



Standard drawings

DC STREETCAR

January 2012

d.
District Department of Transportation

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NOTE:

THESE STANDARD DRAWINGS ARE NOT INTENDED TO BE UTILIZED IN EVERY CASE. ALTERNATIVE DESIGNS SHALL BE CREATED TO ACCOMMODATE SPECIFIC PROJECT REQUIREMENTS AS APPROVED BY DDOT.

D.C. DEPARTMENT OF TRANSPORTATION

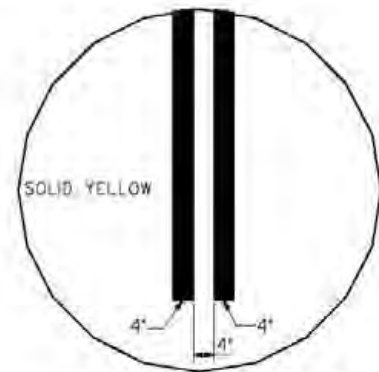
STREETCAR STANDARD DRAWINGS

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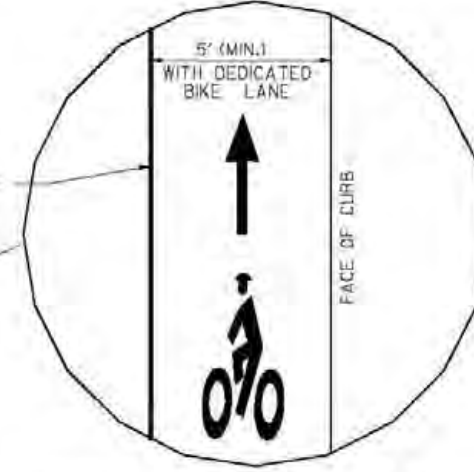
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ISSUED	REVISED	REFERENCE

RECOMMENDED:	<i>Muhammad Khalid</i> DEPUTY CHIEF ENGINEER
APPROVED:	<i>[Signature]</i> CHIEF TRANSPORTATION ENGINEER

