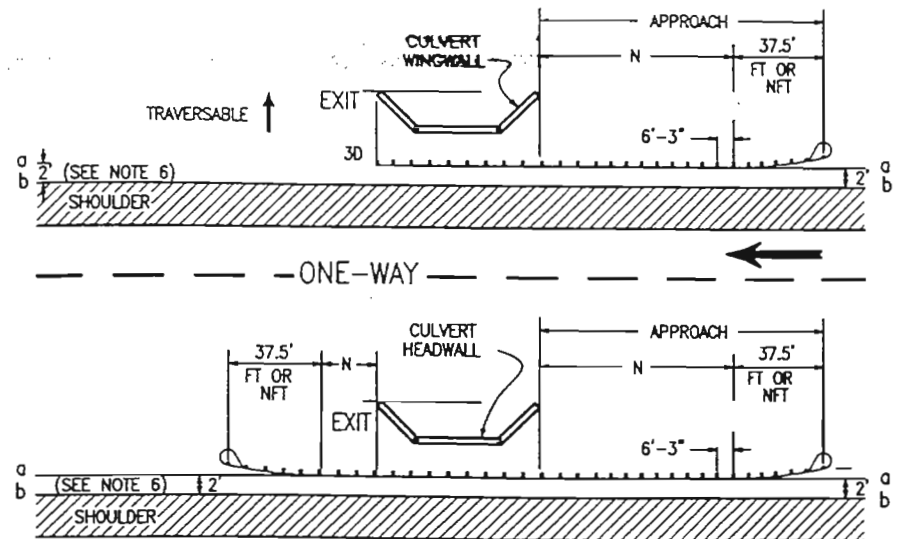
Sheet No. 14 of 15

November 1, 1992

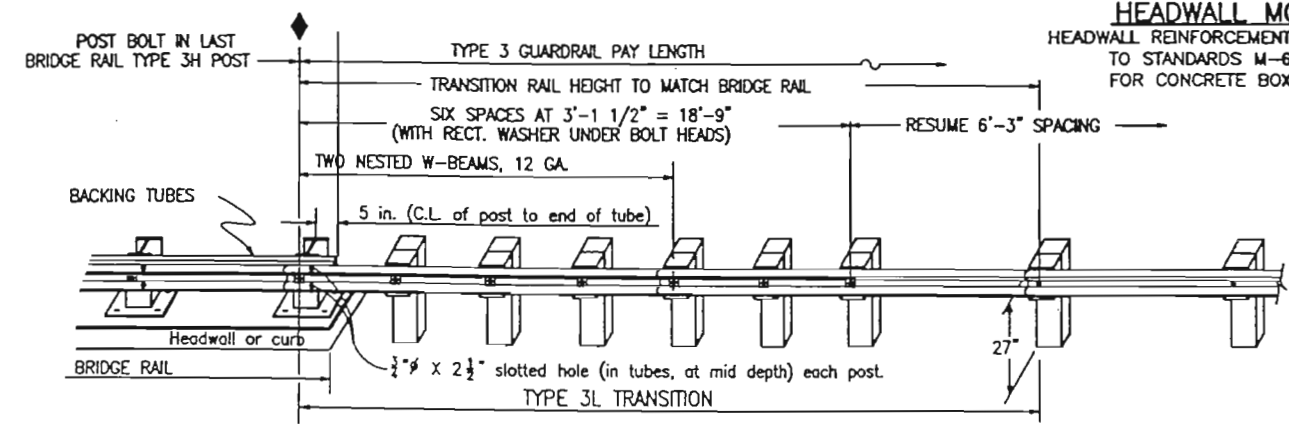


**GENERAL NOTES**

- LOCATION AND LENGTH OF MEDIAN GUARDRAIL APPROACHES TO CULVERTS WITH FULL HEADWALL AND WINGWALLS SHALL BE AS SHOWN FOR BRIDGES ON SHEET 13. THE TYPE 3 GUARDRAIL SHALL CONTINUE ACROSS THE CULVERT AS SHOWN ON THIS SHEET.
- RIGHT SHOULDER BOX CULVERT TREATMENT IS SHOWN ON THIS SHEET FOR CULVERTS 20 FT. OR LESS IN LENGTH.
- GUARDRAIL ACROSS CULVERTS WITH A LENGTH OF 20 FT. OR LESS SHALL BE AS FOLLOWS:
  - FILL HEIGHT AT GUARDRAIL POST 48 IN. OR GREATER: CONSTRUCTION AND PAYMENT AS GUARDRAIL TYPE 3.
  - FILL HEIGHT AT GUARDRAIL LESS THAN 48 IN. & BLOCK FACE TO HEADWALL OFFSET OF 3 FT. OR GREATER. CONSTRUCTION AND PAYMENT AS GUARDRAIL TYPE 3.
  - FILL HEIGHT AT GUARDRAIL POST 48 IN. OR LESS AND BLOCK FACE TO HEADWALL OFFSET LESS THAN 3 FT. CONSTRUCT ACCORDING TO HEADWALL MOUNT DETAILS. PAY FOR AS BRIDGE RAIL TYPE 3H.
- GUARDRAIL ACROSS CULVERTS WITH LENGTH GREATER THAN 20 FT. SHALL BE AS FOLLOWS:
  - FILL HEIGHT AT GUARDRAIL POSTS 48 IN. OR GREATER: CONSTRUCTION AND PAYMENT WILL BE FOR STANDARD GUARDRAIL TYPE 3.
  - FILL HEIGHT AT GUARDRAIL POSTS 47 IN. OR LESS CONSTRUCTION AND PAYMENT IN ACCORDANCE WITH THE CONTRACT BRIDGE PLANS.
- ANCHORAGE D: SIX BOLTS FOR BASE PLATE "B" WITH INSIDE MOUNT. THE BOLTS SHALL BE 7/8 IN. DIA. x 10 IN. HIGH STRENGTH RODS THREADED FULL LENGTH AND ALL GALVANIZED. RODS SHALL BE CAST-IN-PLACE FOR A NEW STRUCTURE. FOR AN EXISTING STRUCTURE, THE RODS SHALL BE INSTALLED IN 1-1/4 IN. DIA. HOLES WITH NON-SHRINK GROUT OR EPOXY PER ASTM C 881.
- THE 2 FT. OFFSET FROM THE EDGE OF THE PAVED SHOULDER TO THE FACE OF THE GUARDRAIL (FOR SHOULDERS 6 FT. OR LESS IN WIDTH) IS DESIRABLE BUT NOT MANDATORY WHEN THE ROADWAY DESIGN SPEED IS LESS THAN 50 MPH. THE MINIMUM OFFSET OF GUARDRAIL FROM THE EDGE OF TRAVELED WAY IS 4 FT. SEE NOTES AND DETAILS ON SHEETS 1, 13, AND 14.
- TYPE 3L POSTS SHALL BE STEEL OR WOOD TO MATCH POSTS USED ON THE APPROACH GUARDRAIL.
- "FT" IS THE FLARED TERMINAL AND "NFT" IS THE NONFLARED TERMINAL.
- THE GUARDRAIL LENGTH DIMENSION "N" IS THE LENGTH AS DETERMINED BY THE LENGTH OF NEED COMPUTATION AND IS SHOWN ON THE PLANS. THE MINIMUM IS 12 FT.-6 IN. WHERE SITE CONDITIONS ALLOW. THE OVERALL REQUIRED LENGTH OF NEED CAN INCLUDE THE LENGTH OF TRANSITION, THE LENGTH OF RAIL (N), AND ANY REDIRECTIVE LENGTH IN THE RAIL END TREATMENT.
- ALL BRIDGE RAIL TYPE 3H BACKING TUBES SHALL BE FABRICATED FROM ASTM A-500 GRADE B. ALL POSTS, BASE PLATES, AND ANCHOR BOLTS SHALL BE FABRICATED FROM ASTM A-36 STEEL. THE ABOVE MATERIAL, W-BEAM, AND ALL ANCHOR BOLTS AND MISCELLANEOUS BOLTS, NUTS, AND WASHERS SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH SECTION 509. CONCRETE, REINFORCING STEEL, AND STRUCTURAL STEEL ELEMENTS SHALL CONFORM TO THE REQUIREMENTS OF SECTIONS 601, 602, AND 509, RESPECTIVELY.
- POST ANCHORS, ENCASED IN CONCRETE, SHALL BE ASTM A-36 STEEL, AND NEED NOT BE GALVANIZED.
- PRIOR TO FABRICATION OF THIS ITEM, THREE SETS OF WORKING DRAWINGS WHICH COMPLY WITH THE REQUIREMENTS OF SECTION 105 SHALL BE SUBMITTED TO THE ENGINEER FOR INFORMATION ONLY.



**RAIL PLACEMENT FOR INSIDE OR HEADWALL MOUNT**  
USE 3L TRANSITION AT BOTH APPROACH AND EXIT ENDS OF BRIDGE RAIL TYPE 3H (HEADWALL MOUNT)



**TYPE 3L TRANSITION AND TYPE 3 GUARDRAIL APPROACH**

- IF HEADWALL MOUNT GUARDRAIL IS USED SEE STANDARD PLAN M-601, CONCRETE BOX CULVERT, AND NOTES BELOW:
  - ALL ITEMS ABOVE TOP OF CBC HEADWALL WILL BE MEASURED AND PAID FOR AS LINEAR FEET OF BRIDGE RAIL TYPE 3H.
  - ★ WHEN NO PAVEMENT ON CBC, POST HEIGHT SHALL BE 1'-4".
  - HEADWALL AND TOEWALL QUANTITIES, AS DESCRIBED BELOW, FOR HEADWALL MOUNTING OF RAIL WILL NOT BE MEASURED AND PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE WORK.
  - ★ ONE ANCHOR ASSEMBLY SHALL BE PLACED FOR EACH RAIL POST.
  - ★ IF 2" OR LESS PAVEMENT IS PLACED ON THE CBC, TOTAL HEADWALL AND TOEWALL CONCRETE QUANTITY WILL BE 0.095 CU.YD. PER FOOT.
  - ★ IF PAVEMENT ON CBC IS GREATER THAN 2", FOR EACH INCH OF ADDITIONAL PAVEMENT INCREASE THE HEADWALL HEIGHT BY 1" AND THE HEADWALL AND TOEWALL CONCRETE QUANTITY BY 0.003 CU.YD. PER FOOT.
  - ★ HEADWALL STIRRUP LENGTH SHALL BE INCREASED AS NECESSARY TO CONSTRUCT THE REQUIRED HEADWALL HEIGHT.

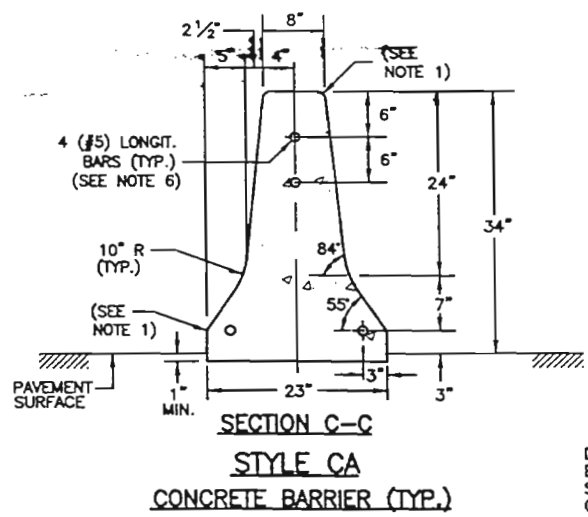
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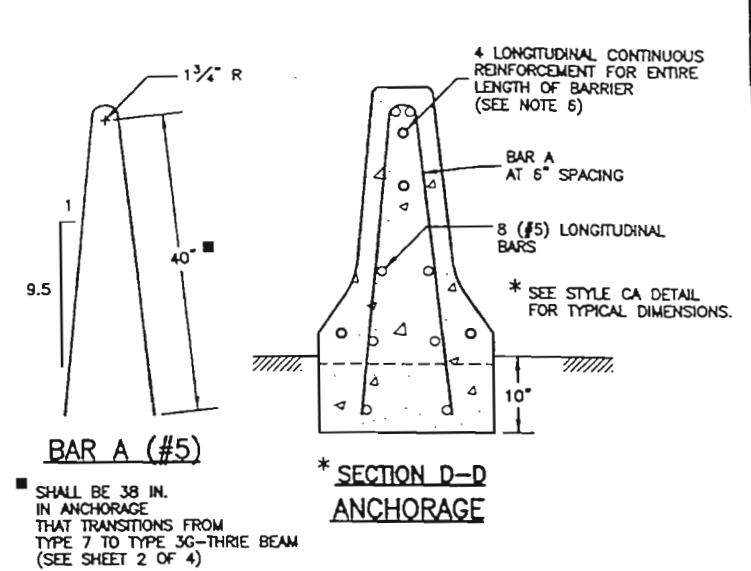
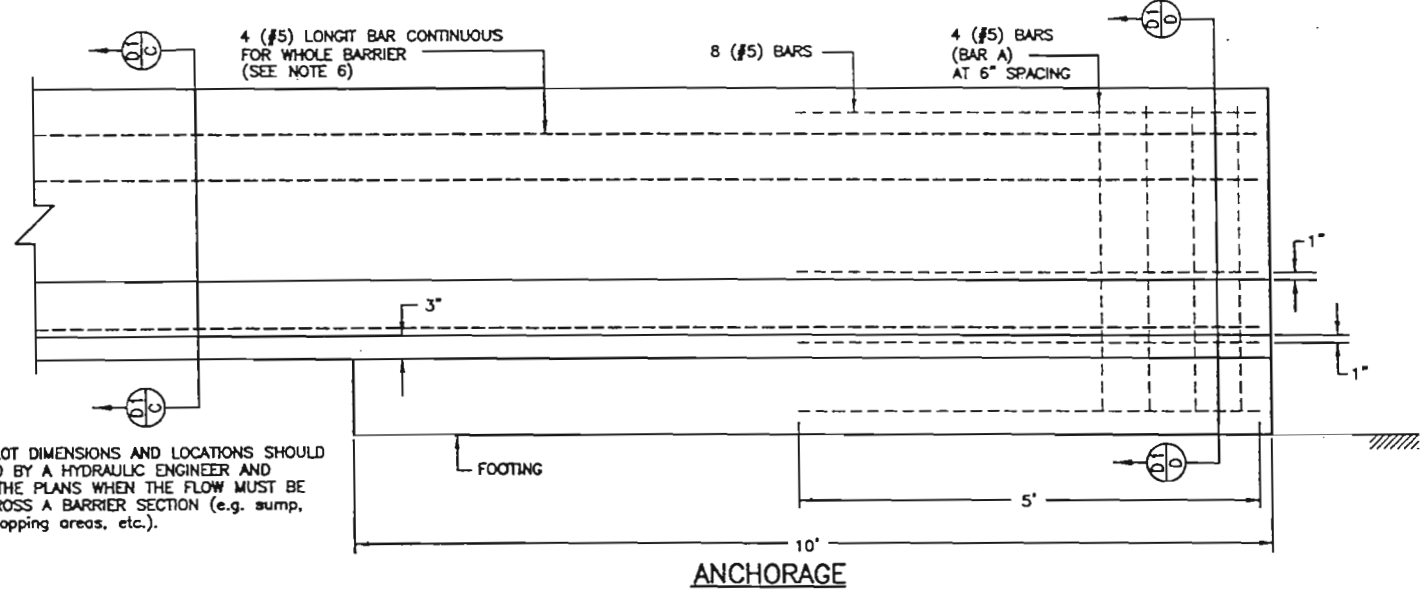
Standard Plan Revised  
 Date: 04-06-98  
 Comments: Safety/Design Improvements  
 05-07-99 Safety/Proprietary Improvements

**GUARDRAIL TYPE 3**  
**W - BEAM**  
 Issued By: Staff Design Branch November 1, 1992

**STANDARD PLAN NO.**  
**M-606-1**  
 Sheet No. 15 of 15

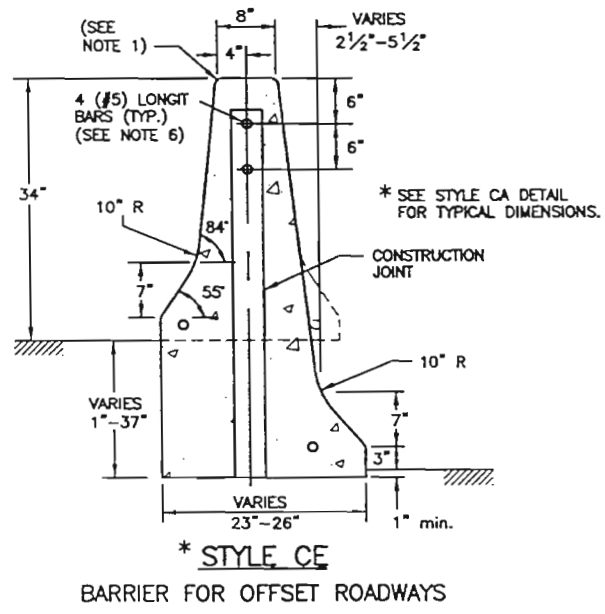
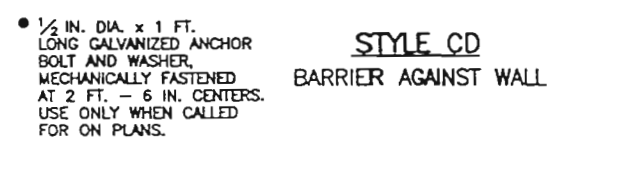
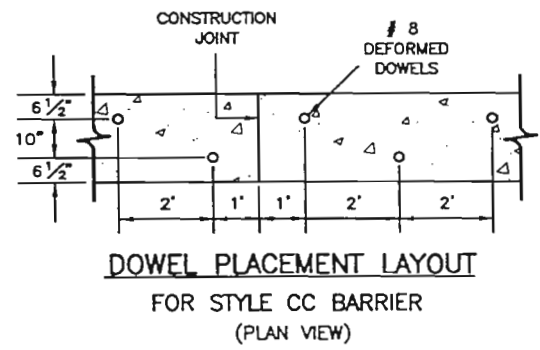
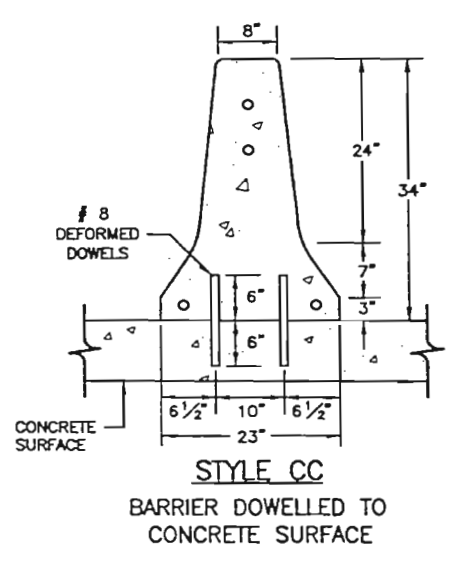
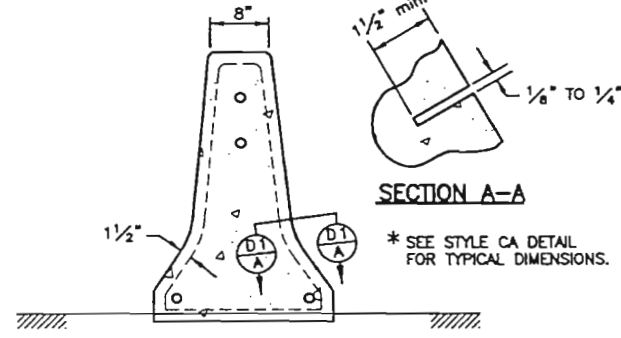
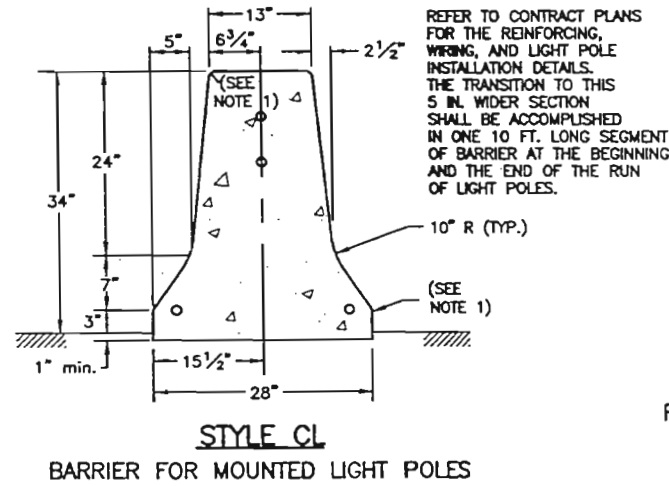
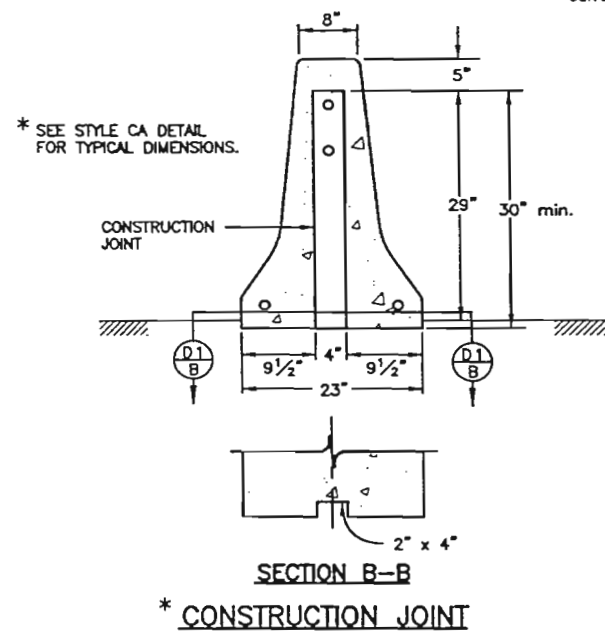


