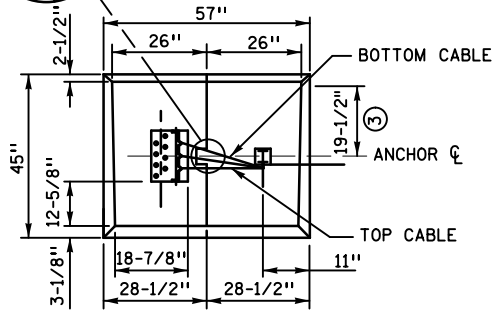
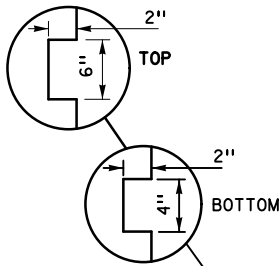
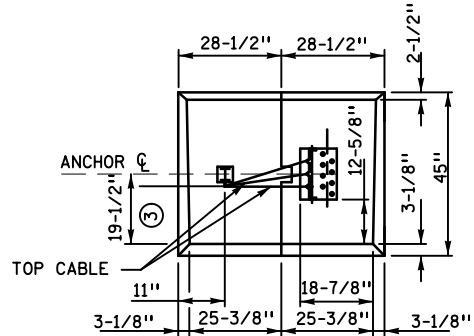


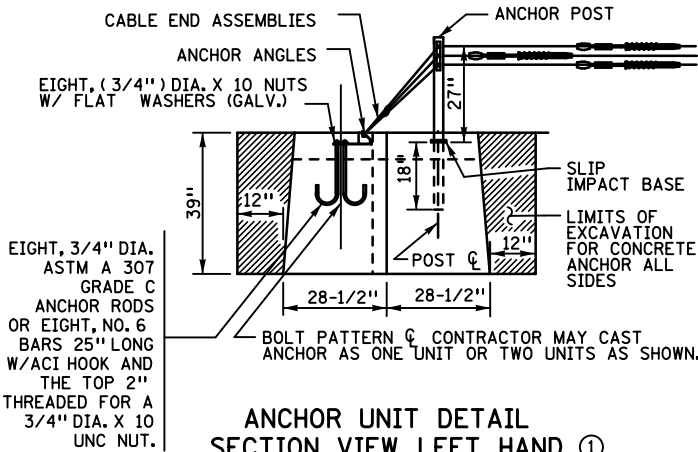
TAPERED KEYWAY DETAIL



ANCHOR UNIT DETAIL
TOP VIEW LEFT HAND
(REINFORCEMENT NOT SHOWN)



ANCHOR UNIT DETAIL
TOP VIEW RIGHT HAND
(REINFORCEMENT NOT SHOWN)
TWO PIECE



ANCHOR UNIT DETAIL
SECTION VIEW LEFT HAND ①

(REINFORCEMENT NOT SHOWN)

NOTES:

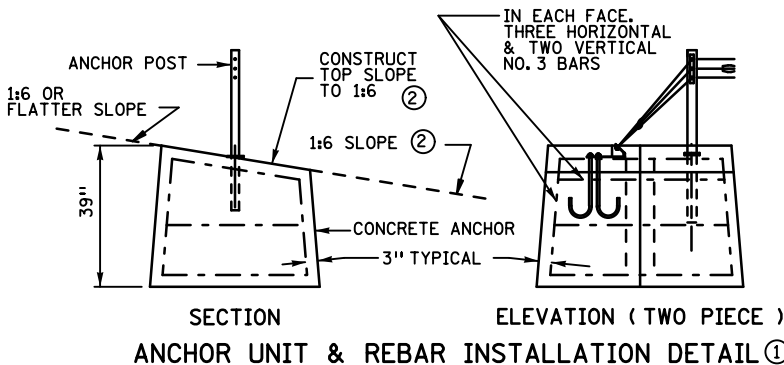
ANCHOR SHALL BE ONE OR TWO PIECE. DIMENSIONS OF TWO PIECE ANCHOR ARE SHOWN ON DRAWING. DIMENSIONS OF ONE PIECE ANCHOR ARE 59" LONG BY 35" WIDE BY 39" HIGH.