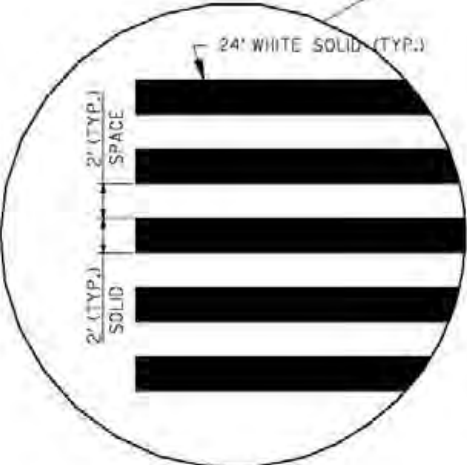
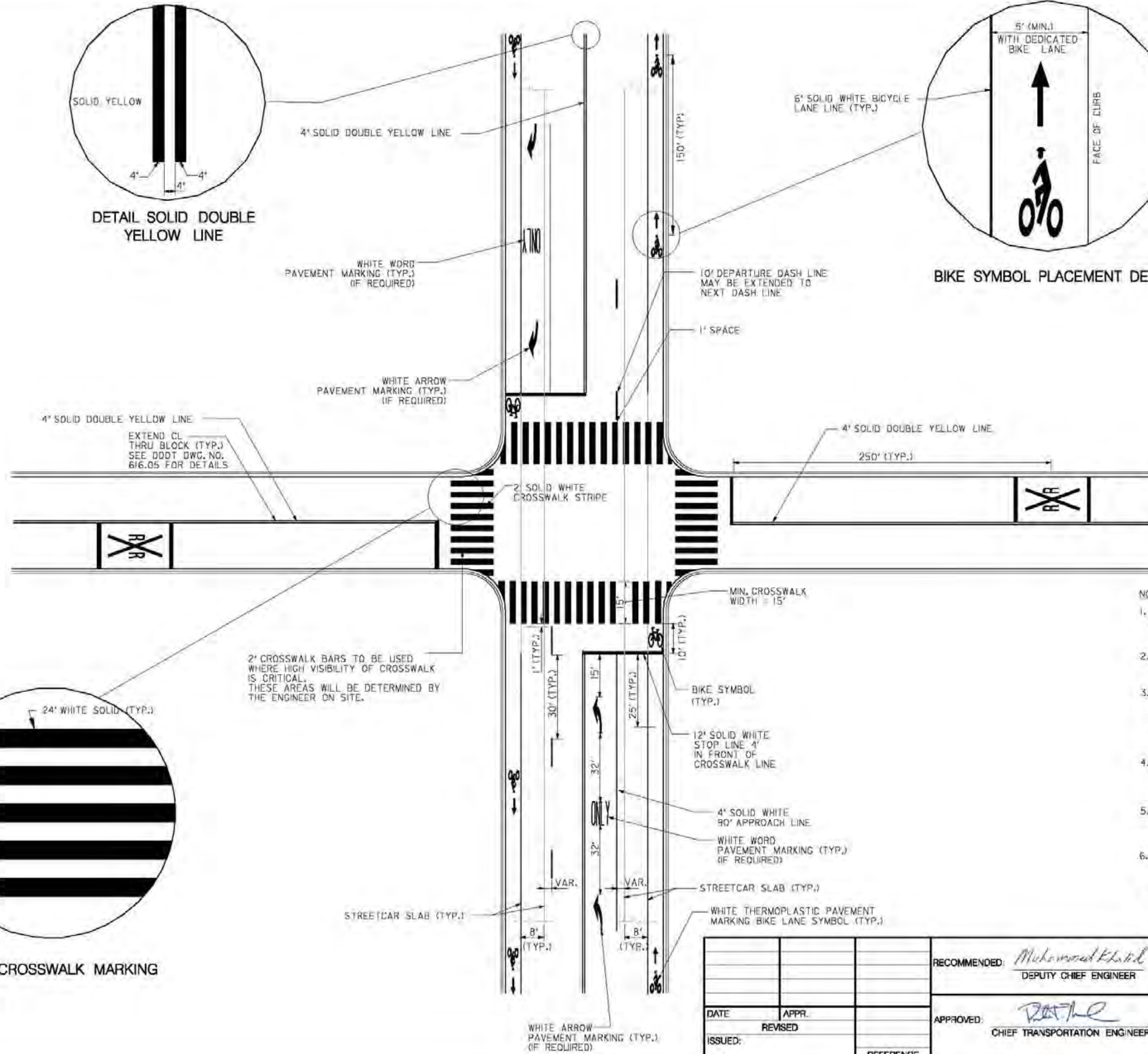
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DRAWN BY	
PROJECT MGR.	
DIVISION CHIEF	
DATE	
FILE	
DWG. NO.	I-01



DETAIL SOLID DOUBLE YELLOW LINE



BIKE SYMBOL PLACEMENT DETAIL



DETAIL CROSSWALK MARKING

NOTES:

1. ALL STRIPING WORK AND SIGNS SHALL MEET ALL APPLICABLE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) AND DOT STANDARDS AND SPECIFICATIONS.
2. WHEELCHAIR RAMP (NOT SHOWN FOR CLARITY) MUST BE LOCATED ENTIRELY WITHIN CROSSWALK.
3. WHEN DIRECTED BY THE ENGINEER, PARKING "L" SHALL BE PLACED TO INDICATE THE END OF THE PARKING SPACES; SPECIFICALLY ADJACENT TO PARKING RESTRICTION SIGNS NEAR STREET INTERSECTIONS, 10 FT. ON EITHER SIDE OF FIRE HYDRANTS AND 5 FT. ON EITHER SIDE OF DRIVEWAY AND/OR ALLEY ENTRANCES.
4. 2' CROSSWALK LINES TO BE USED WHERE HIGH VISIBILITY OF CROSSWALK IS CRITICAL. THESE AREAS WILL BE DETERMINED BY THE TRAFFIC ENGINEER ON SITE.
5. PAVEMENT MARKINGS SHALL NOT BE APPLIED IN THE GUTTER AREA OR ATOP SURFACE STRUCTURES SUCH AS MANHOLE COVERS, VALVES VAULTS, ETC.
6. ALL MARKINGS BETWEEN THE STREET CAR TRACKS MUST BE ADJUSTED TO FIT.