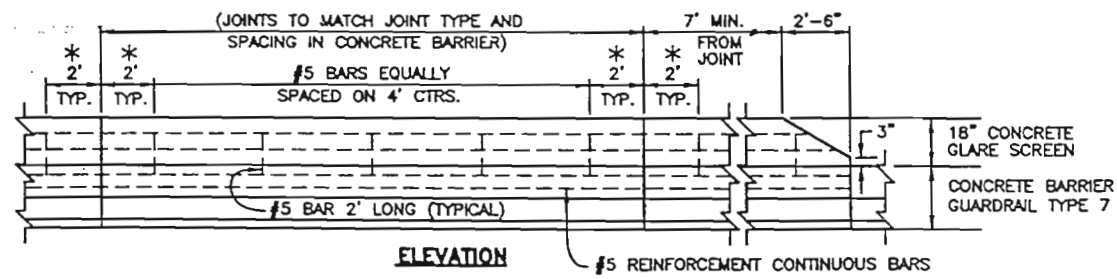
DRAINAGE SLOT DIMENSIONS AND LOCATIONS SHOULD BE PROVIDED BY A HYDRAULIC ENGINEER AND SHOWN ON THE PLANS WHEN THE FLOW MUST BE CARRIED ACROSS A BARRIER SECTION (e.g. sump, culvert overtopping areas, etc.).



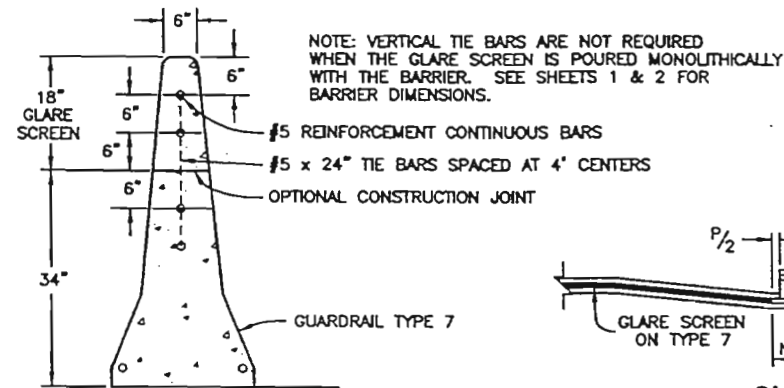
GENERAL NOTES

- All edges shall be rounded with a 1 in. radius except as shown.
- The barrier shall be anchored at the ends and at interruptions with the 10 ft. reinforced anchorage. The anchorage end barrier may be monolithic or the barrier may be connected to the 10 in. deep footing using 10 (1 in.) rebar dowels set 2 in line at 24 in. spacing.
- Barrier may be cast-in-place or slip formed.
- Construction joints shall be used on all barrier types shown, at the end of the day's pour or after any interruption longer than 30 minutes. All construction joints shall be thoroughly cleaned before fresh concrete is poured.
- Reinforcing steel in anchorage shall be Grade 60 epoxy coated deformed bars.
- Continuous longitudinal reinforcement shall be either Grade 60 epoxy coated deformed bars or wire strand with minimum ultimate tensile strength of 28,000 lbs. and Class C galvanizing according to ASTM A 603.
- Transition to existing concrete barrier installations of dissimilar shape shall be accomplished in one 10 ft. long segment of barrier.
- Concrete shall be Class D.
- Additional material for barrier embedment greater than 1 in. will not be measured and paid for separately but shall be include in the work.
- Epoxy coated longitudinal rebar shall have a minimum lap splice of 38 in. Wire strand longitudinal reinforcement shall be butt welded or mechanically spiced to maintain 100% of the minimum required tensile strength.

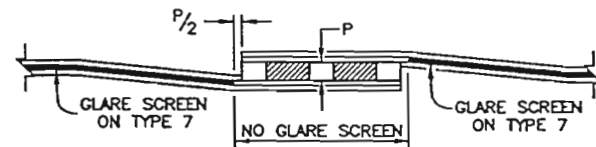




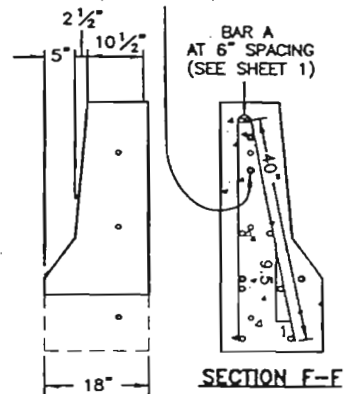
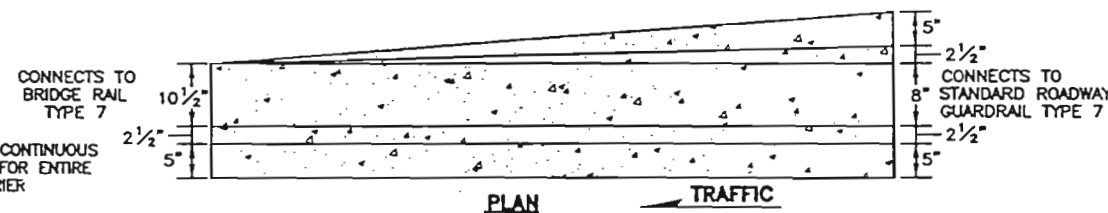
\* 2 FT. IS TYPICAL FOR CAST-IN-PLACE BARRIERS.  
1 FT. IS TYPICAL FOR PRECAST BARRIERS.  
THE MINIMUM ACCEPTABLE DIMENSION IS 6 IN.



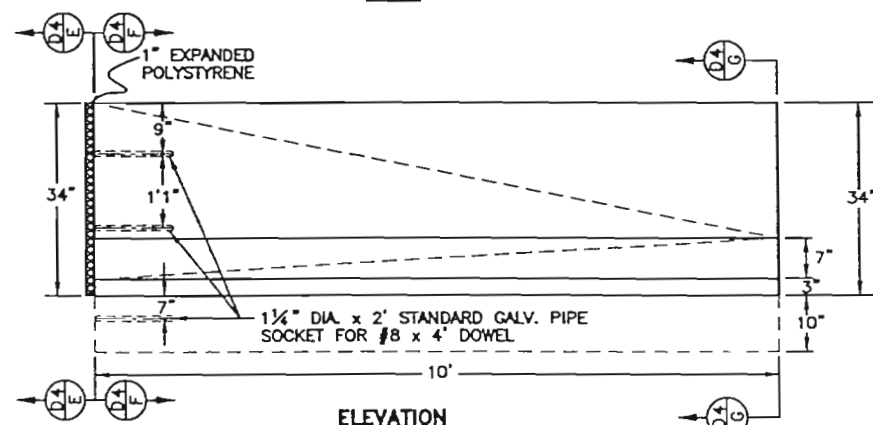
CONCRETE GLARE SCREEN



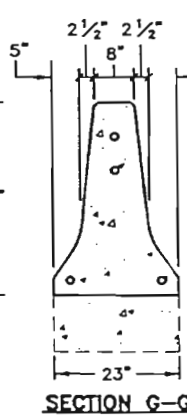
GLARE SCREEN AT MEDIAN OBSTRUCTIONS



SECTION E-E



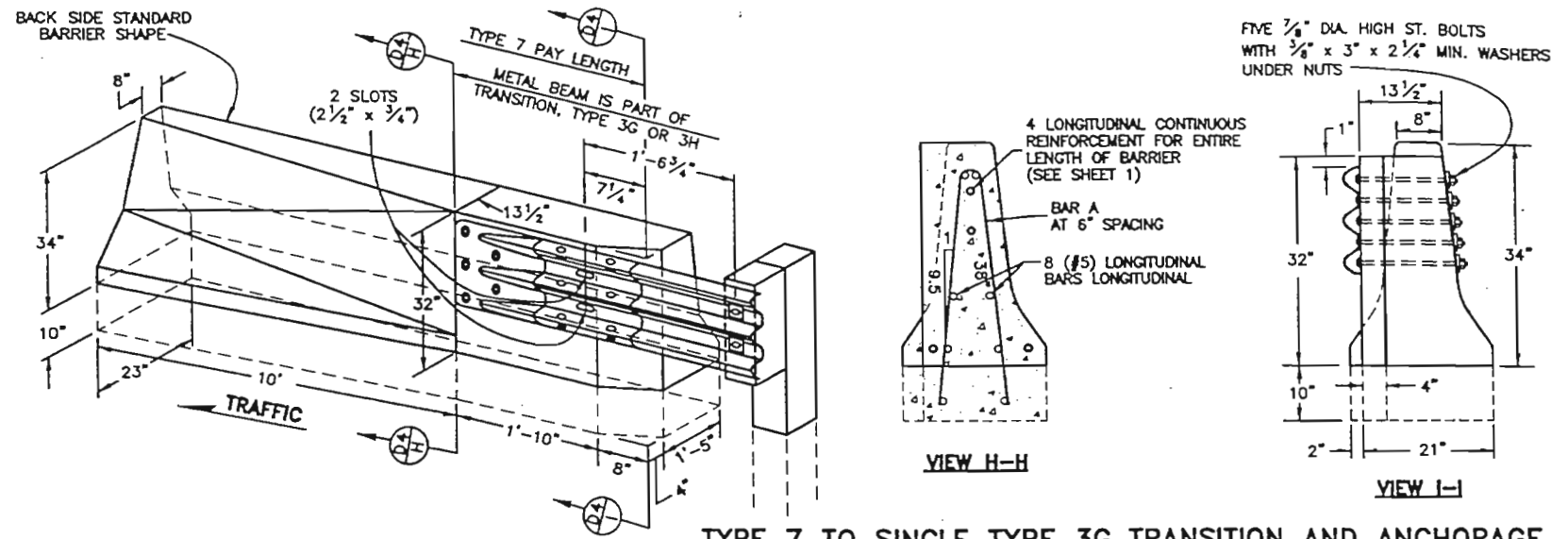
ELEVATION



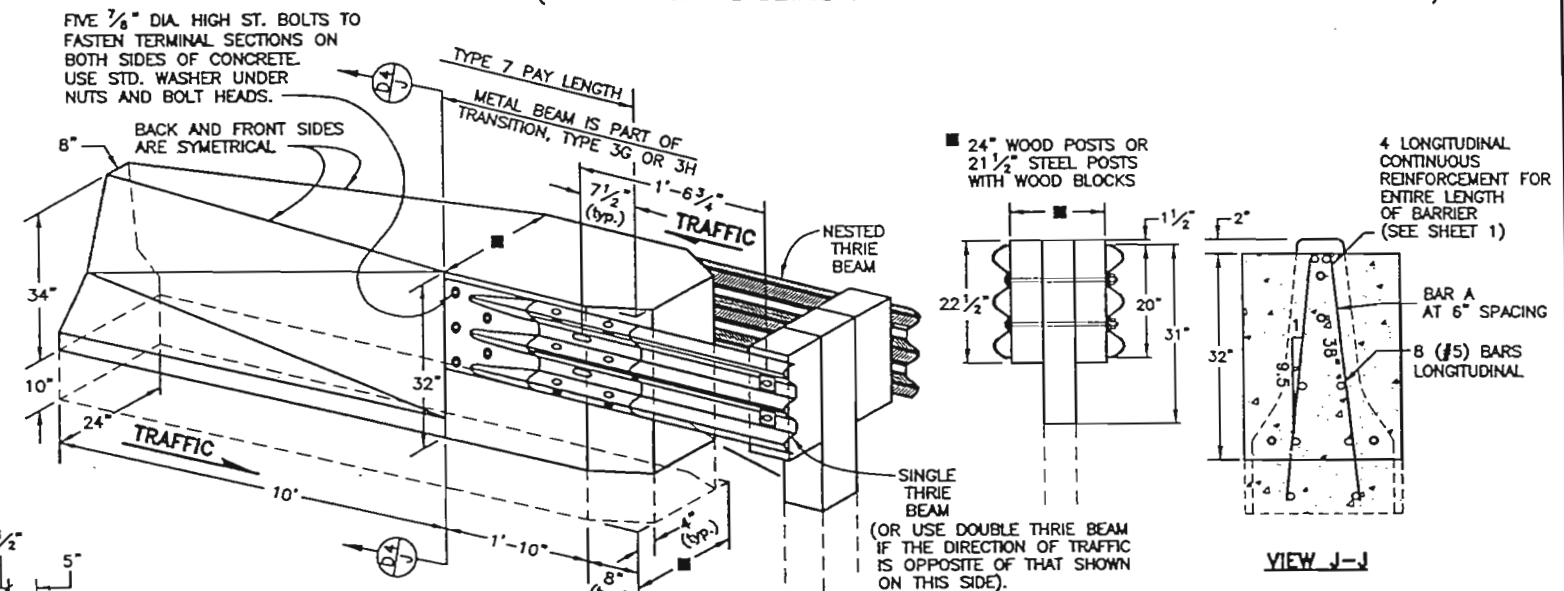
SECTION G-G

THIS SECTION PROVIDES A TRANSITION FOR THE SHAPE OF THE BRIDGE RAIL TYPE 7 TO THE ROADWAY GUARDRAIL TYPE 7. MEASURED AND PAID FOR AS GUARDRAIL TYPE 7. (SEE ANCHORAGE DETAIL ON SHEET 1 FOR REINFORCEMENT INFORMATION)

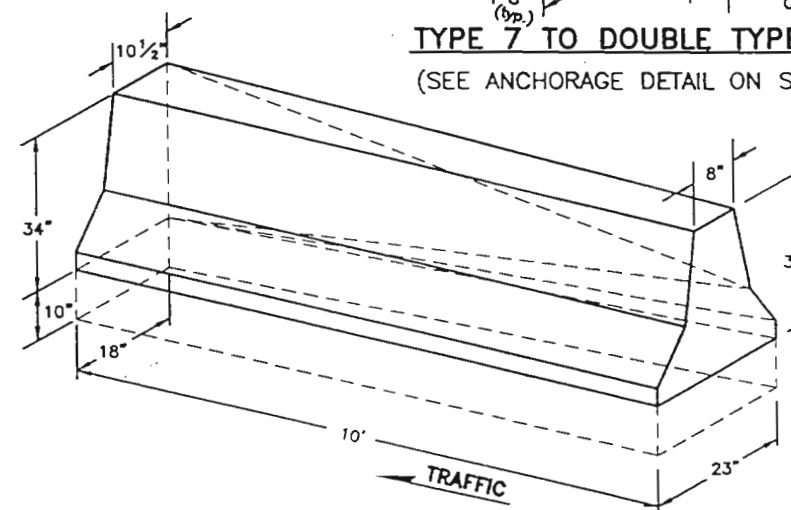
BRIDGE RAIL TYPE 7 TO ROADWAY SHOULDER TYPE 7 TRANSITION AND ANCHORAGE



TYPE 7 TO SINGLE TYPE 3G TRANSITION AND ANCHORAGE  
(SEE ANCHORAGE DETAIL ON SHEET 1 FOR REINFORCEMENT INFORMATION)



TYPE 7 TO DOUBLE TYPE 3G TRANSITION AND ANCHORAGE  
(SEE ANCHORAGE DETAIL ON SHEET 1 FOR REINFORCEMENT INFORMATION)



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Drawing File Name: 6061302.dwg

Acad Version: R13

Scale: NA

Units: English

Standard Plan Revised

Date: 04-06-98

Comments: Safety/Design Improvements

05-07-99 Continuous Reinforcement Specification

GUARDRAIL TYPE 7  
F-SHAPE BARRIER

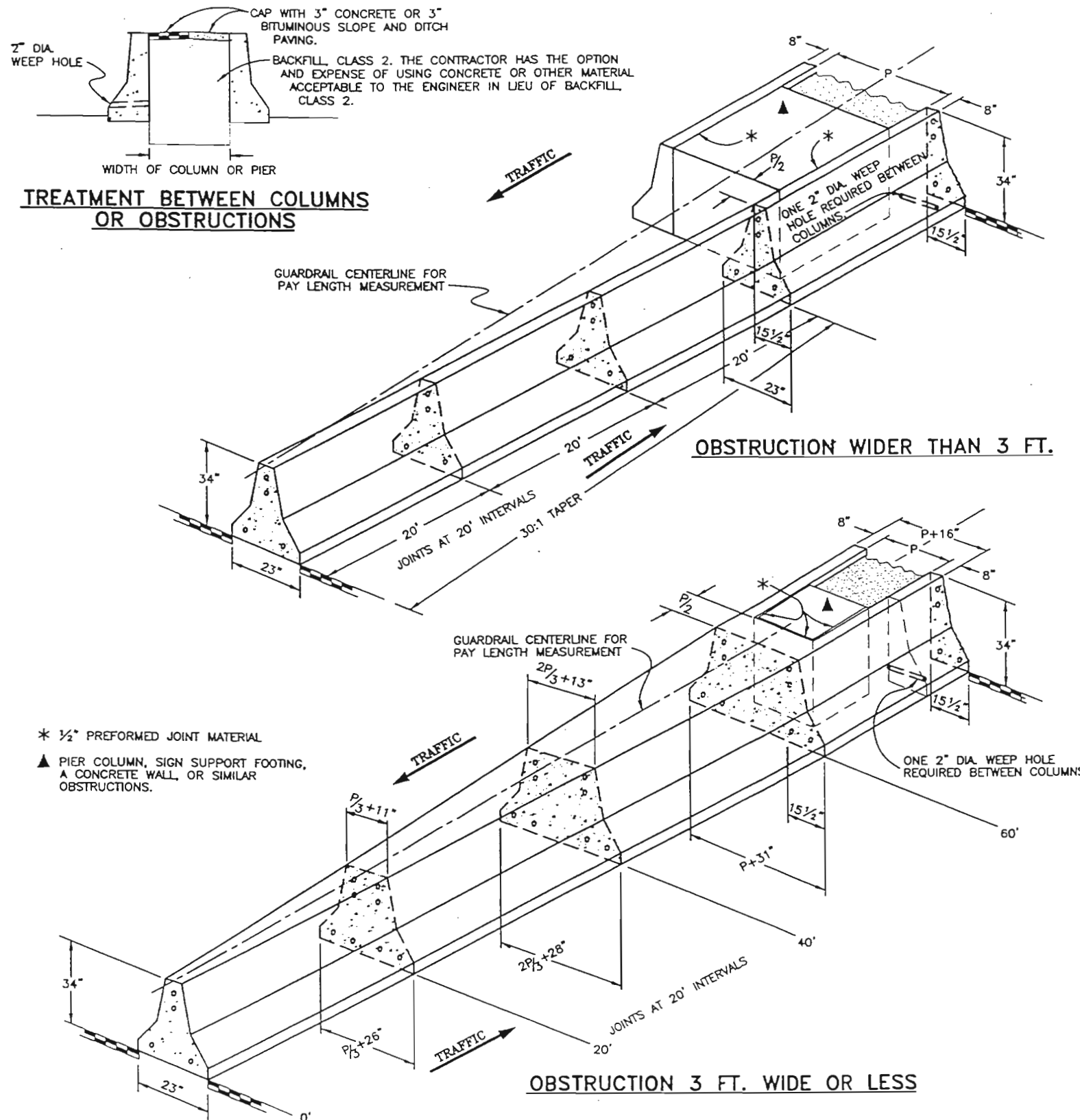
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October 29, 1998

STANDARD PLAN NO.