LIFTING DEVICES, IF EMBEDDED IN CONCRETE, SHALL BE RATED BY THEIR MANUFACTURER AS HAVING A "SAFE WORKING LOAD" OF FOUR TONS (4 TONS U.S. CUSTOMARY) FOR THE ONE PIECE ANCHOR AND TWO TONS (2 TONS) EACH FOR EACH OF THE HALVES OF THE TWO PIECE ANCHOR UNIT.

① THE CONCRETE ANCHOR SHALL BE SET INTO THE EXCAVATION AS DETAILED. THE BOTTOM OF THE ANCHOR SHALL HAVE A FULL AND EVEN BEARING ON THE SURFACE UNDER IT SO THAT IF THE CONTRACTOR ELECTS TO PLACE THE ANCHOR IN TWO SECTIONS, THERE WILL BE LITTLE OR NO DIFFERENTIAL SETTLEMENT. IF THE CONTRACTOR ELECTS TO PLACE THE ANCHOR IN TWO SECTIONS, THE TOPS OF BOTH SECTIONS SHALL BE ON THE SAME PLANE. AFTER THE ANCHOR IS IN PLACE, THE EXCAVATION SHALL BE BACKFILLED IN ACCORDANCE WITH STANDARD SPEC. 2451.

② IT IS PERMISSIBLE TO CAST THE ANCHOR IN PLACE, IF IT IS NOT POSSIBLE TO HAVE 1:6 OR FLATTER SLOPES ADJACENT TO POST. SLOPE THE TOP AND DOCUMENT THE DECISION. (SLOPE NOT TO BE STEEPER THAN 1:4 IN DOCUMENTED SITUATIONS.) IT IS POSSIBLE TO BURY ONE EDGE. NO PART OF THE ANCHOR SHALL EXTEND MORE THAN 4 INCHES ABOVE GROUND. DO NOT BURY THE PART WITH THE ANCHOR ANGLE NOTCHES THAT CABLES HOOK ON TO.

③ 19 3/4" ACTUAL DISTANCE ON 1:6 SLOPE.



SECTION ELEVATION (TWO PIECE)
ANCHOR UNIT & REBAR INSTALLATION DETAIL ①

APPROVED AUGUST 2, 2002

Delbert W. Gerdas
STATE DESIGN ENGINEER

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

3-CABLE GUARDRAIL ANCHOR
ANCHOR DETAILS

SPECIFICATION
REFERENCE

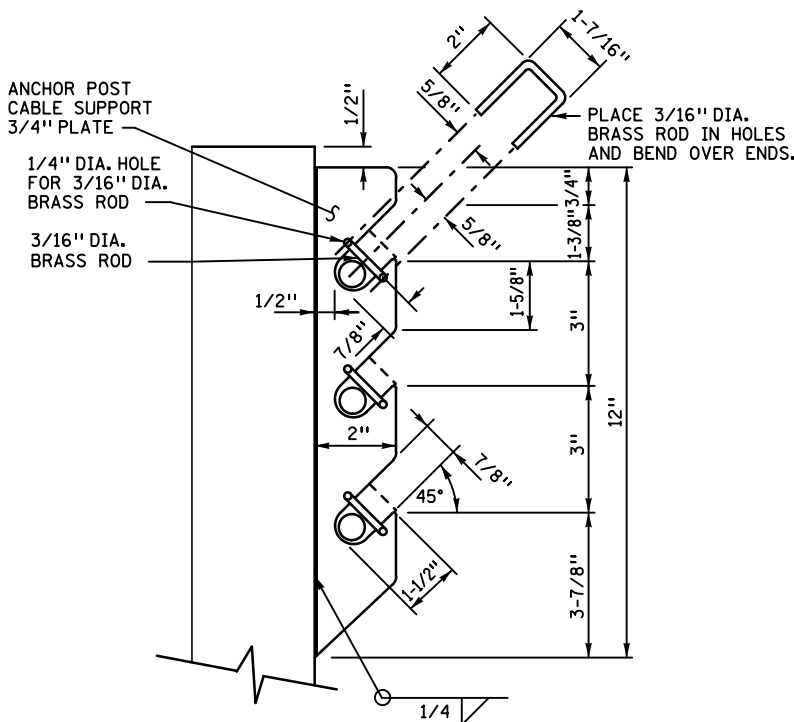
2554

REVISION
3-22-2013 M.J.E.