D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

STREETCAR TYPICAL PAVEMENT MARKING WITH DEDICATED BIKE LANE (2 TRAVEL LANES)

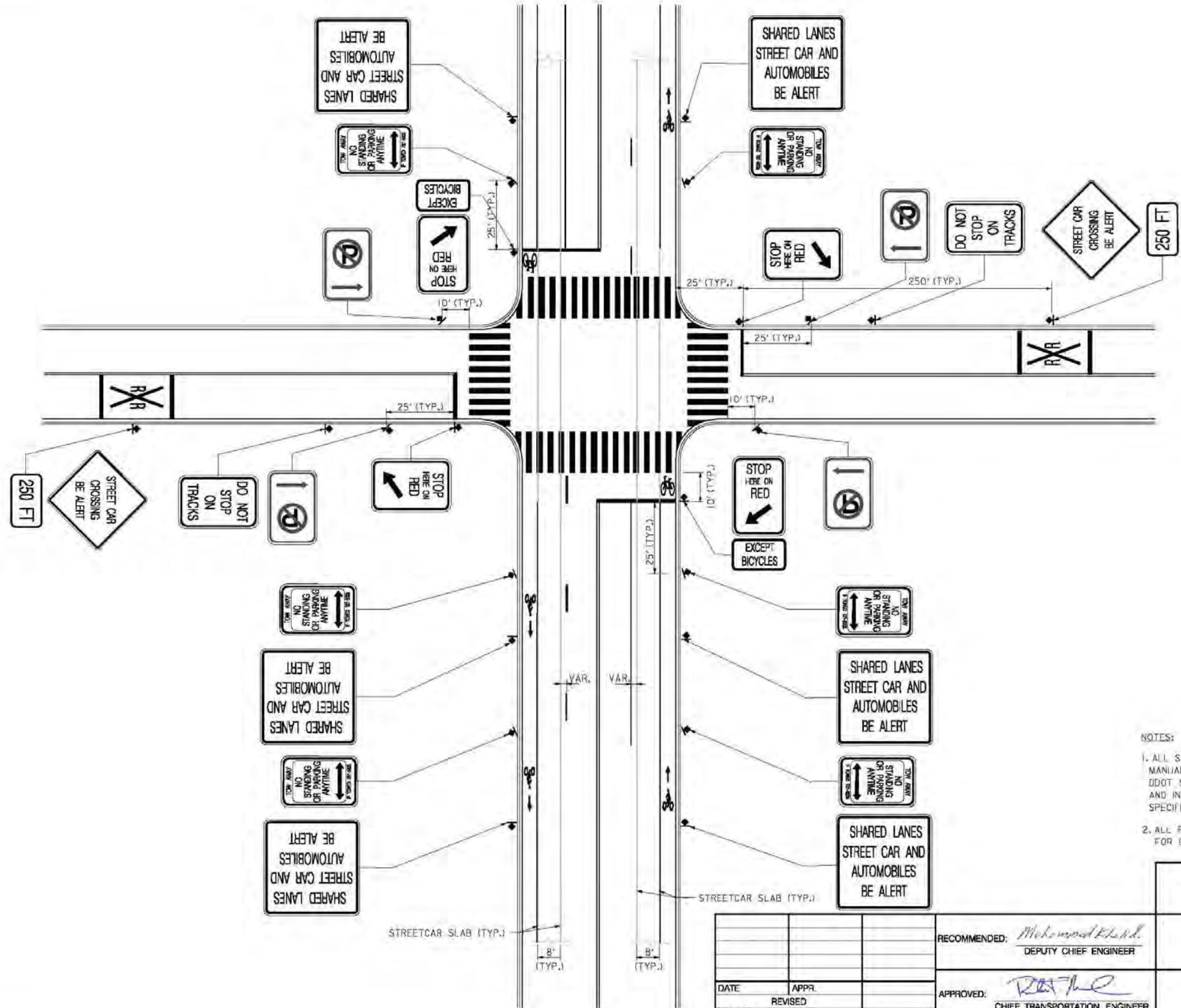
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DATE	APPR.	ISSUED:	REFERENCE
	REVISED		