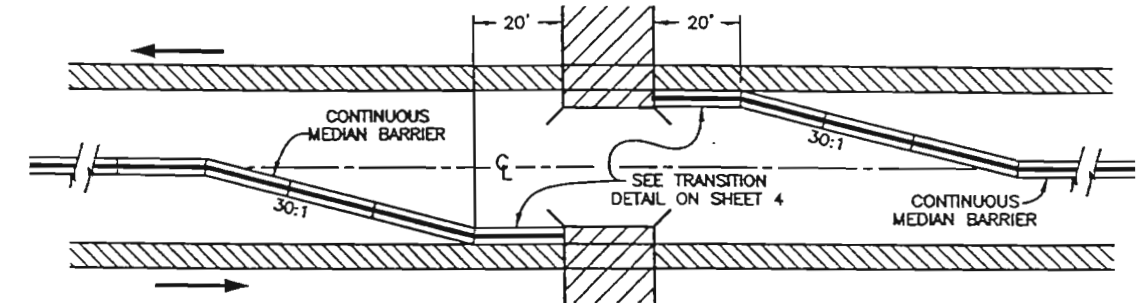
M-606-13

Sheet No. 2 of 4

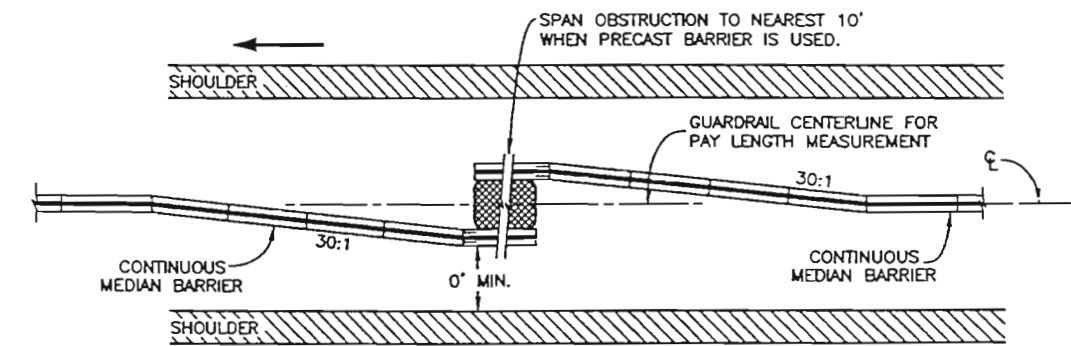


**GENERAL NOTES**

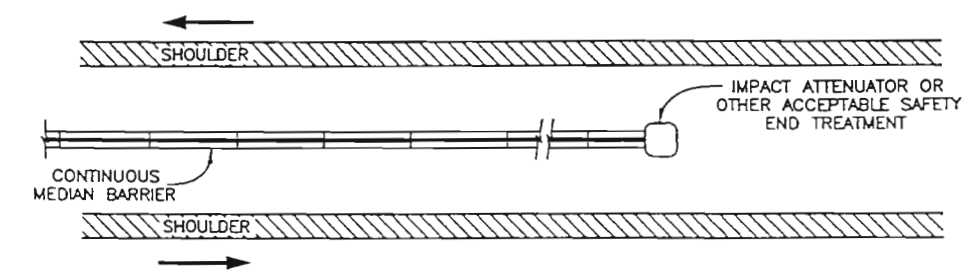
1. In general, the median in these applications will be paved on a slope continued from the adjacent paved shoulder or a 10:1 or flatter slope.
2. The pay length (quantity) for barrier on both sides of an obstruction shall not be measured and paid for as two separate lengths but shall be determined by one linear measurement along the guardrail centerline for pay length measurement, also the backfill and cap between columns or obstructions will not be measured and paid for separately but shall be included in the work.
3. The treatment between columns or obstructions may be used with styles CD, and CA as appropriate.



**BRIDGE APPROACH**



**STYLE CA AT OBSTRUCTION  
(OBSTRUCTION NOT SUITABLE FOR TYPE CD)**



**MEDIAN BARRIER END TREATMENT**

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Drawing File Name: 6061303.dwg

Acad Version: R13

Scale: NA

Units: English

Standard Plan Revised

Date:

Comments:

04-06-98

Safety/Design Improvements

05-07-99

Continuous Reinforcement Specification

**GUARDRAIL TYPE 7  
F-SHAPE BARRIER**

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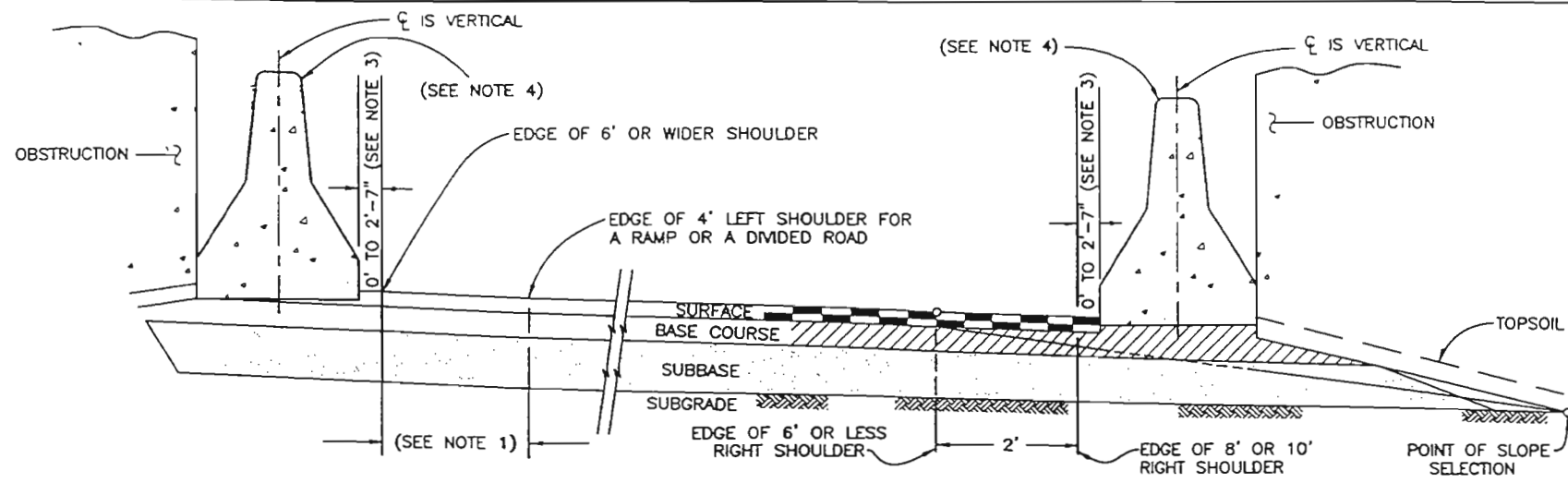
October 29, 1998

**STANDARD PLAN NO.**

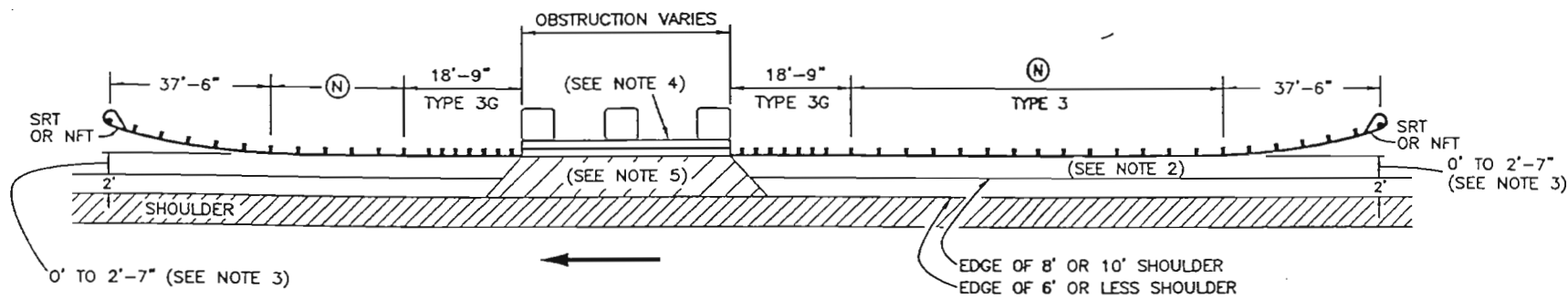
M-606-13

Sheet No. 3 of 4

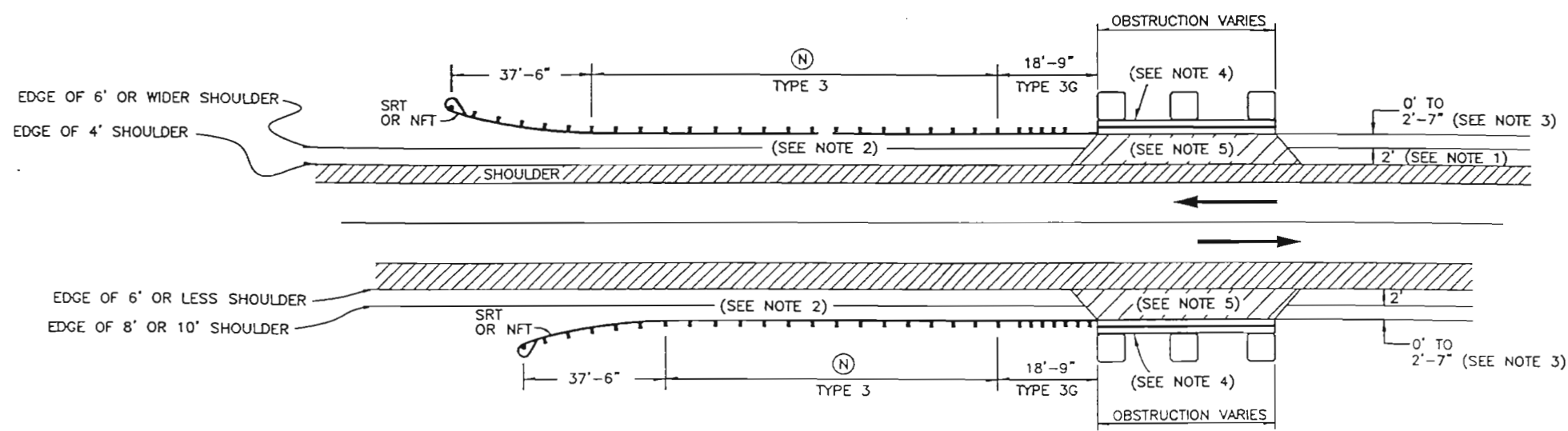




**TYPE 7 ON LEFT AND RIGHT SHOULDERS  
AT OBSTRUCTIONS**



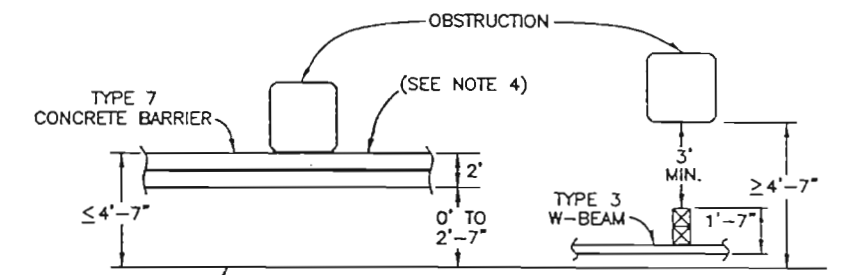
**2-LANE 2-WAY ROADS**




**DIRECTIONAL ROADWAYS AND RAMP  
HAZARDS ON ROADSIDES**

**GENERAL NOTES**

1. 2 ft. is desirable for this dimension with a 4 ft. left shoulder. The minimum is 0 ft. 0 ft. is acceptable for 6 ft. or wider shoulders.
  2. Slope grading to face of rail shall be according to the Standard Plan M-606-1.
  3. Place barrier adjacent to obstruction. If the distance from the edge of shoulder to the barrier exceeds 2 ft. - 7 in., Type 3-W Beam Guardrail may be specified in the plans instead of Type 7 (see project plans and detail below).
  4. Style CA Barriers are shown. Style CD may be used as appropriate. See Sheet 2 for Type 7 to Single Type 3G transition.
  5. Pave area between shoulder and Type 7, compute quantities and pay for as pavement pay item.
- (N) The guardrail length dimension "N" is the length as determined by the length of need computation and as shown on the plans. Minimum shall be 12 ft. - 6 in. where site conditions allow.



LIMIT OF GUARDRAIL INSTALLATION IN RESTRICTED CLEARANCE SITUATIONS. SEE DETAILS FOR TYPE 7 ON LEFT AND RIGHT SHOULDERS, AND NOTE (SEE NOTE 3).

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**GENERAL NOTES**

1. Bars, plates, and shapes shall be structural steel conforming to the specifications of ASTM Designation: A 36.
2. High-strength steel bolts, nuts and washers shall conform to the specifications of ASTM Designation: A 325. All other bolts and nuts shall conform to the specifications of ASTM Designation: A 307. Such bolts shall be furnished with commercial quality washers.
3. Pipe posts shall be welded or seamless steel pipe conforming to the specifications of ASTM Designation: A 53, Grade B. At the option of the Contractor, posts may be fabricated from structural steel conforming to the specifications of ASTM Designation: A36. Anchor bolts shall be made from steel bar conforming to AASHTO M 314-90 with 55,000 psi min. yield stress and 75,000 psi min. tensile strength.
4. Sign structures shall be constructed true to dimensions, shall be free from kinks, twists or bends, and shall be uniform in appearance. The completed sections shall be assembled in the shop and shall be checked for straightness, alignment, and dimension. Any variations shall be corrected to the satisfaction of the Engineer.
5. Mast arms shall be temporarily supported to take all load off of the field splices while bolts are being tightened in order to firmly seat the flange plates.
6. Posts for tubular sign structures shall be formed to the radii shown on the plans by heat treatment or by fabrication to such radii by methods which will not crimp or buckle the interior radius of the pipe bend.
7. Clips, eyes, or removable brackets shall be affixed to all posts and mast arms, as necessary, to secure the sign during shipping and for lifting and moving during erection. This is to prevent damage to the finished galvanized or painted surfaces. Brackets on tubular sign structures shall be removed after erection. Details of such devices shall be shown on the shop drawings.
8. High-strength bolted connections, where shown on the plans, shall conform to the provisions of 509.28, Connections Using High-Strength Bolts. Assembly of high-strength bolted connections for sign structures may be performed with galvanizing or paint on the contact surfaces.
9. Bolts with diameters exceeding by up to 1/4 inch the diameter of the bolts shown on the plans may be used, provided that required clearances and edge distances are not reduced below that required for the larger bolt.
10. Walkways shall only be located underneath and between sign panels. Do not locate walkways under any other portions of sign structure which do not have sign panels.

11. All sign structures shall be fabricated into the largest practical sections prior to galvanizing. Splice locations shall be submitted to the Engineer for approval and the Contractor shall not commence fabrication until such splice locations are approved.
12. Welding of steel shall conform to the requirements of AWS D1.1. All areas to be welded shall be ground to bright metal. No butt weld splices will be permitted. All welding and required testing shall be complete before any material is galvanized. All circumferential and stiffener welds shall be non-destructively tested using the enhanced magnetic particle method in accordance with Subsection 509.18(d). The acceptance criteria are stated in Table 6.1 of ANSI/AWS D1.1. All longitudinal welds within 6" of full-penetration circumferential groove welds shall be full penetration groove welds and shall be inspected as specified above. Maximum weld undercut shall be 0.01".
13. All tube members shall be hot-dip galvanized as per ASTM A123. Walkway gratings, walkway brackets, gutters, safety railings, steel mountings for light fixtures, and all nuts, bolts, and washers for sign structures shall be galvanized after fabrication as per ASTM A123 or ASTM A153, as appropriate, and shall not be painted.
14. All concrete shall be either Class B or Class BZ. Reinforcing steel:  $f_y = 60,000$  psi. Caisson foundations shall be completed at least 7 days before sign structures are erected thereon.
15. Structures shall be grounded in accordance with applicable electrical codes.
16. Sheets in the index marked with an \* provide instructions to designers for their use in the preparation of sign plans.
17. NPS = Nominal Pipe Size; O.D. = Outside Diameter.
18. Prior to fabrication, six sets of shop drawings, which comply with the requirements of Section 105.02 of the Standard Specifications, shall be submitted to CDOT Staff Bridge, 4201 E. Arkansas Ave. Denver, Colorado 80222.

REVISIONS

S-614-50

**NOTES**

Specifications:

Design: "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals", American Association of State Highway and Transportation Officials (AASHTO), 1994

"Fatigue-Resistant Design of Cantilevered Signal, Sign and Light Supports", National Cooperative Highway Research Program (NCHRP) Report 412, 1998.

Subsection 17.4, Signs, in the Staff Bridge Branch Bridge Design Manual.

Construction: CDOT Standard specifications, these standard sheets and the project plans.

Wind loading: 80, 90 or 100 mph velocity.