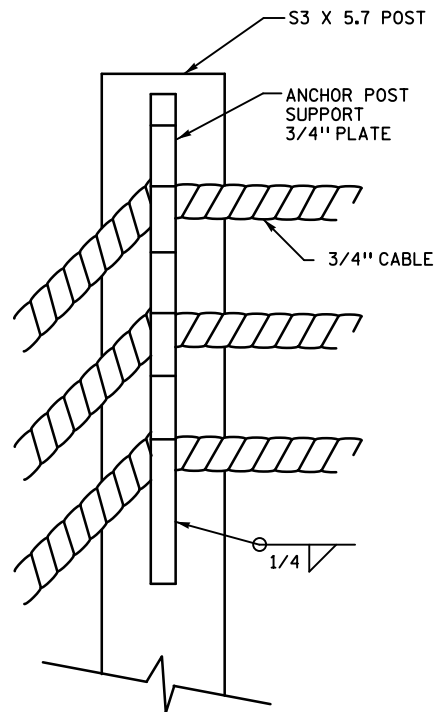
STANDARD
PLATE
NO.

8333B

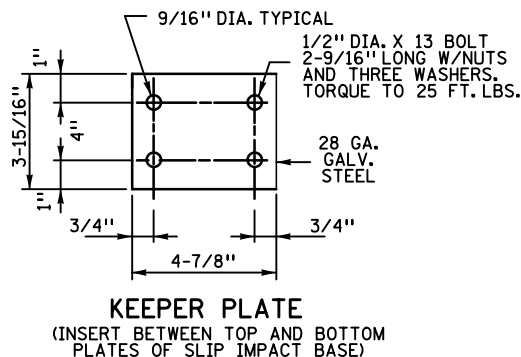
1 OF 4



SIDE VIEW OF POST TOP

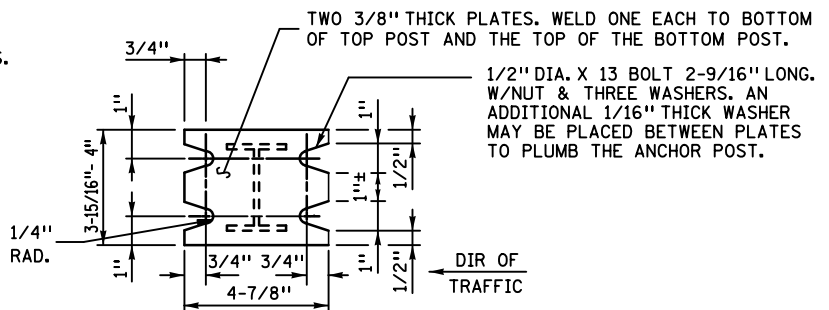


**FRONT VIEW OF POST TOP
(TRAFFIC SIDE)**



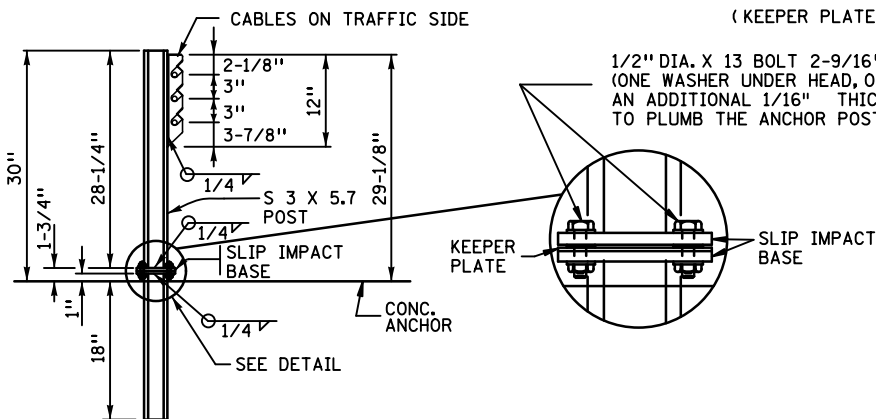
KEEPER PLATE

(INSERT BETWEEN TOP AND BOTTOM PLATES OF SLIP IMPACT BASE)



SLIP IMPACT BASE

(KEEPER PLATE NOT SHOWN)



SIDE VIEW

ANCHOR POST DETAIL

(SHOWN FOR LEFT HANDED ANCHOR)

NOTES:

ALL POSTS SHALL BE S3 X 5.7 ROLLED STEEL SECTIONS. POSTS AND PLATES SHALL CONFORM TO ASTM A36 AND SHALL HAVE TYPE I GALVANIZING ACCORDING TO AASHTO M111 (ASTM A123).