RECOMMENDED: *Muhammad Khalid*
DEPUTY CHIEF ENGINEER

APPROVED: *[Signature]*
CHIEF TRANSPORTATION ENGINEER

PROJECT ENG.	DESIGNED BY
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CHECKED BY	DRAWN BY
DRAWN BY	PROJECT MGR.
PROJECT MGR.	DIVISION CHIEF
DIVISION CHIEF	DATE
DATE	FILE
FILE	DWG. NO.
DWG. NO.	C-01



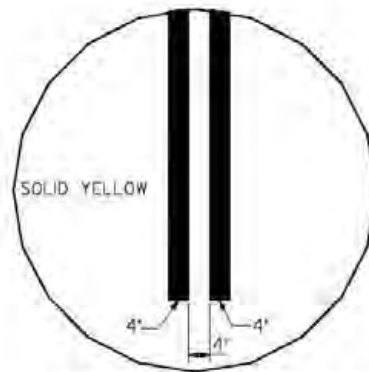
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1. ALL STREETCAR TRAFFIC SIGNS SHALL MEET ALL APPLICABLE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) AND DDOT STANDARDS AND SPECIFICATIONS. SIGNS SHALL BE FABRICATED AND INSTALLED IN ACCORDANCE WITH DDOT STANDARDS AND SPECIFICATIONS.
 2. ALL PARKING RESTRICTION SIGNS SHALL BE ANGLED @ 45 DEGREES FOR BETTER VISIBILITY.

D.C. DEPARTMENT OF TRANSPORTATION	
STREETCAR STANDARD DRAWINGS	PROJECT ENG. _____ DESIGNED BY _____ CHECKED BY _____ DRAWN BY _____ PROJECT NO. _____
STREETCAR TYPICAL TRAFFIC SIGNING WITH DEDICATED BIKE LANE (2 TRAVEL LANES)	DIVISION C-12F DATE _____ FILE _____ DWG. NO. C-12
N.T.S.	

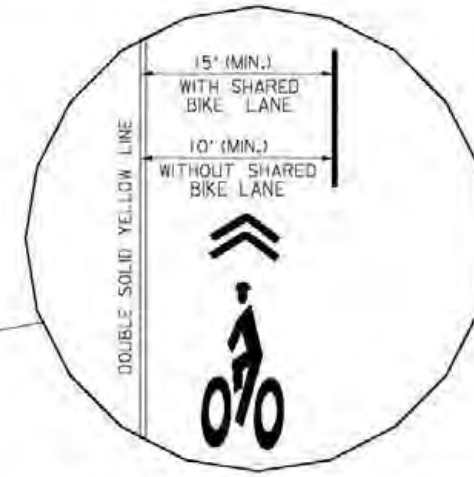
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ISSUED:	REVISED	REFERENCE