**Overhead sign x-section sheet(s) should show:**

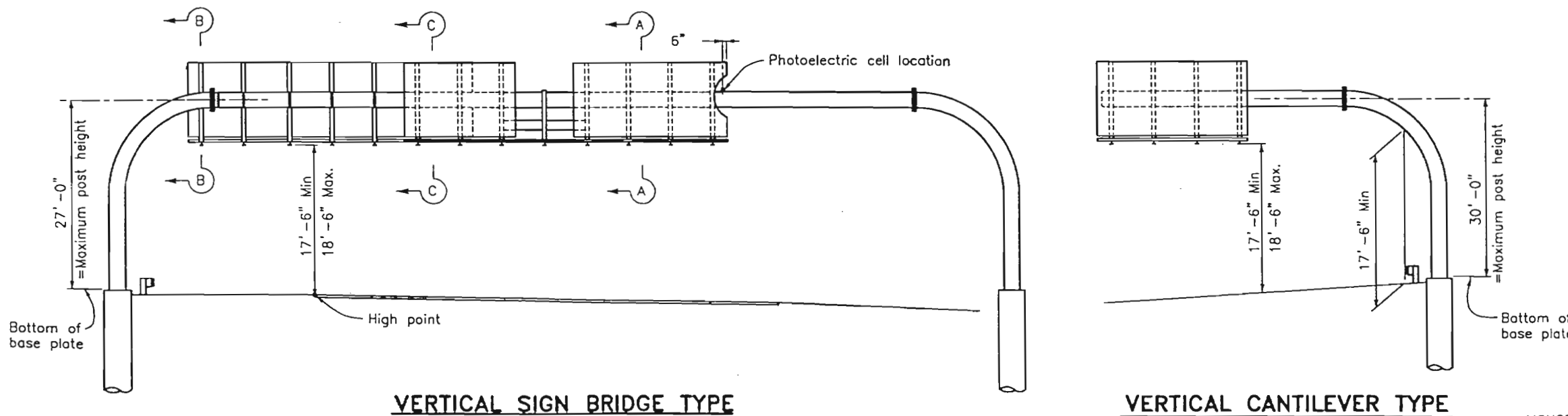
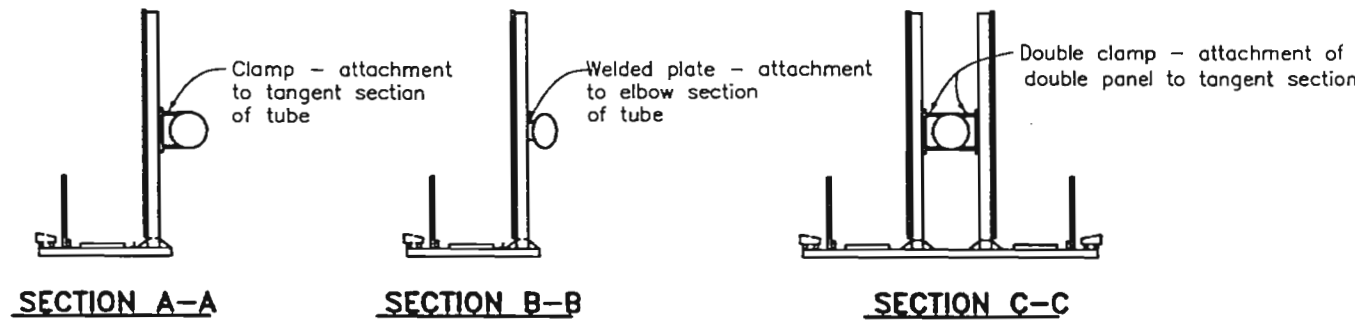
1. Sign structure location (Hwy., station and direction).
2. Length of structure span.
3. Panel size and location on structure.
4. Post height(s) from top of caisson to  $\epsilon$  arm tube.
5. Caisson diameter and minimum embedment.
6. Top of caisson elevation.
7. Caisson pay length.
8. Walkway location.
9. Photoelectric cell location if required.
10. Lane line location(s) if structure is over traffic.
11. As Constructed Block.

**INDEX**

1. General Information
2. Cantilever Fabrication And Field Splice Details.
3. Sign Bridge Fabrication Details.
4. Structural details.
5. Structural details.
6. Base plate details.
7. Walkway details.
8. Walkway safety railing details
9. Lighting details
10. Cantilever - pipe selection worksheet.\*
11. Sign Bridge - pipe selection worksheet.\*
12. Foundation selection worksheet.\*

**WALKWAY BRACKETS:**

Maintain uniform spacing where possible. Maximum spacing shall not exceed 5'-6". Minimum clear to field splice = 1'-0"  $\pm$ .



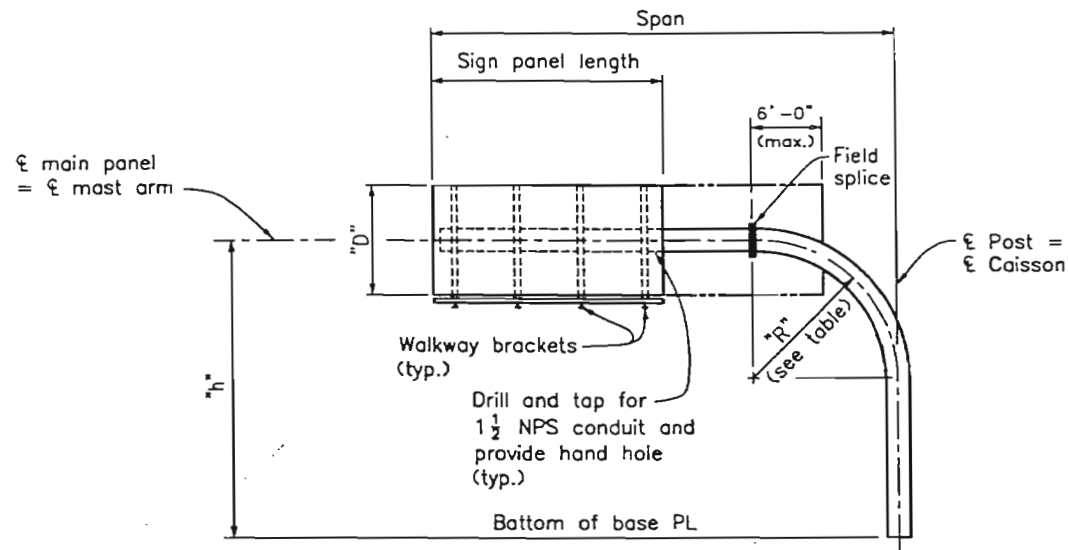
COLORADO DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGNS - MONOTUBE GENERAL INFORMATION

9-25-99	ISSUED BY	STANDARD PLAN NO.
	TRANS. SAFETY AND TRAFFIC ENGR. BRANCH	S-614-50
DATE	REVIS	SHEET 1 OF 12 (ENGLISH)
	DATE: Dec. 10, 1998	

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MONOFAB1

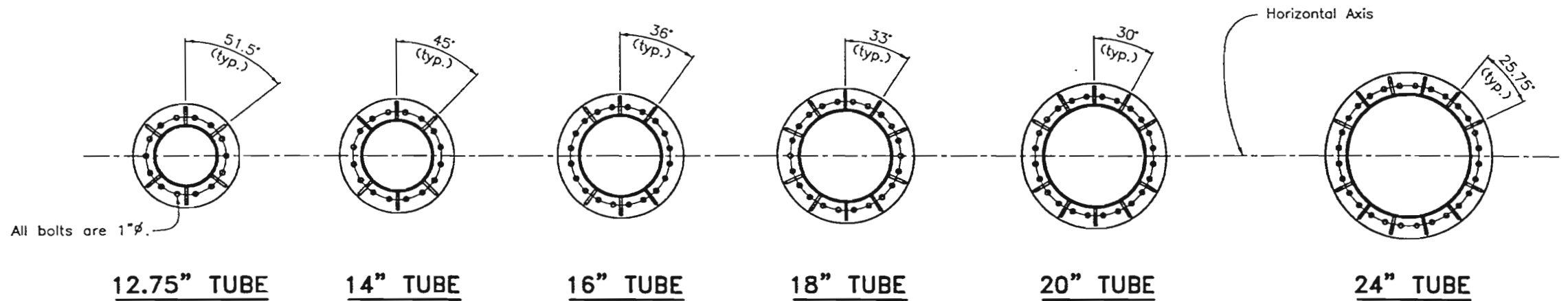


**VERTICAL POST CANTILEVER**

**NOTES**

1. When several sign panels are to be installed with a space between the panels, the space shall be as small as possible and 2'-0" maximum.
2. All posts between base plate and field splice shall have a tube wall thickness of 1/2". All mast arms shall have a tube wall thickness of 3/8".
3. During sign erection, the post shall be aligned by using the leveling nuts to make the sign panel level.
4. See Sheet 5 for additional field splice information.

PIPE POST	
Pipe OD (in.)	"R" (ft.)
12.75	8
14	8
16	8
18	8
20	8
24	10



**FIELD SPLICE DETAILS**

Stiffeners shall be located on both sides of the field splice.

COLORADO  
 DEPARTMENT OF TRANSPORTATION  
 OVERHEAD SIGNS - MONOTUBE  
 CANTILEVER FABRICATION AND  
 FIELD SPLICE DETAILS

9-25-99

NO SCALE

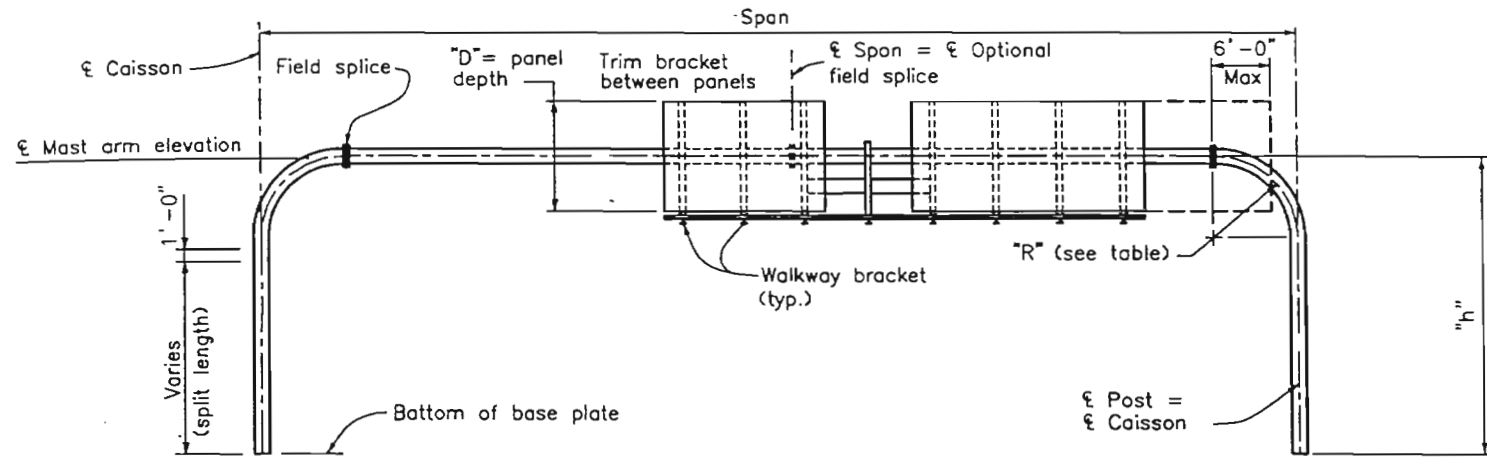
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STANDARD PLAN NO.  
 S-614-50

MONOFAB2

DATE  
REVIS

DATE: Dec. 10, 1998  
 SHEET 2 OF 12 (ENGLISH)



**VERTICAL POST SIGN BRIDGE**

**NOTES**

1. The maximum sign panel overlap onto elbow shall not exceed 6'-0" from the field splice.
2. All posts between base plate and field splice shall have a tube wall thickness of 1/2". All mast arms shall have a tube wall thickness of 3/8".
3. Before any portion of the sign frames are assembled in their final positions the Contractor shall demonstrate to the Engineer by preassembly or other approved methods that the span lengths of the frames in the no load condition match within 1/2" ± the field measured span lengths between foundations.
4. If the sign frames are erected as one unit, they shall be adequately suspended to avoid distortions or changes in span length between base plates.
5. For standard pipe members (Mast Arms) with lengths greater than 40'-0" an optional bolted field splice will be permitted at 1/3 of the span to facilitate galvanizing and hauling operations. For standard pipe members with lengths greater than 80'-0" two optional bolted field splices will be allowed at the 1/3 points.
6. See Sheet 2 for field splice details.

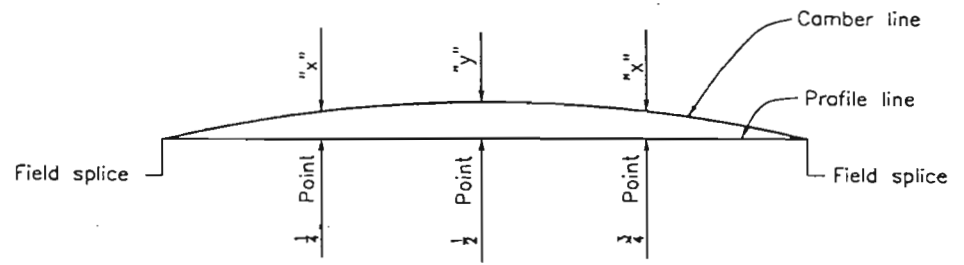
**\* PIPE POST**

Pipe OD (in.)	"R" (ft.)	Camber type
12.75	8	(A)
14	8	(A)
16	8	(B)
18	8	(C)
20	10	(C)
24	12	(D)

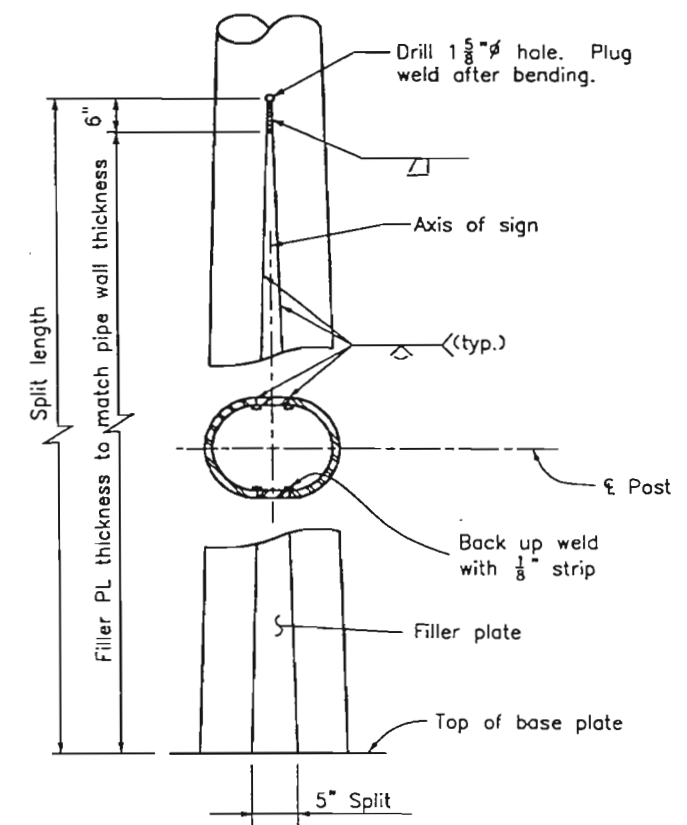
- Use camber type E for 130' - 140'.
- \* Mast arm diameter same as post.
- Indicates camber type, see table.

**CAMBER**

Type	"x"	"y"
(A)	1 1/2"	2"
(B)	2 1/4"	3"
(C)	2 3/4"	4"
(D)	3 1/2"	5"
(E)	4 1/2"	6"



**CAMBER DIAGRAM**

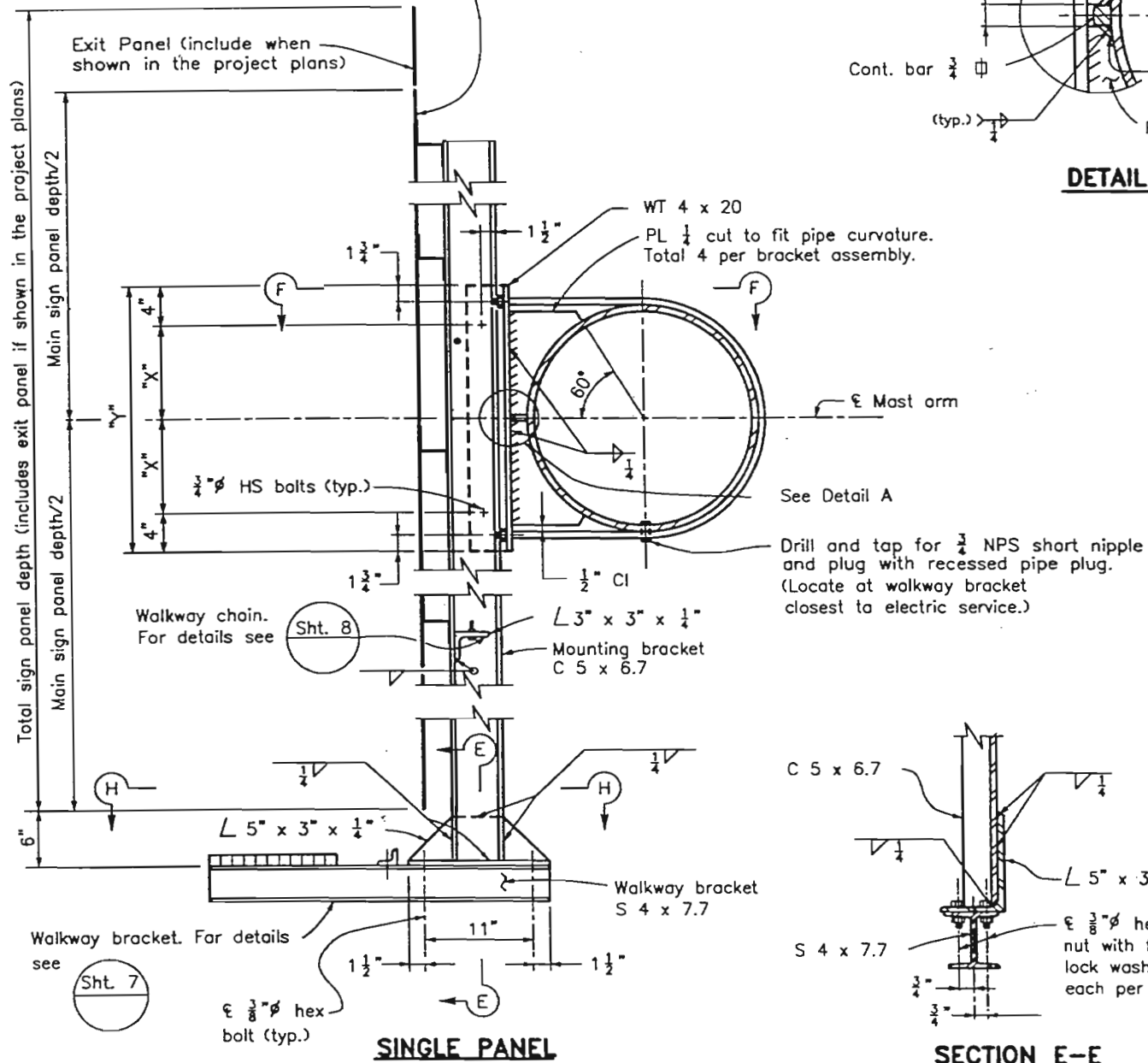


**POST SPLIT DETAILS**

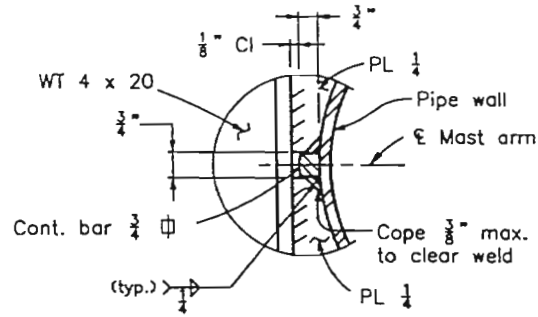
**COLORADO**  
**DEPARTMENT OF TRANSPORTATION**  
**OVERHEAD SIGNS - MONOTUBE**  
**SIGN BRIDGE**  
**FABRICATION DETAILS**  
 NO SCALE

ISSUED BY	STANDARD PLAN NO.
TRANS. SAFETY AND	S-614-50
TRAFFIC ENGR. BRANCH	
DATE	SHEET 3 OF 12 (ENGLISH)
REVISIONS	
DATE: Dec. 10, 1998	

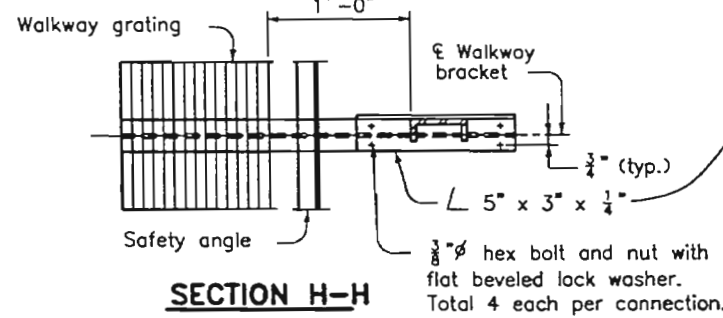
Sign panel shall be sheet aluminum mounted using backing zees. All details and requirements shall be as per the Colorado DOT M+S Standard S-614-4. Payment shall be made under item 614, Sign Panel (Class III).