DO NOT INSTALL CABLE GUARDRAIL ON THE INSIDE OF HORIZONTAL CURVES GREATER THAN 4°.

APPROVED AUGUST 2, 2002

Delbert W. Jendoe
STATE DESIGN ENGINEER

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

**3-CABLE GUARDRAIL ANCHOR
POST DETAILS**

SPECIFICATION
REFERENCE

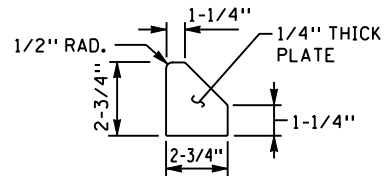
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REVISION DATE
1-05-05

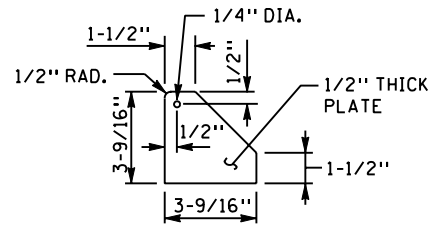
STANDARD
PLATE
NO.

8333B

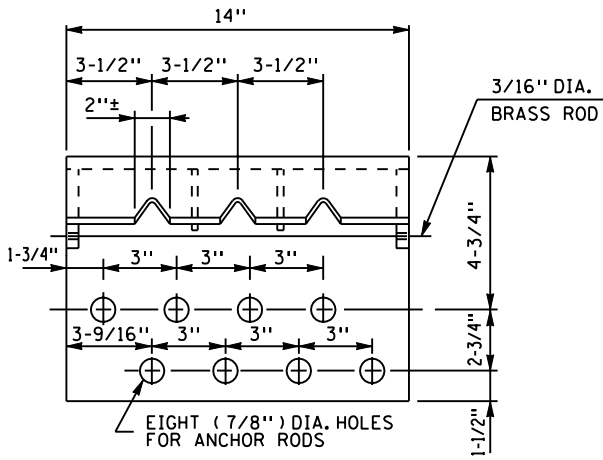
2 OF 4



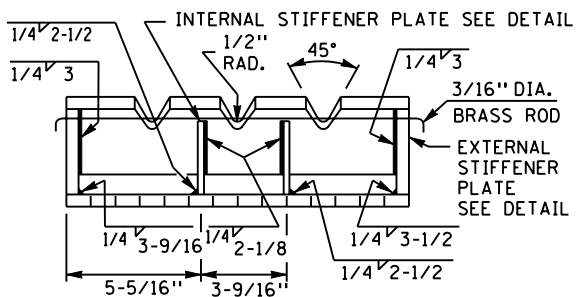
INTERNAL STIFFENER PLATE



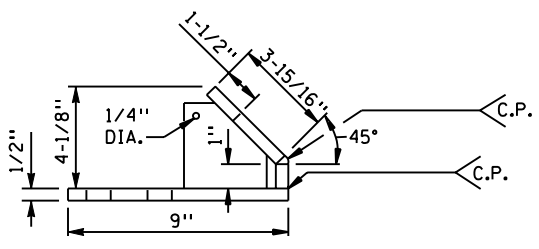
EXTERNAL STIFFENER PLATE



PLAN VIEW



SIDE VIEW

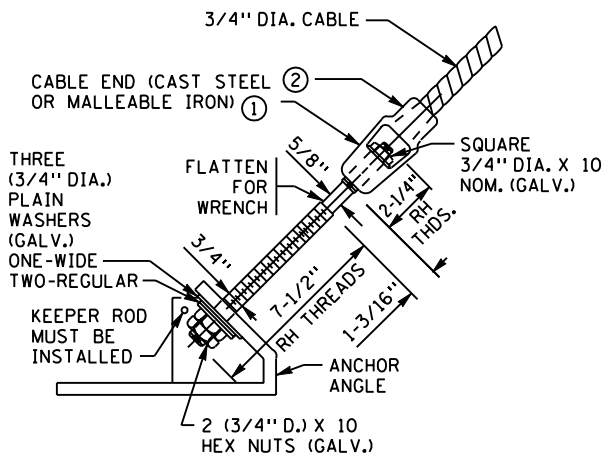


END VIEW

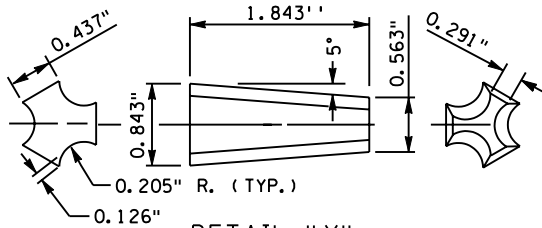
ANCHOR ANGLE DETAILS

NOTES:
ALTERNATE METHODS OF FABRICATING ANCHOR ANGLES SHALL BE SUBMITTED FOR APPROVAL.

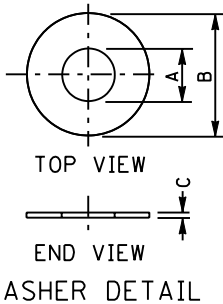