RECOMMENDED: *Mohammed Khalid*
 DEPUTY CHIEF ENGINEER

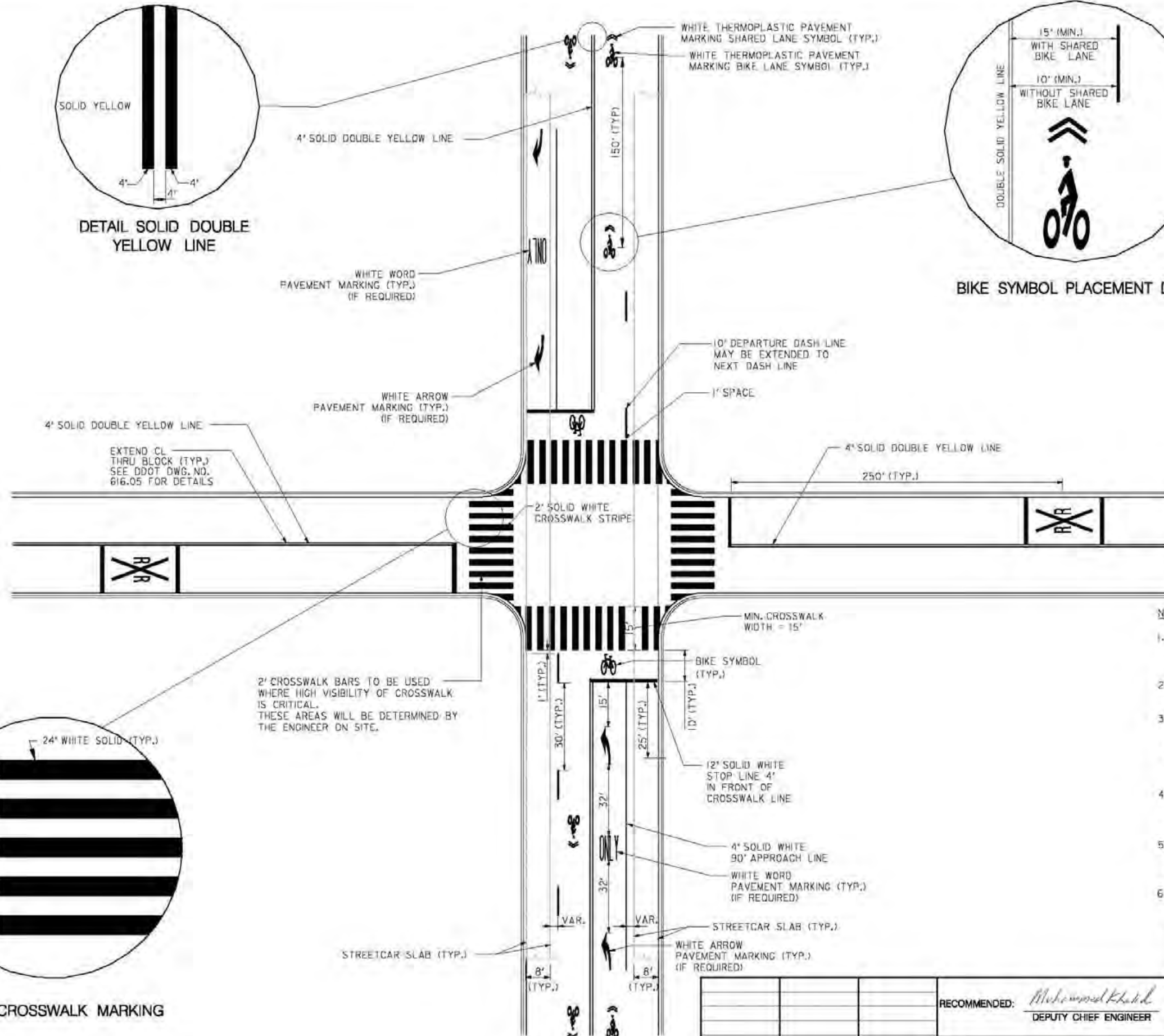
APPROVED: *[Signature]*
 CHIEF TRANSPORTATION ENGINEER