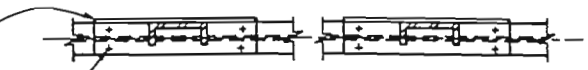
SINGLE PANEL



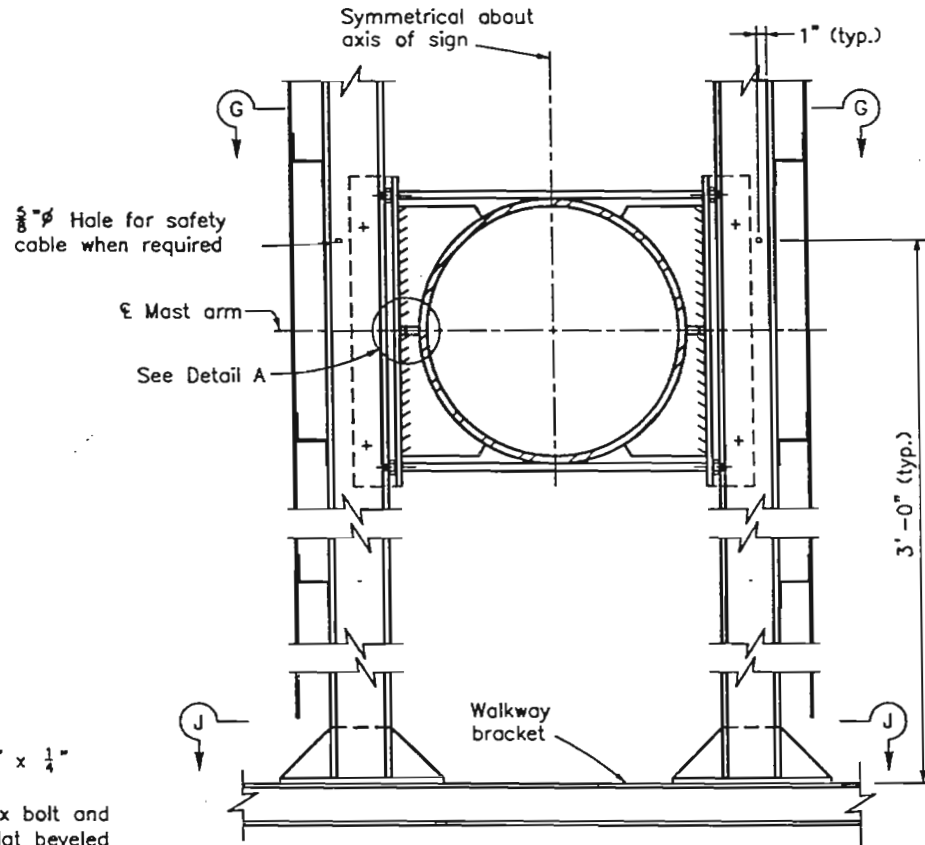
DETAIL A



SECTION H-H



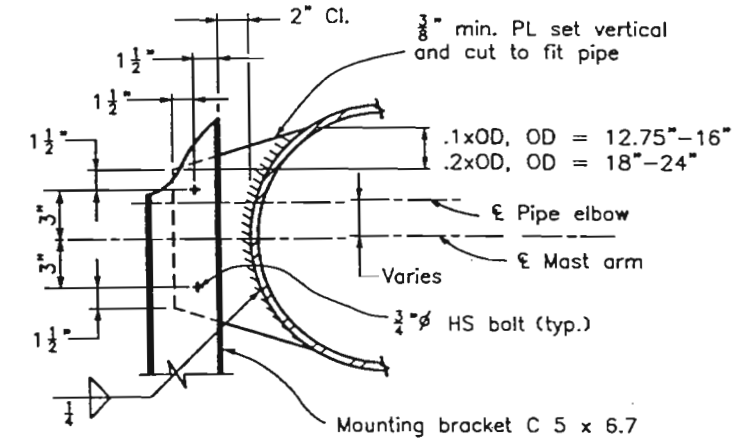
SECTION J-J



NOTES

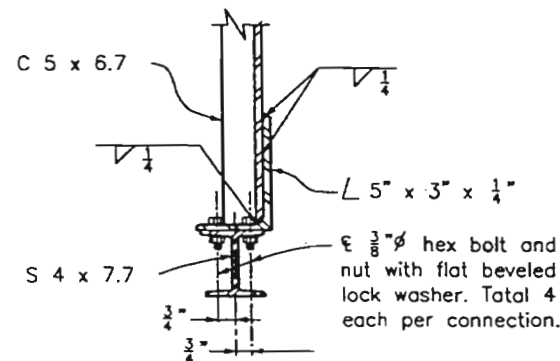
For details not shown or noted see "Single Panel". Assembly details shown apply to tangent portion of pipe only. For mounting bracket on elbow see Detail B.

DOUBLE PANEL



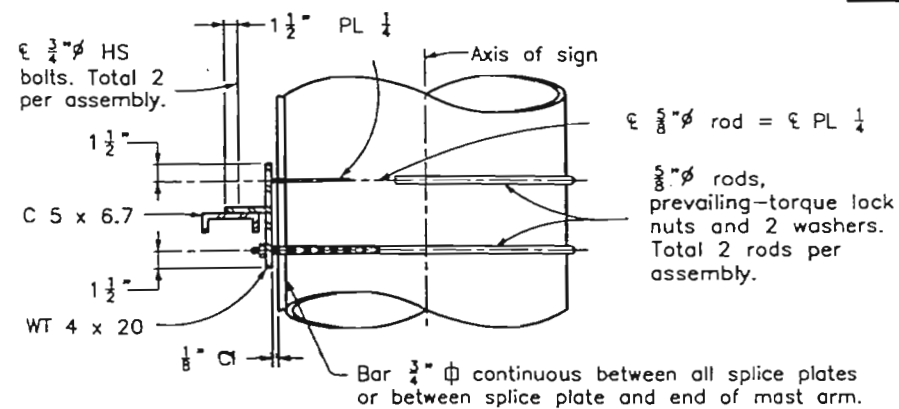
DETAIL B

Mounting bracket on elbow

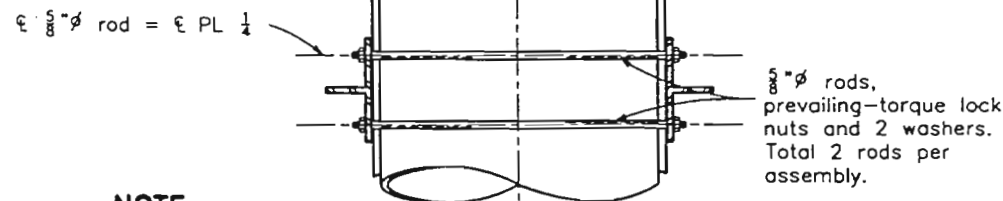


SECTION E-E

MOUNTING BRACKET ASSEMBLY DETAILS



VIEW F-F



VIEW G-G

NOTE

For details not shown or noted see "View F-F".

Pipe Outside Diameter (in.)	Distance	
	"X" (in.)	"Y" (in.)
12.75	4 1/2	17
14	5	18
16	6	20
18	7	22
20	8	24
24	10	28

COLORADO DEPARTMENT OF TRANSPORTATION  
OVERHEAD SIGNS - MONOTUBE STRUCTURAL DETAILS

9-25-99

NO SCALE

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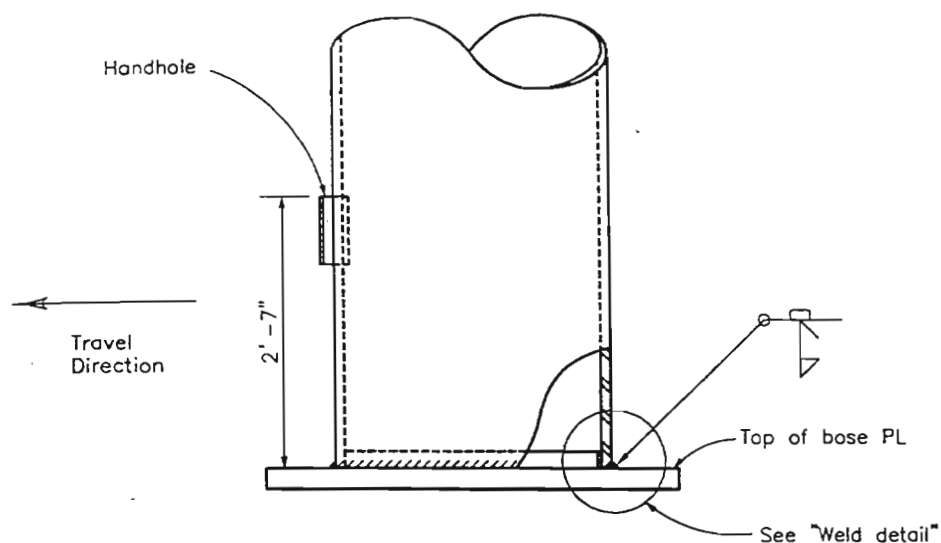
STANDARD PLAN NO.

S-614-50

DATE  
REVISED

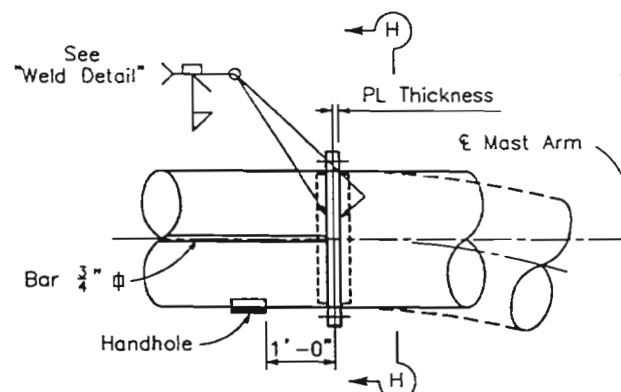
DATE: Dec. 10, 1998

SHEET 4 OF 12 (ENGLISH)



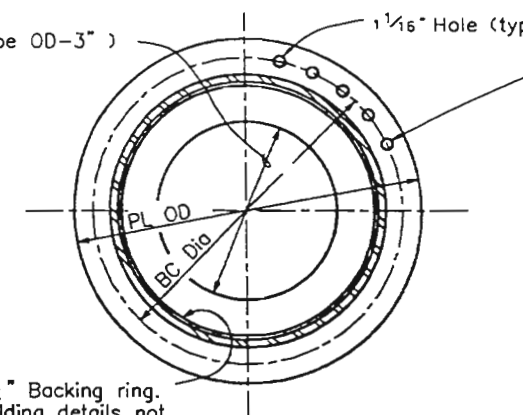
**POST BASE ELEVATION**

(For base PL details see "Foundation Details" sheets)



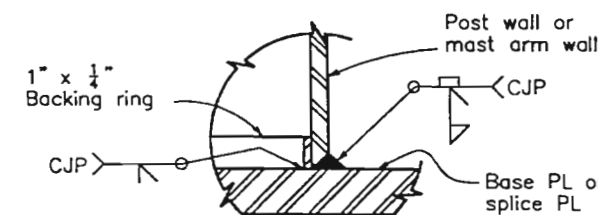
**FIELD SPLICE**

PL ID = (Pipe OD - 3")

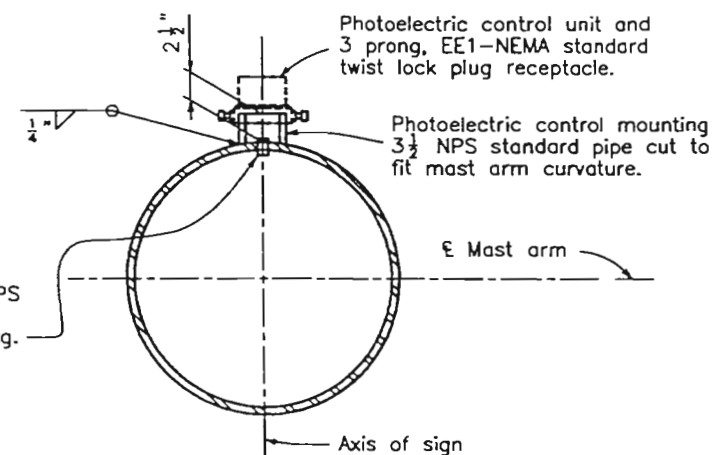


**SECTION H-H**

1" ASTM A-325 H.S. bolts (galvanized) equally spaced. Lubricated tightening torque: 395 ft.-lbs. for 1" ϕ bolts. See table for other details



**WELD DETAIL**



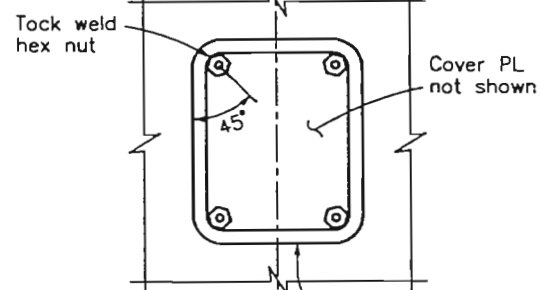
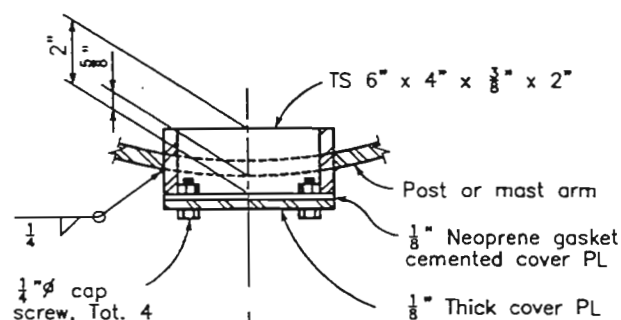
**PHOTOELECTRIC CONTROL DETAILS**

(See "Layout" sheet for location when required)

FIELD SPLICE					
Pipe Outside Diameter (in.)	PL Thickness (in.)	BC Diameter (in.)	PL OD (in.)	# of Stiff.	# of Bolts
12.75	1 1/4	16	21	6	14
14	1 1/4	17	22	6	16
16	1 1/4	21	24	6	20
18	1 3/8	23	26	10	22
20	1 3/8	25	28	10	24
24	1 1/2	29	32	12	28

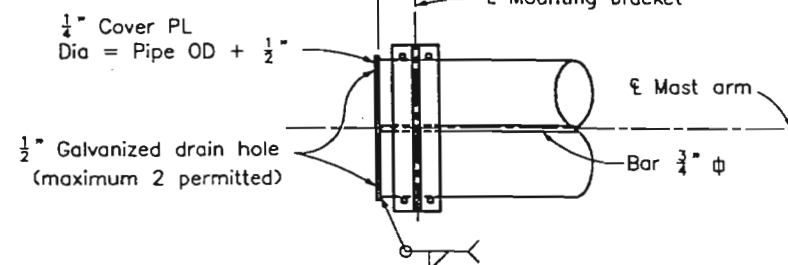
**NOTES**

- Design based on capacity of standard pipe.
- NPS = Nominal Pipe Size. OD = Outside Diameter.



**HANDHOLE AND COVER DETAILS**

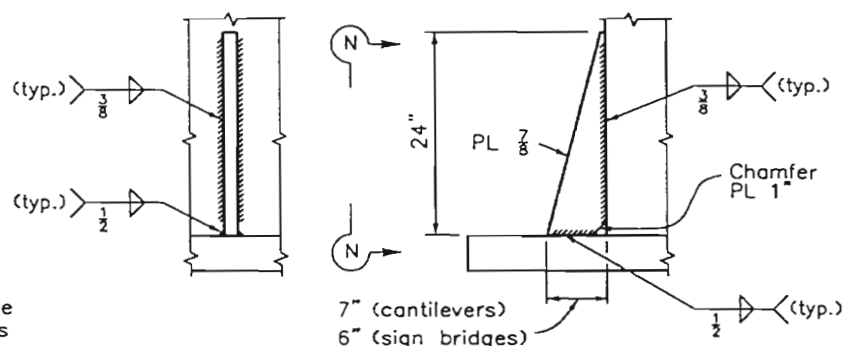
Note: Terminate weld 1/2" short of the top of the stiffener plate. At the other 3 weld terminations on these two typical welds stop the weld 1/4" short of the end of the plate.



**MAST ARM END DETAIL**

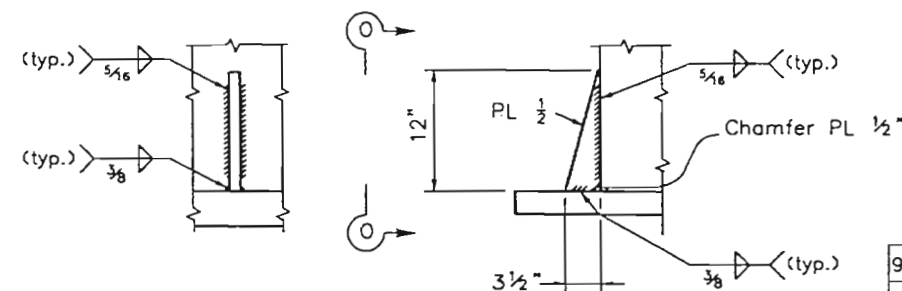
(For "Cantilever Type" only)

Note: Stiffeners are to be placed at the base of all posts and all field splices. See sheets 2 and 6 for the location of stiffeners. Stiffeners are not shown elsewhere in these sheets for clarity.