APPROVED <u>AUGUST 2, 2002</u>	STATE OF MINNESOTA DEPARTMENT OF TRANSPORTATION	SPECIFICATION REFERENCE	STANDARD PLATE NO.
<i>Delbert W. Indes</i> STATE DESIGN ENGINEER	3-CABLE GUARDRAIL ANCHOR ANCHOR ANGLE DETAILS	2554	8333B
		REVISION DATE 1-05-05	3 OF 4



CABLE END ASSEMBLY TO ANCHOR ANGLE DETAIL

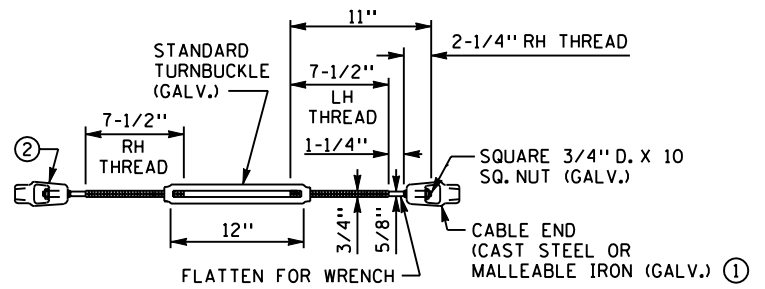


DETAIL "X"
TYPICAL WEDGE
USE FOR TURNBUCKLE CABLE
END ASSEMBLY AND
COMPENSATING DEVICE.
(DO NOT GALVANIZE)

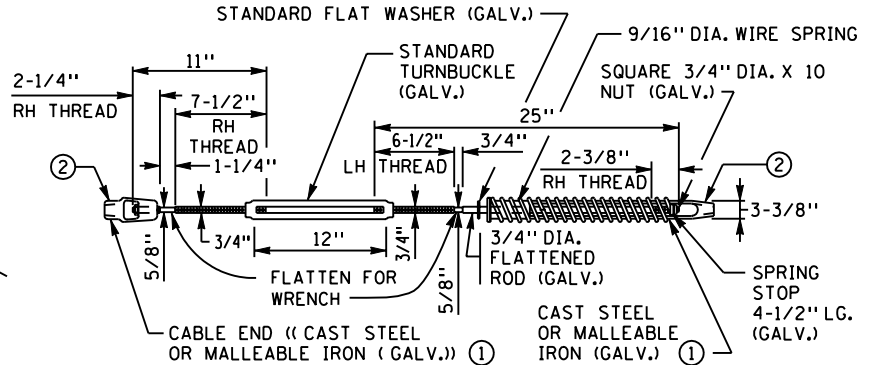


WASHER DETAIL

WASHER	WASHER SERIES	A		B		C	
		INSIDE DIA. IN.	INSIDE DIA. IN.	OUTSIDE DIA. IN.	OUTSIDE DIA. IN.	THICKNESS	THICKNESS
3/4"	REGULAR	0.879	0.858	1.969	1.944	0.181	0.138
	WIDE	0.879	0.858	2.598	2.551	0.201	0.157
1/2"	NARROW	0.534	0.524	1.000	0.980	0.110	0.079



DETAIL "A"
STEEL TURNBUCKLE CABLE END ASSEMBLY ③



DETAIL "B"
SPRING CABLE END ASSEMBLY (COMPENSATING DEVICE) ③

NOTES:

3/4" ROUND WIRE CABLE SHALL CONSIST OF THREE STRANDS (7 WIRES PER STRAND) AND HAVE A MINIMUM TENSILE STRENGTH OF 25 KIPS.