DETAIL SOLID DOUBLE YELLOW LINE



BIKE SYMBOL PLACEMENT DETAIL

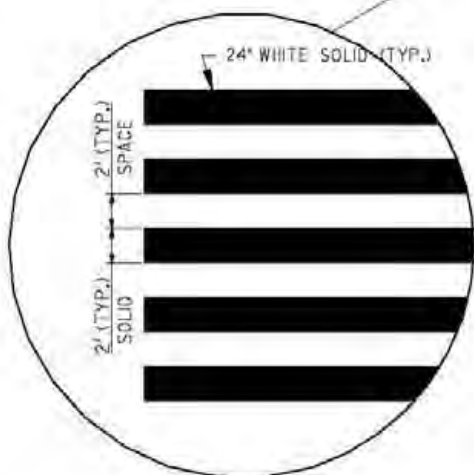


EXTEND CL THRU BLOCK (TYP.) SEE DDOT DWG. NO. 616.05 FOR DETAILS

2' CROSSWALK BARS TO BE USED WHERE HIGH VISIBILITY OF CROSSWALK IS CRITICAL. THESE AREAS WILL BE DETERMINED BY THE ENGINEER ON SITE.

NOTES:

1. ALL STRIPING WORK AND SIGNS SHALL MEET ALL APPLICABLE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) AND DDOT STANDARDS AND SPECIFICATIONS.
2. WHEELCHAIR RAMP (NOT SHOWN FOR CLARITY) MUST BE LOCATED ENTIRELY WITHIN CROSSWALK.
3. WHEN DIRECTED BY THE ENGINEER, PARKING "L" SHALL BE PLACED TO INDICATE THE END OF THE PARKING SPACES; SPECIFICALLY ADJACENT TO PARKING RESTRICTION SIGNS NEAR STREET INTERSECTIONS, 10 FT. ON EITHER SIDE OF FIRE HYDRANTS AND 5 FT. ON EITHER SIDE OF DRIVEWAY AND/OR ALLEY ENTRANCES.
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5. PAVEMENT MARKINGS SHALL NOT BE APPLIED IN THE GUTTER AREA OR ATOP SURFACE STRUCTURES SUCH AS MANHOLE COVERS, VALVES, VAULTS, ETC.
6. ALL MARKINGS BETWEEN THE STREET CAR TRACKS MUST BE ADJUSTED TO FIT.