**SECTION N-N STIFFENER DETAILS**

(© the pole base)



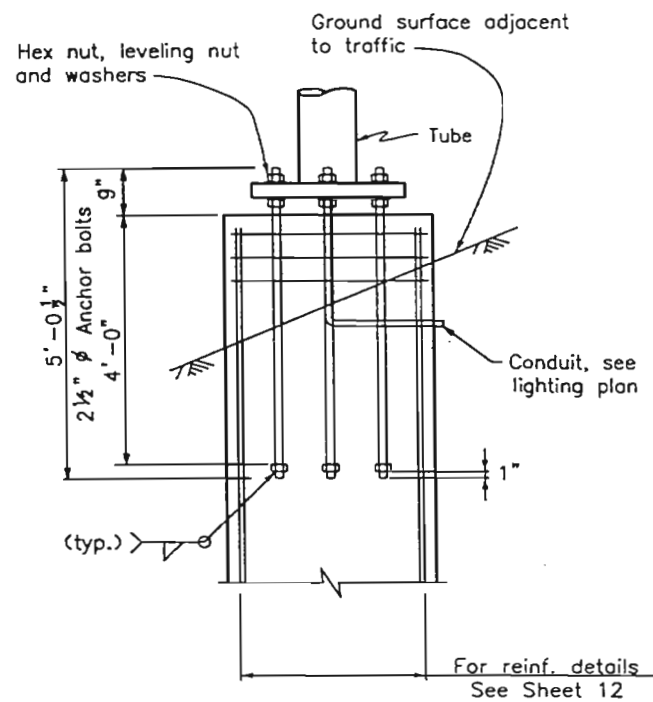
**SECTION O-O STIFFENER DETAILS**

(© the field splice) MONOFAB5

COLORADO  
DEPARTMENT OF TRANSPORTATION  
OVERHEAD SIGNS - MONOTUBE  
STRUCTURAL DETAILS

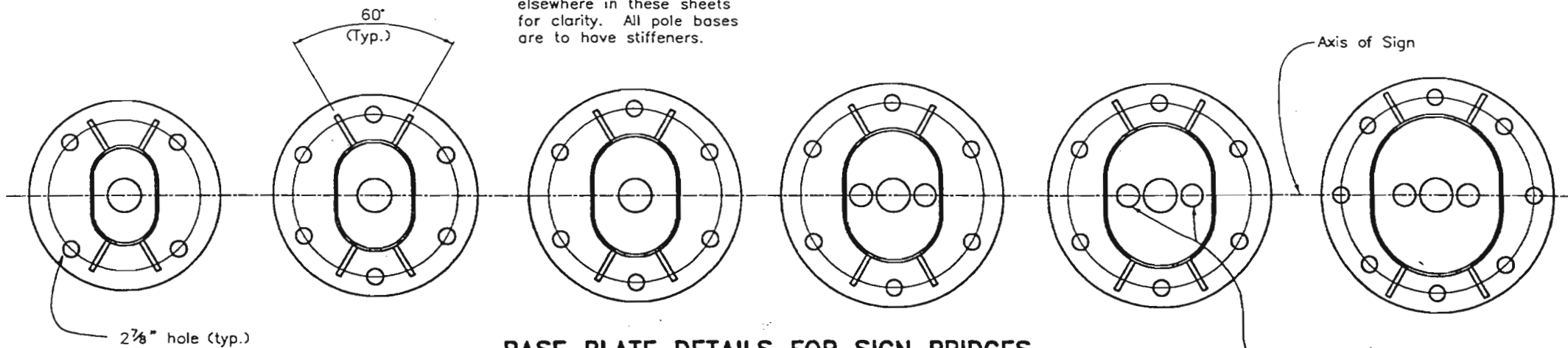
9-25-99	ISSUED BY TRANS. SAFETY AND TRAFFIC ENGR. BRANCH	STANDARD PLAN NO. S-614-50
DATE REVISED	DATE: Dec. 10, 1998	SHEET 5 OF 12 (ENGLISH)



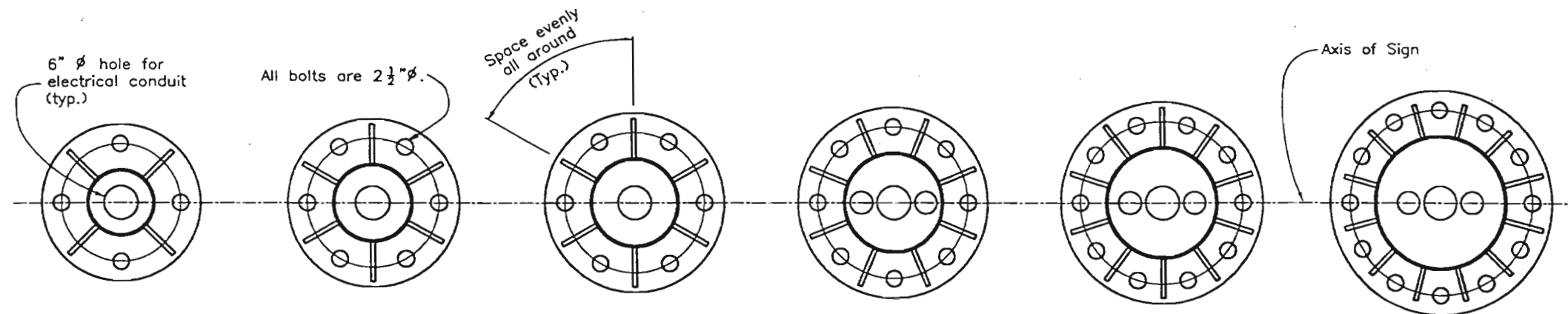


**ANCHOR BOLT DETAIL**

Note: Stiffeners are not shown elsewhere in these sheets for clarity. All pole bases are to have stiffeners.



**BASE PLATE DETAILS FOR SIGN BRIDGES**



**BASE PLATE DETAILS FOR CANTILEVERS**

**12.75" TUBE**

**14" TUBE**

**16" TUBE**

**18" TUBE**

**20" TUBE**

**24" TUBE**

**CANTILEVERS**

Pipe OD (in.)	Split (in.)	Base PL Size (Diam. x thick.) (in.)	Bolt Circle (in.)	# of Anchor Bolts	# of Stiff.
12.75	-	28" x 2.5"	21"	4	4
14	-	30" x 2.5"	23"	6	6
16	-	32" x 2.5"	25"	6	6
18	-	34" x 2.75"	27"	8	8
20	-	36" x 3.0"	29"	10	10
24	-	40" x 3.0"	33"	12	12

**SIGN BRIDGES**

Pipe OD (in.)	Split (in.)	Base PL Size (Diam. x thick.) (in.)	Bolt Circle (in.)	# of Anchor Bolts	# of Stiff.
12.75	5	34" x 2.5"	27"	4	4
14	5	36" x 2.5"	29"	6	4
16	5	38" x 2.5"	31"	6	4
18	5	40" x 2.75"	33"	6	4
20	5	40" x 3.0"	33"	6	4
24	5	42" x 3.0"	35"	8	4

**NOTES**

1. Thread upper 9" and galvanize upper 1'-0" of the anchor bolts.
2. Anchor bolts shall be set with a steel template until the concrete has cured at least two days.
3. There shall be no grout pod installed on top of the existing foundations.
4. The anchor bolts shall be tightened using the turn-of-nut method. The bolts shall first be tightened to snug tight, which is defined as the tightness that exists when the upper and lower nuts are in firm contact with the base plate. The upper and lower nuts shall then each be rotated an additional 1/6 turn (60° ± 15°).

COLORADO DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGNS - MONOTUBE BASE PLATE DETAILS

9-25-99

NO SCALE

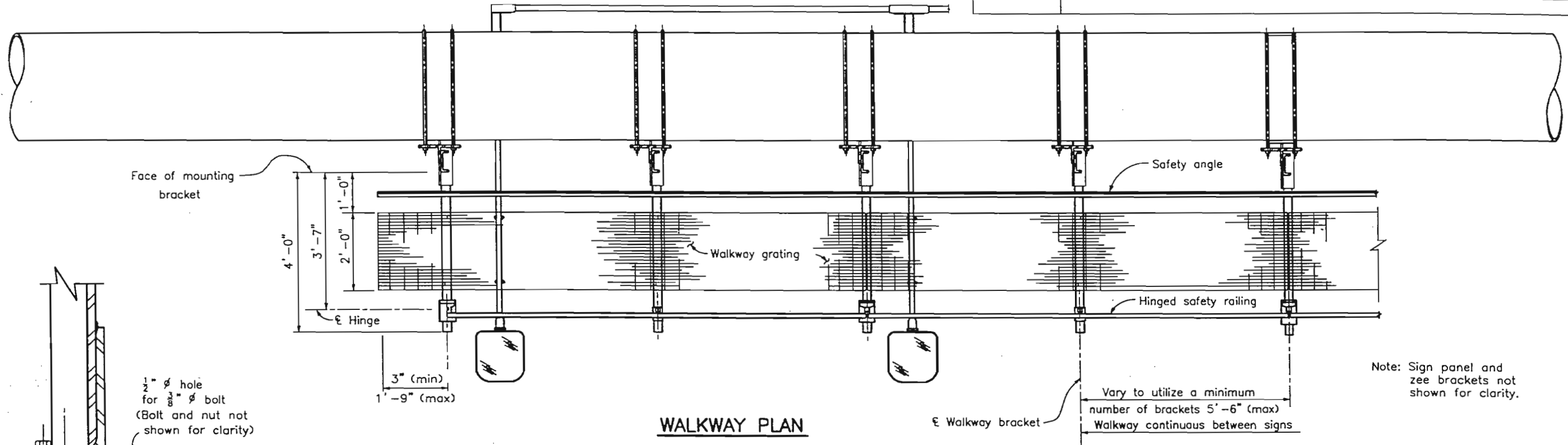
MONOFAB6

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DATE  
REVISED

DATE: Dec. 10, 1998

STANDARD PLAN NO.  
S-614-50

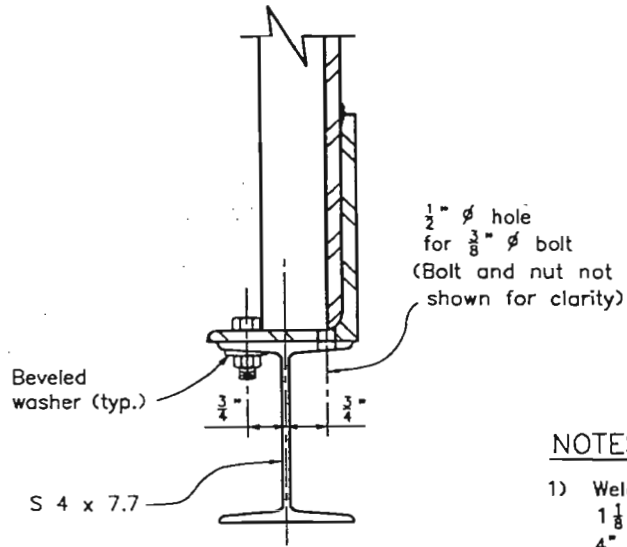
SHEET 6 OF 12 (ENGLISH)



**WALKWAY PLAN**

Note: Sign panel and zee brackets not shown for clarity.

Vary to utilize a minimum number of brackets 5'-6" (max) Walkway continuous between signs

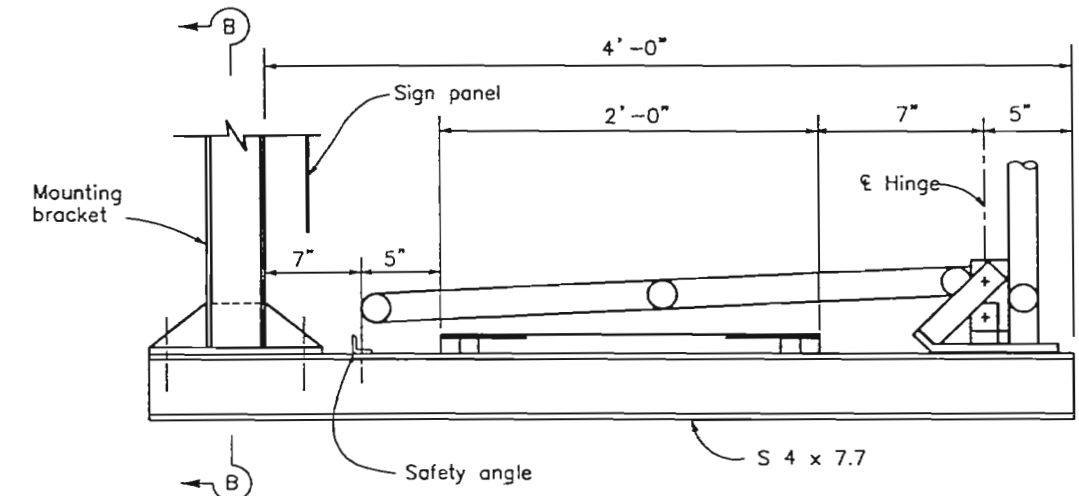


**SECTION B-B**

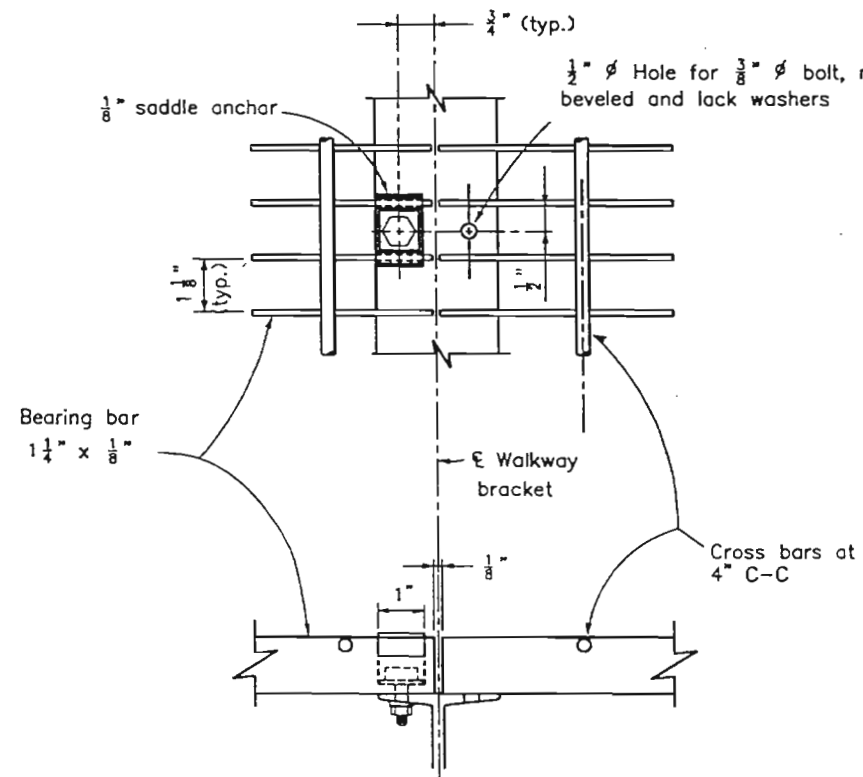
**NOTES**

- 1) Welded type grating shall have  $1\frac{1}{4}$ " x  $\frac{1}{8}$ " bearing bars at  $1\frac{1}{8}$ " centers with  $\frac{1}{4}$ " diameter (or equal) cross bars at 4" centers. If mechanical lock grating is used, it shall be equal in strength to the welded type. Alternate hold-down clips may be submitted for approval.
- 2) Walkway grating to be continuous (no splices) over as many walkway brackets as practical consistent with fabrication, ease of handling and assembly.

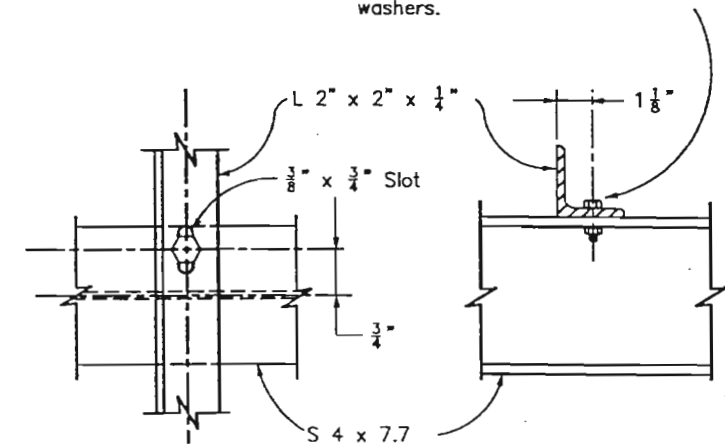
$\frac{3}{8}$ "  $\phi$  Hex head bolt and nut. Provide flat, lock and beveled washers.



**TYPICAL WALKWAY SECTION**



**WALKWAY DETAILS**



**SAFETY ANGLE DETAILS**

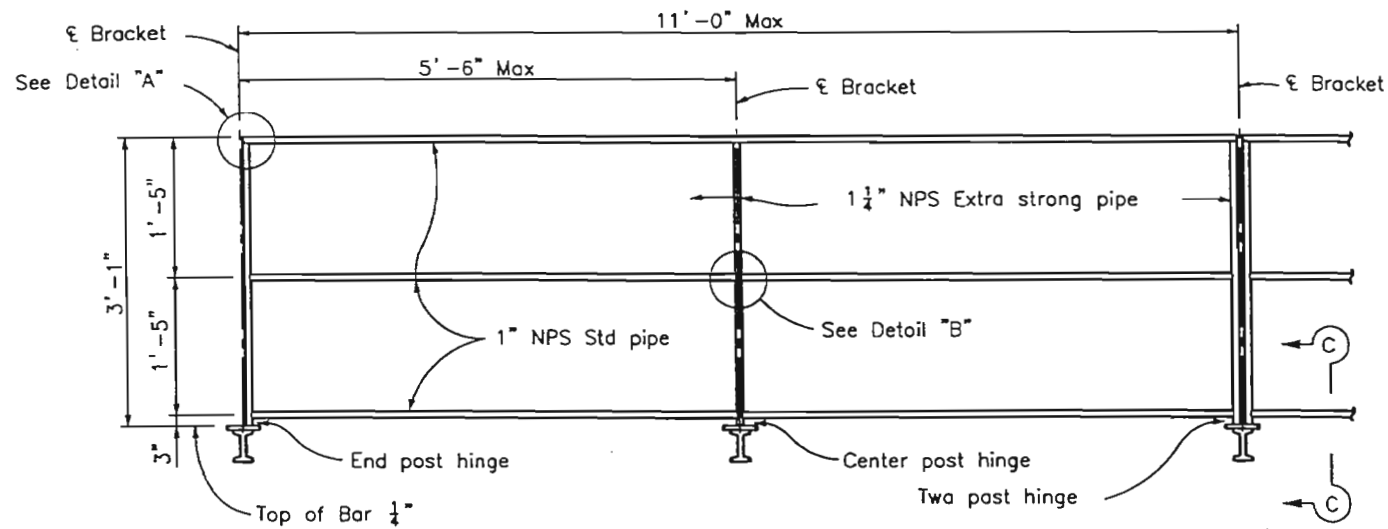
COLORADO DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGNS - MONOTUBE WALKWAY DETAILS