AT ALL LOCATIONS WHERE THE CABLE IS CONNECTED TO A CABLE SOCKET WITH A WEDGE TYPE CONNECTION, ONE WIRE OF THE WIRE ROPE SHALL BE CRIMPED OVER THE BASE OF THE WEDGE TO HOLD IT FIRMLY IN PLACE.

DESIGNS FOR A STEEL TURNBUCKLE CABLE END ASSEMBLY OR SPRING CABLE END ASSEMBLY SHALL BE SUBMITTED FOR APPROVAL. COMPENSATING DEVICES MUST HAVE A SPRING RATE OF 456 LBS./INCH ± 46 LBS./INCH AND A TOTAL AVAILABLE "THROW" OF 6" MIN.

- ① WIRE ROPE CONNECTING HARDWARE SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M269. THE ROPE, WITH CONNECTING HARDWARE ATTACHED, SHALL DEVELOP THE FULL STRENGTH OF A SINGLE CABLE (25 KIPS). CAST STEEL COMPONENTS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M103 (ASTM A27) GRADE 70-40 CLASS 1.
- ② ALL CABLE ENDS AND SPLICES SHALL BE DESIGNED TO USE THE WEDGE SHOWN IN DETAIL "X" AND SHALL DEVELOP THE FULL STRENGTH OF THE 3/4" ROUND CABLE (25 KIPS). THE CABLE ENDS AND SPLICES SHALL HAVE A HOT DIPPED GALVANIZED COATING ACCORDING TO AASHTO M30, TYPE 1, CLASS A.
- ③ THE FOLLOWING CRITERIA SHALL APPLY TO CABLE SYSTEMS.
ON TANGENTS AND ON THE OUTSIDE OF HORIZONTAL CURVES:
FOR INDIVIDUAL CABLE RUNS:
- UP TO 1,000 FEET, USE A TURNBUCKLE ON ONE END OF THE RUN AND A COMPENSATING DEVICE ON THE OTHER END.
- FROM 1,000 TO 2,000 FEET, USE A COMPENSATING DEVICE ON BOTH ENDS OF THE RUN.
- OVER 2,000 FEET IN LENGTH, USE INTERMEDIATE ANCHORS. THE ANCHORS SHALL BE EQUALLY SPACED AT INTERVALS NOT TO EXCEED 2,000 FEET.
- DO NOT USE CABLE GUARDRAIL ON THE INSIDE OF CURVES GREATER THAN 4".
ON THE INSIDE OF HORIZONTAL CURVES:
SEE STANDARD PLATE 8331 (SHEET 1 NOTES).

PRIOR TO FINAL ACCEPTANCE BY THE STATE, THE FOLLOWING VALUES SHALL BE USED TO TIGHTEN THE TURNBUCKLES, DEPENDING ON THE TEMPERATURE AT THE TIME OF THE ADJUSTMENT.

TEMPERATURE (DEGREES FAHRENHEIT)													
122	108	99	88	79	68	59	48	39	28	18	9	-2	-11
TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO
109	100	90	81	70	61	50	41	30	19	10	0	-9	-20

SPRING COMPRESSION FROM UNLOADED POSITION IN EACH SPRING IN INCHES
1" 1-1/4" 1-1/2" 1-3/4" 2" 2-1/4" 2-1/2" 2-3/4" 3" 3-1/4" 3-1/2" 3-3/4" 3-15/16" 4-1/4"

APPROVED AUGUST 2, 2002
Delbert W. Lunde
STATE DESIGN ENGINEER

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION
3-CABLE GUARDRAIL ANCHOR
CABLE END DETAILS

SPECIFICATION REFERENCE 2554	STANDARD PLATE NO. 8333B
REVISION DATE 1-05-05	4 OF 4