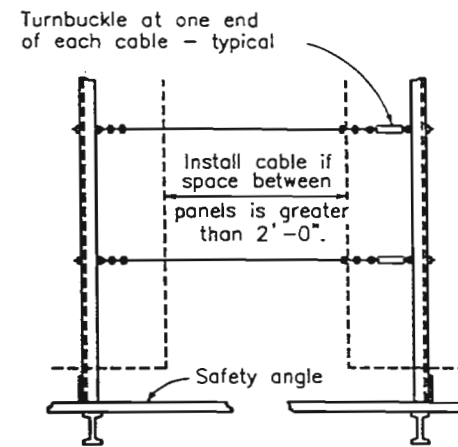
NO SCALE

ISSUED BY TRANS. SAFETY AND TRAFFIC ENGR. BRANCH	STANDARD PLAN NO. S-614-50
DATE REVISI	DATE: Dec. 10, 1998

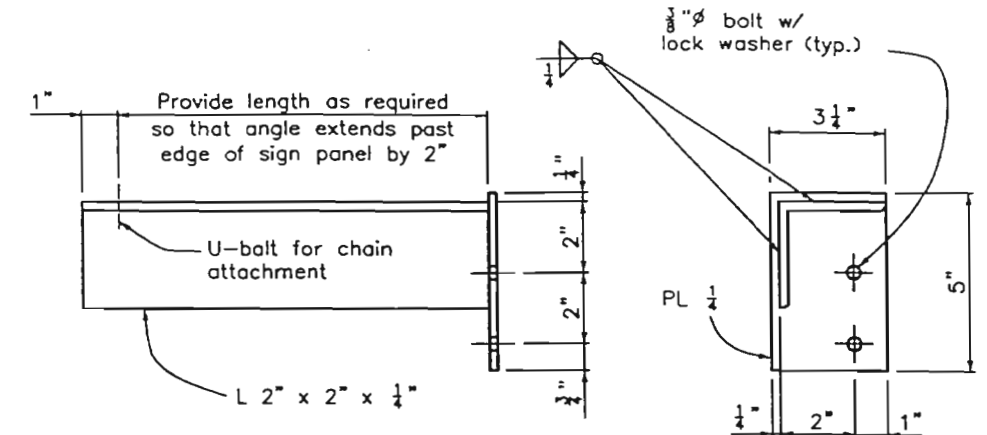




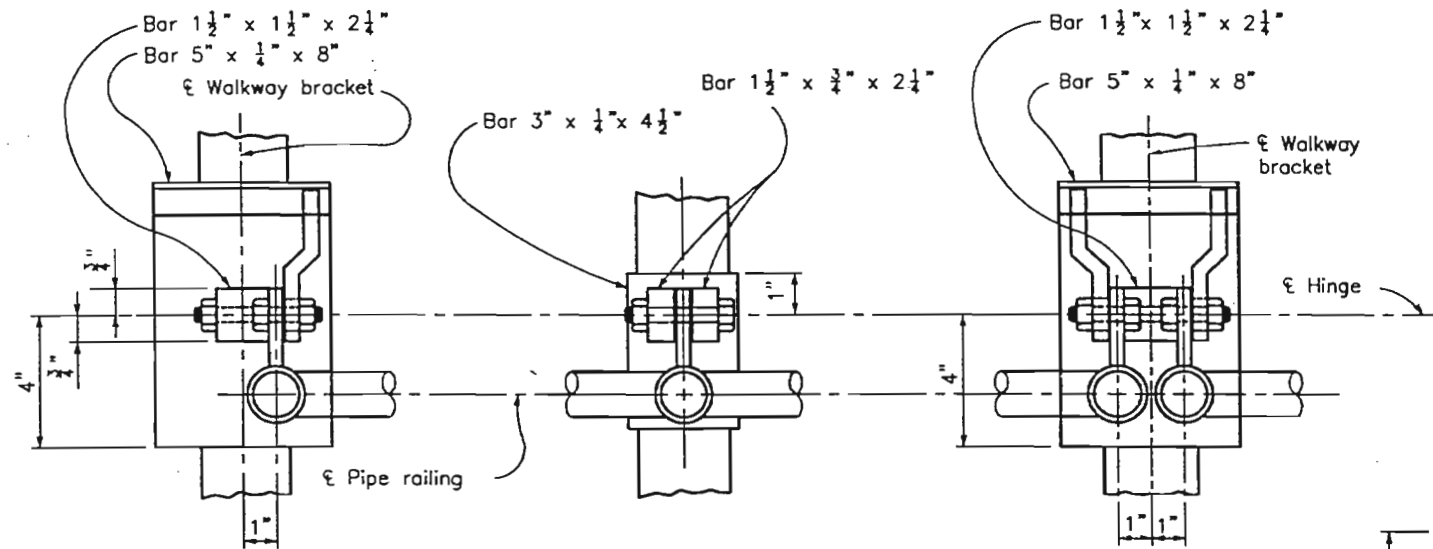
**SAFETY RAILING ELEVATION**



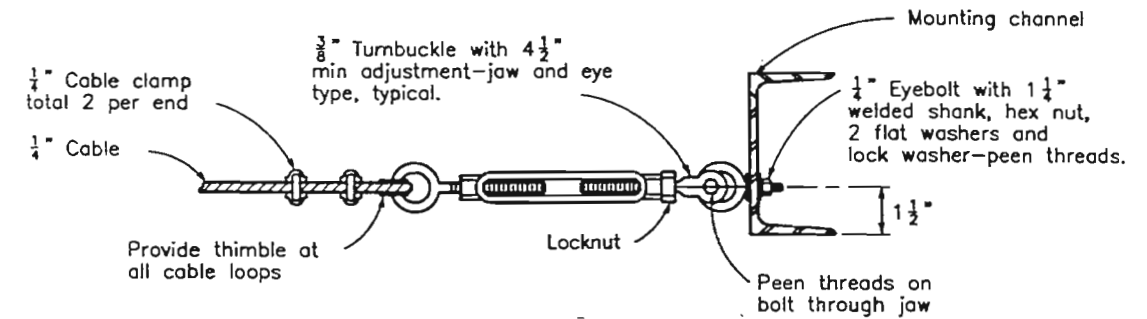
**BETWEEN PANELS**



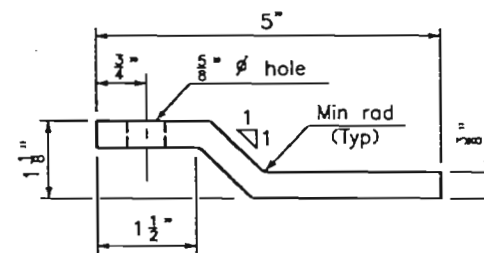
**DETAIL C**



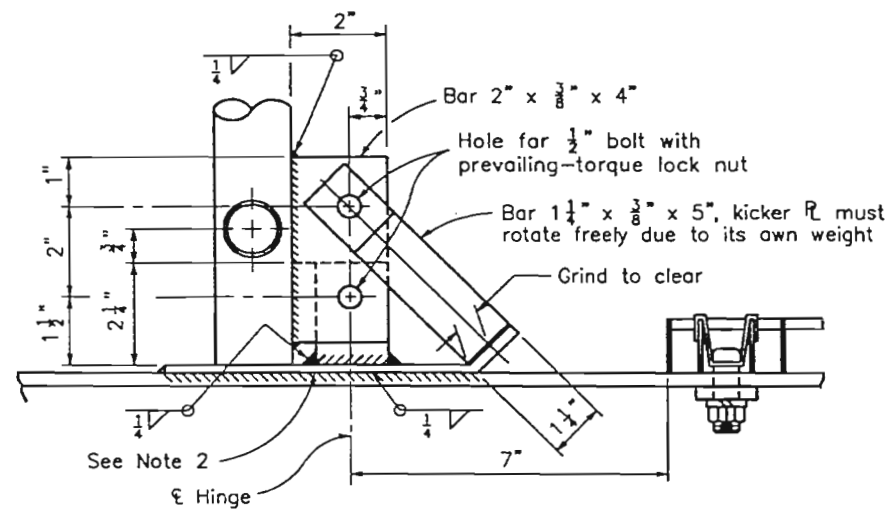
**HINGE - PLAN**



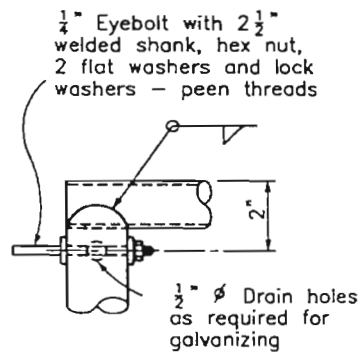
**TURNBUCKLE DETAILS**



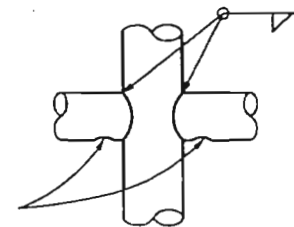
**PLAN - KICKER BAR**



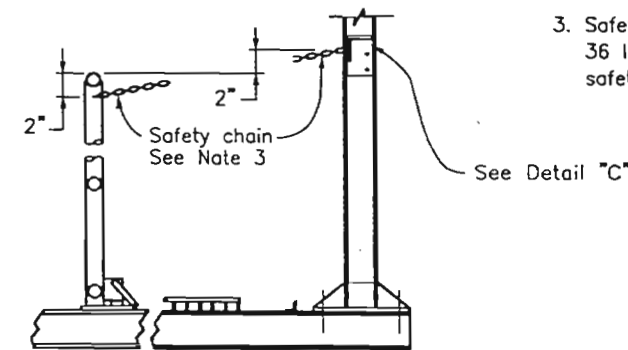
**SECTION C-C**



**DETAIL A**



**DETAIL B**



**CHAIN ASSEMBLY**

**NOTES**

1. Special care shall be taken to insure that the complete hinge and latch assembly will hold the safety railing in a steady manner, free of wobble while in the raised position. Maximum allowable displacement from vertical at top of railing when latched shall be 1".
2. Details for bolting hinge base plate to walkway bracket may be submitted for approval.
3. Safety chain shall be 1/4" galvanized steel coil chain, approximately 36 links per yard. Length shall be minimum which allows lock-up of safety railing.

**NOTES**

Alternative venting methods may be used if approved by the Engineer.

COLORADO  
DEPARTMENT OF TRANSPORTATION  
OVERHEAD SIGNS - MONOTUBE  
WALKWAY SAFETY RAILING DETAILS

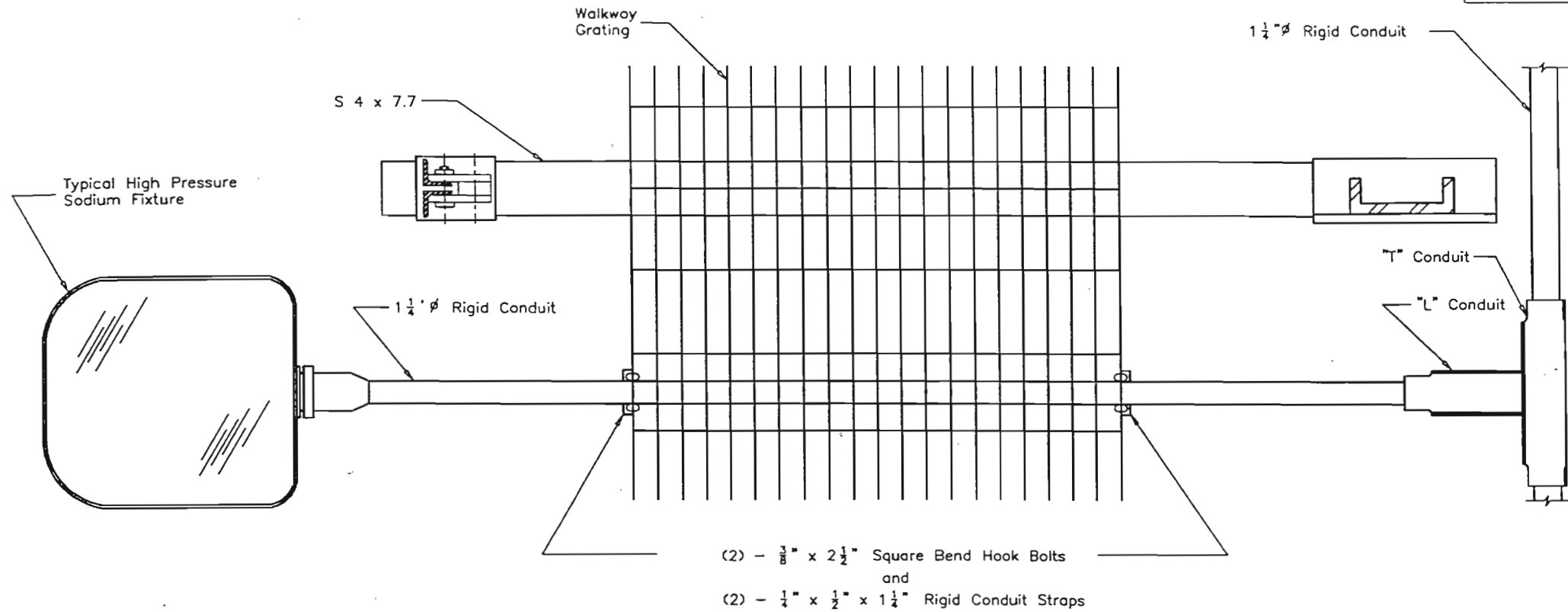
9-25-99

NO SCALE

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TRAFFIC ENGR. BRANCH  
DATE REVISIONS

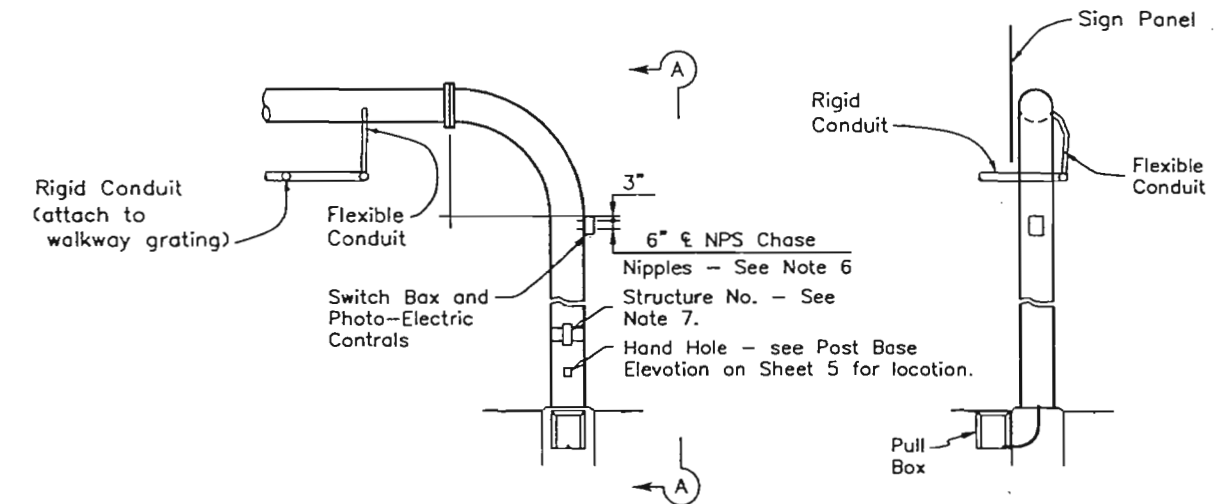
STANDARD PLAN NO.  
S-614-50  
SHEET 8 OF 12 (ENGLISH)



**LIGHTING NOTES**

1. Fixtures shall be watertight, dustproof and designed for ease of lamp and ballast replacement.
2. Lamp shall be of High Pressure Sodium type (250 Watt). Lamps and ballasts shall be designed to operate over an ambient temperature range of -20° F to +120° F.
3. Ballasts shall be of the magnetic regulator type specifically manufactured for use with high pressure sodium lamps, and shall operate at a minimum of 90% power factor. Operation shall be suitable with a line voltage variation of ±10%.
4. The type, number and spacing of fixtures shall be per manufacturer's specifications to maintain a maximum initial illumination of the sign face of 30 footcandles to 60 footcandles with a maximum uniformity ratio (maximum illumination / minimum illumination) of 5:1.
5. Fixture and mounting details will be subject to approval by the Engineer.
6. Drill and tap 1 1/2" NPS chase nipples and plug with recessed pipe plugs. Place perpendicular to sign panel axis and away from approaching traffic.

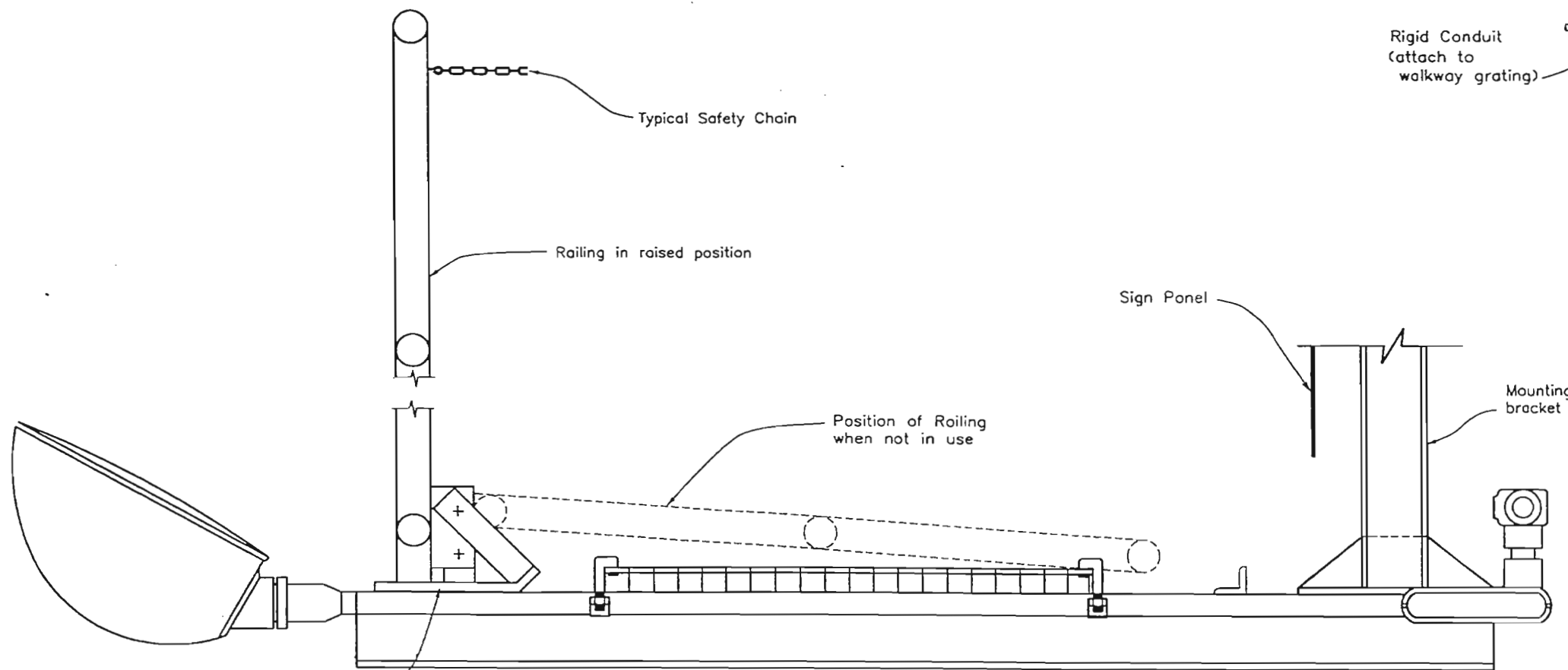
(2) - 3/8" x 2 1/2" Square Bend Hook Bolts  
and  
(2) - 1/2" x 1/2" x 1 1/2" Rigid Conduit Straps



**SECTION A-A**

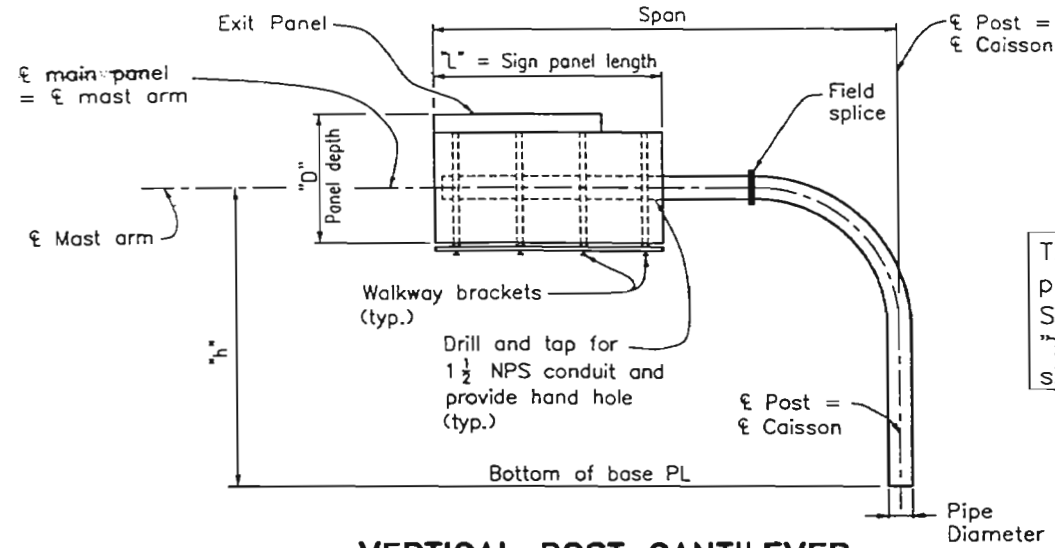
**NOTE:**

See other pages in this standard for details not shown. All details which are not shown on this sheet have been omitted for clarity.



See Hinge and Railing Details, Sheet 8

COLORADO DEPARTMENT OF TRANSPORTATION	
OVERHEAD SIGNS - MONOTUBE LIGHTING DETAILS	
9-25-99	NO SCALE
ISSUED BY TRANS. SAFETY AND TRAFFIC ENGR. BRANCH	STANDARD PLAN NO. S-614-50
DATE REVISIONS	DATE: Dec. 10, 1998 SHEET 9 of 12 (ENGLISH)



**VERTICAL POST CANTILEVER**

**PIPE SELECTION PROCEDURE FOR VERTICAL POST CANTILEVERS**

- A. Coverage Percentage =  $\frac{\text{Sign panel length}}{\text{Span}}$  For the span length use the span from one of the charts (25', 35', etc.), not the actual span.
- B. Pick the pipe outside diameter (OD) from the 0-50% or the 51-80% chart. The coverage percentage chosen should be high enough to include any sign panels which may potentially be placed on this sign in the future.
- C. To determine "D" for the selection charts add the area of the exit panel, if present, to the main sign panel area. Divide by the main panel length to obtain "D".
- D. If no tube is shown for a certain span this indicates that this span/sign panel/height combination exceeds the limits of this standard.
- E. On the overhead sign x-section sheet indicate the diameter of the tube, the height "h" and the span.

This sheet is to be used for the purpose of creating the "Overhead Sign X-section sheets" and the "Tabulation of Overhead Signs" sheet for a given project.

80 MPH WIND

**UP TO 50% COVERAGE CHART**

"D" (ft.) →	"h" (ft.) →	10'		12'		14'	
		h ≤ 25	25 < h ≤ 30	h ≤ 25	25 < h ≤ 30	h ≤ 25	25 < h ≤ 30
Span ≤ (ft.)	20'	12.75	14	14	14	14	16
	25	14	16	16	16	16	18
	30	16	18	18	18	18	20
	35	18	20	20	20	24	24
	40	20	24	24	24	24	24
	45	24	24	24	24		

**51-80% COVERAGE CHART**

"D" (ft.) →	"h" (ft.) →	10'		12'		14'	
		h ≤ 25	25 < h ≤ 30	h ≤ 25	25 < h ≤ 30	h ≤ 25	25 < h ≤ 30
Span ≤ (ft.)	20'	16	16	16	18	18	20
	25	18	18	18	20	20	24
	30	20	20	20	24	24	24
	35	24	24	24	24	24	
	40	24	24				
	45						

90 MPH WIND

"D" (ft.) →	"h" (ft.) →	10'		12'		14'	
		h ≤ 25	25 < h ≤ 30	h ≤ 25	25 < h ≤ 30	h ≤ 25	25 < h ≤ 30
Span ≤ (ft.)	20'	14	14	16	16	16	18
	25	16	18	18	18	18	20
	30	18	20	20	20	24	24
	35	20	24	24	24	24	24
	40	24	24	24			
	45						

"D" (ft.) →	"h" (ft.) →	10'		12'		14'	
		h ≤ 25	25 < h ≤ 30	h ≤ 25	25 < h ≤ 30	h ≤ 25	25 < h ≤ 30
Span ≤ (ft.)	20'	16	18	18	20	20	20
	25	20	20	20	24	24	24
	30	24	24	24	24	24	
	35	24					
	40						
	45						

100 MPH WIND

"D" (ft.) →	"h" (ft.) →	10'		12'		14'	
		h ≤ 25	25 < h ≤ 30	h ≤ 25	25 < h ≤ 30	h ≤ 25	25 < h ≤ 30
Span ≤ (ft.)	20'	16	16	16	18	18	18
	25	18	18	20	20	20	24
	30	20	24	24	24	24	24
	35	24	24	24			
	40						

"D" (ft.) →	"h" (ft.) →	10'		12'		14'	
		h ≤ 25	25 < h ≤ 30	h ≤ 25	25 < h ≤ 30	h ≤ 25	25 < h ≤ 30
Span ≤ (ft.)	20'	18	20	20	24	24	24
	25	20	24	24	24	24	
	30	24	24				
	35						

**PROCEDURE TO DETERMINE THE DESIGN WIND SPEED**

80 mph is the standard design wind speed for the State of Colorado. The standard design wind speed of 80 mph is to be used at all locations except the following:

- Use the 90 mph wind speed for locations within 4 miles of either side of the base of the foothills along the front range of the eastern slope.
- Use the 100 mph wind speed for locations in Boulder County.

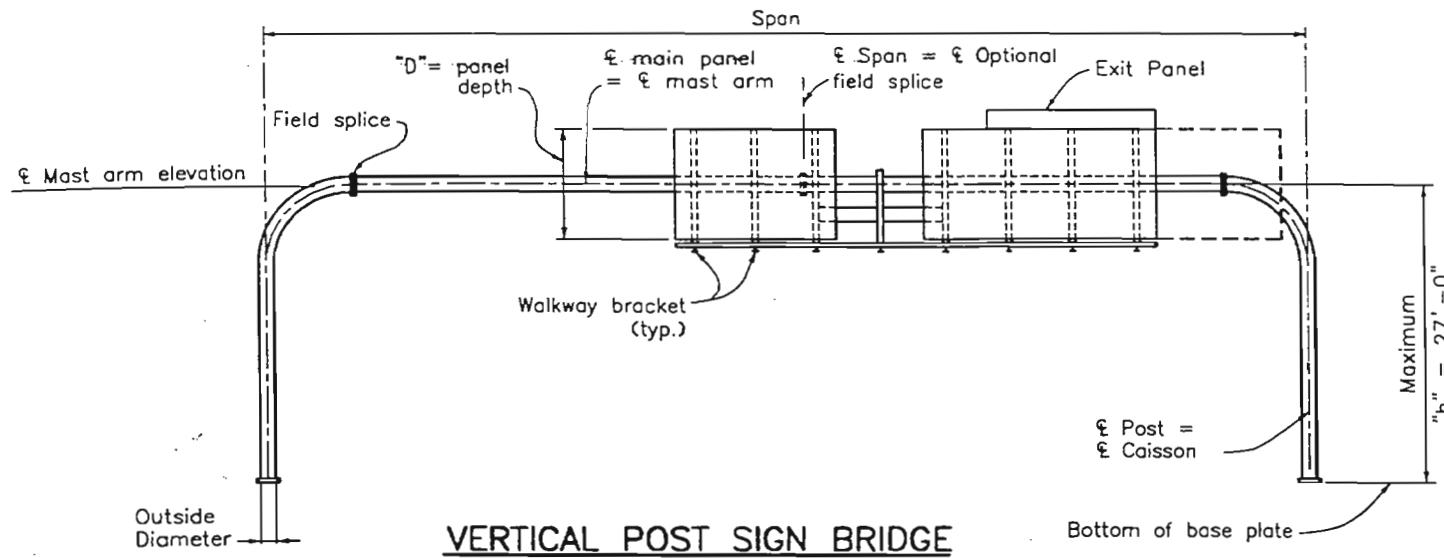
If there are questions concerning the proper design wind speed contact the Staff Bridge Branch.

**COLORADO DEPARTMENT OF TRANSPORTATION OVERHEAD SIGNS - MONOTUBE CANTILEVER PIPE SELECTION WORKSHEET**

NO SCALE

ISSUED BY TRANS. SAFETY AND TRAFFIC ENGR. BRANCH STANDARD PLAN NO. S-614-50

DATE REVISIED DATE: Dec. 10, 1998 SHEET 10 OF 12 (ENGLISH)



**VERTICAL POST SIGN BRIDGE**

**STRUCTURE SELECTION PROCEDURE FOR SIGN BRIDGES**

- A. Design is based on a sign height of 15' with 50% of the span length covered up until the capacity of the largest pole shown is reached. Beyond this point the coverage percentage decreases.
- B. The maximum primary panel height is 14'. Add the area of all exit panels to the area of all primary panels to check against maximum sign panel area.
- C. Obtain the design wind speed from the overhead sign x-section.
- D. Pick pipe OD and split size from the appropriate chart. Include the area of all sign panels shown in the overhead sign x-section sheets which may potentially be placed on the sign in the future.
- E. Maximum difference between post heights on an individual frame = 5'-0"
- F. If no pole/arm size is shown for a certain span this indicates that this span/sign panel/height combination exceeds the limits of this standard.
- G. The overhead sign x-section sheets indicate the height "h", the span and the sign panel sizes.

80 MPH WIND

Span ≤	Maximum sign panel area (Sq. Ft.)	* PIPE POST	
		Pipe OD (in.)	Split (in.)
50'	375	12.75	5
60'	450	14	5
70'	525	16	5
80'	600	18	5
90'	675	20	5
100'	750	20	5
110'	825	24	5
120'	900	24	5
130'	780	24	5
140'	700	24	5

\* Mast arm diameter same as post.

**PROCEDURE TO DETERMINE THE DESIGN WIND SPEED**

80 mph is the standard design wind speed for the State of Colorado. The standard design wind speed of 80 mph is to be used at all locations except the following:

1. Use the 90 mph wind speed for locations within 4 miles of either side of the base of the foothills along the front range of the eastern slope.
2. Use the 100 mph wind speed for locations in Boulder County.

If there are questions concerning the proper design wind speed contact the Staff Bridge Branch.

90 MPH WIND

Span ≤	Maximum sign panel area (Sq. Ft.)	* PIPE POST	
		Pipe OD (in.)	Split (in.)
50'	375	14	5
60'	450	16	5
70'	525	18	5
80'	600	20	5
90'	675	24	5
100'	750	24	5
110'	775	24	5
120'	650	24	5
130'	585	24	5
140'	525	24	5

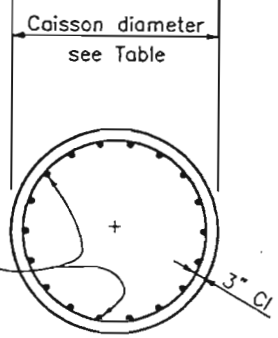
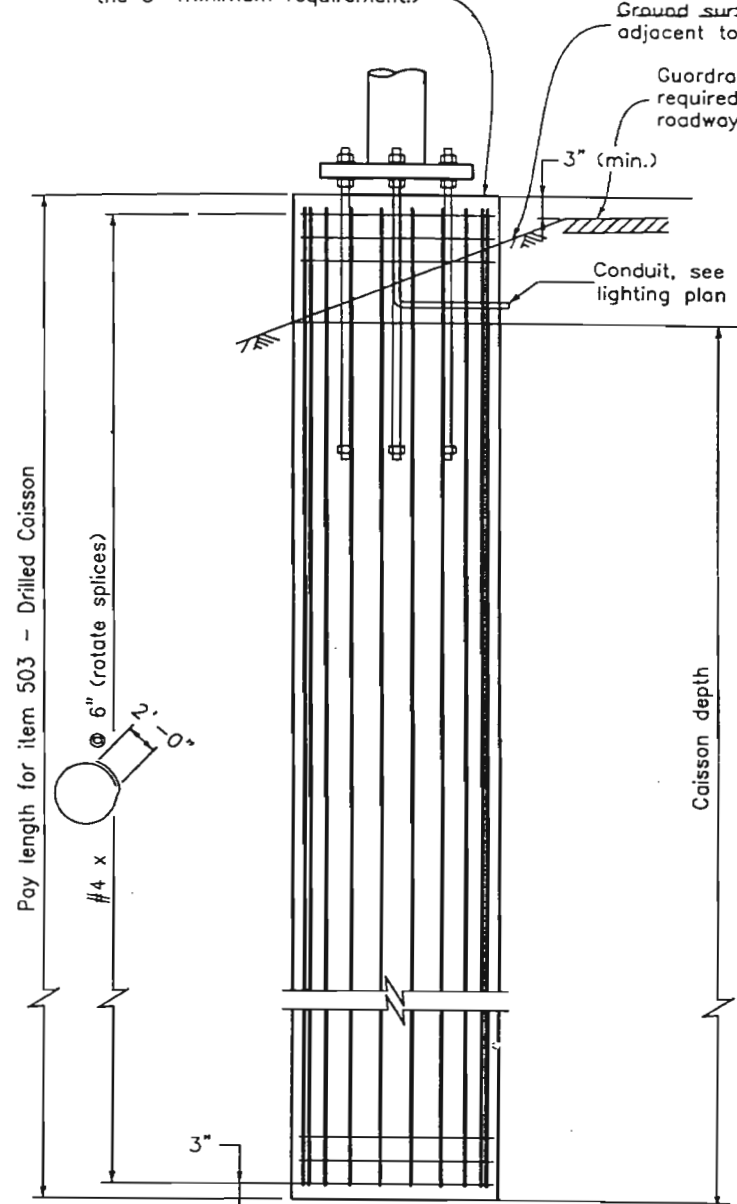
\* Mast arm diameter same as post.

Span ≤	Maximum sign panel area (Sq. Ft.)	* PIPE POST	
		Pipe OD (in.)	Split (in.)
50'	375	16	5
60'	450	18	5
70'	525	20	5
80'	600	24	5
90'	675	24	5
100'	660	24	5
110'	580	24	5
120'	500	24	5
130'	450	24	5
140'	400	24	5

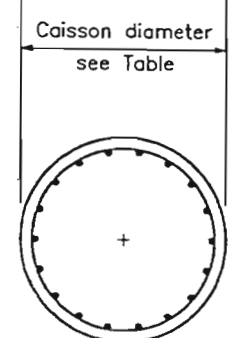
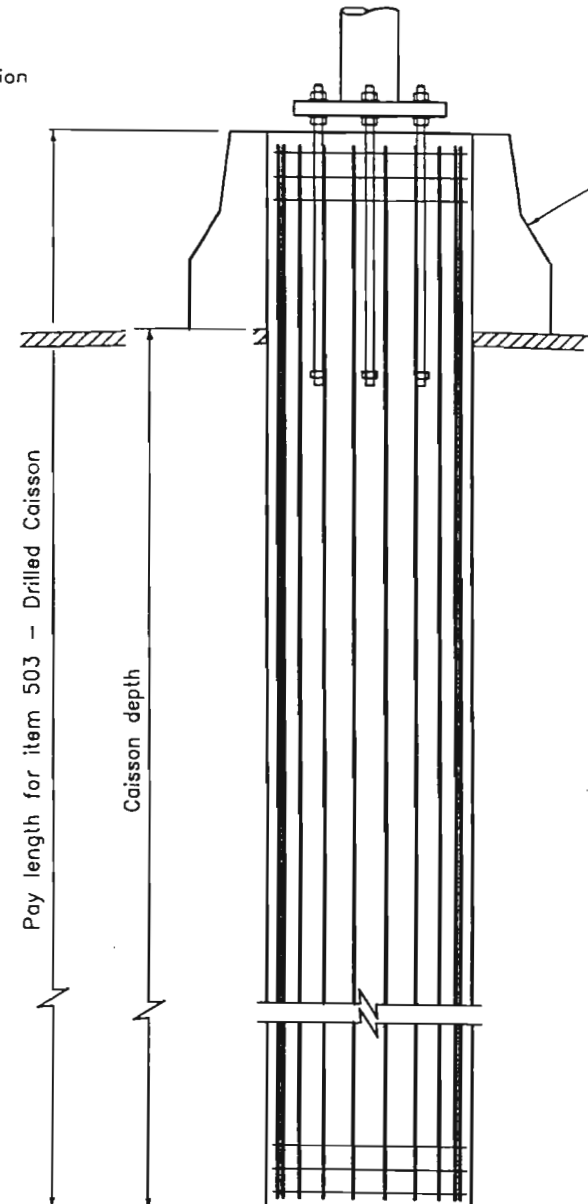
\* Mast arm diameter same as post.

COLORADO DEPARTMENT OF TRANSPORTATION OVERHEAD SIGNS - MONOTUBE SIGN BRIDGE STRUCTURE SELECTION WORKSHEET NO SCALE	
ISSUED BY TRANS. SAFETY AND TRAFFIC ENGR. BRANCH	STANDARD PLAN NO. S-614-50
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Locate the top of the caisson at the elevation of the highpoint of the highway under the sign structure. (Adjust as necessary to meet the 3" minimum requirement.)



Ground surface adjacent to traffic  
 Guardrail protection required per the roadway plans.  
 3" (min.)  
 Conduit, see lighting plan



Type 4 Concrete Barrier as shown in roadway plans.

This sheet is to be used for the purpose of creating the "Overhead Sign X-section sheet(s)" and the "Tabulation of Overhead Signs" sheet for a given project.

**CAISSON DRILLING NOTES**

1. Contact the Engineer if any of the following situations are encountered during drilling:
  - a) The soil has a high organic content or consists of saturated silt and clay.
  - b) The site won't support the weight of the drilling rig.
  - c) The foundation soils are not homogenous.
  - d) Firm bedrock is encountered.
2. Caissons shall be placed against undisturbed earth.
3. The following soils were used for design:
  - a) Granular with a unit weight of 100 pcf and a 28 degree angle of internal friction (phi angle).
  - b) Cohesive with a unit weight of 100 pcf and a unit cohesion of 500 psf.

**Bridges**

Pipe Outside Diameter (inches)	Split (inches)	Caisson Diameter (inches)	Caisson Depth (feet)	Vertical Reinf
12.75	5	48	17	18 - #8
14	5	48	19	24 - #8
16	5	48	20	24 - #8
18	5	54	21	24 - #8
20	5	54	22	24 - #8
24	5	54	24	24 - #8

**Cantilevers**

Pipe Outside Diameter (inches)	Split (inches)	Caisson Diameter (inches)	Caisson Depth (feet)	Vertical Reinf
12.75	-	36	13	13 - #8
14	-	42	15	18 - #8
16	-	42	16	18 - #8
18	-	42	17	18 - #8
20	-	48	18	24 - #8
24	-	48	20	24 - #8

**CAISSON FOUNDATION DETAILS  
 MEDIAN RAIL INSTALLATION**

(See Roadside Shoulder Installation for additional information)

**CAISSON FOUNDATION DETAILS  
 ROADSIDE SHOULDER INSTALLATION**

**COLORADO  
 DEPARTMENT OF TRANSPORTATION**

**OVERHEAD SIGNS - MONOTUBE  
 FOUNDATION SELECTION WORKSHEET**

NO SCALE

ISSUED BY TRANS. SAFETY AND TRAFFIC ENGR. BRANCH	STANDARD PLAN NO. S-614-50
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