DETAIL CROSSWALK MARKING

D.C. DEPARTMENT OF TRANSPORTATION

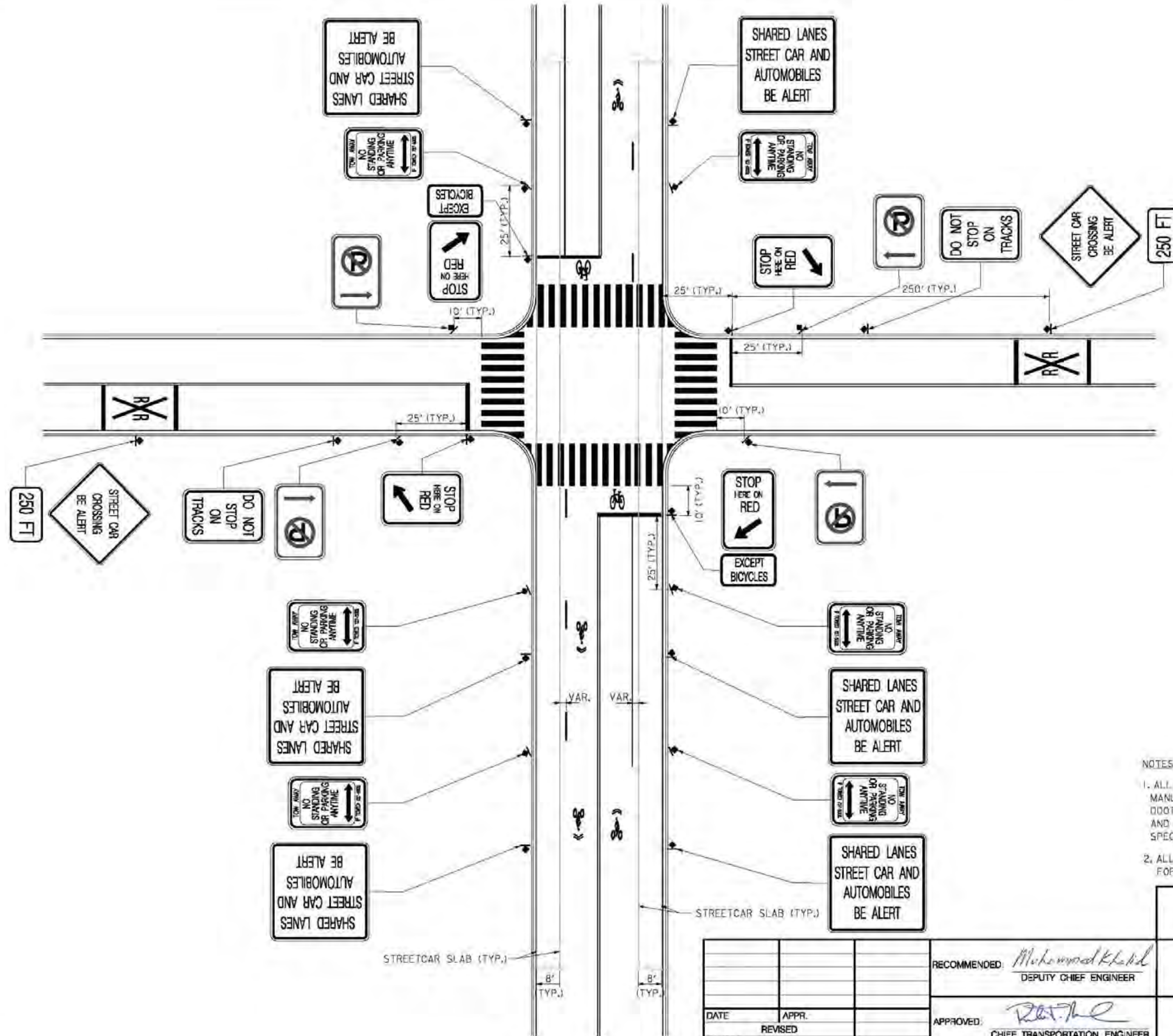
STREETCAR STANDARD DRAWINGS

STREETCAR TYPICAL PAVEMENT MARKING WITH SHARED BIKE LANE (2 TRAVEL LANES)
N.T.S.

RECOMMENDED: *Muhammad Khalid*
DEPUTY CHIEF ENGINEER

APPROVED: *[Signature]*
CHIEF TRANSPORTATION ENGINEER

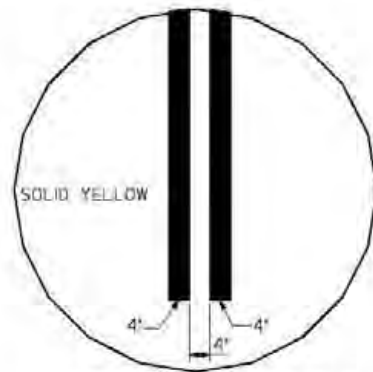
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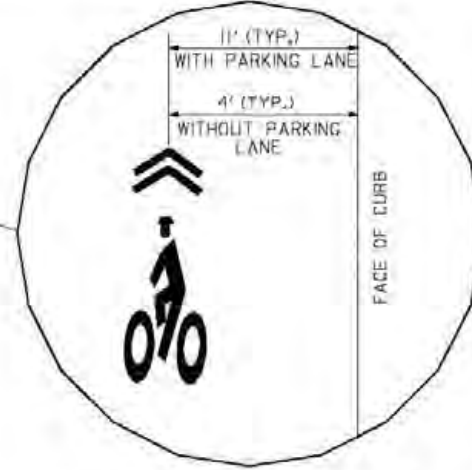
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D.C. DEPARTMENT OF TRANSPORTATION	
STREETCAR STANDARD DRAWINGS	PROJECT ENG. _____ DESIGNED BY _____ CHECKED BY _____ DRAWN BY _____ PROJECT MGR. CV
STREETCAR TYPICAL TRAFFIC SIGNING WITH SHARED BIKE LANE (2 TRAVEL LANES) N.T.S.	DIVISION CHIEF _____ DATE _____ FILE _____ DWG. NO. C-04

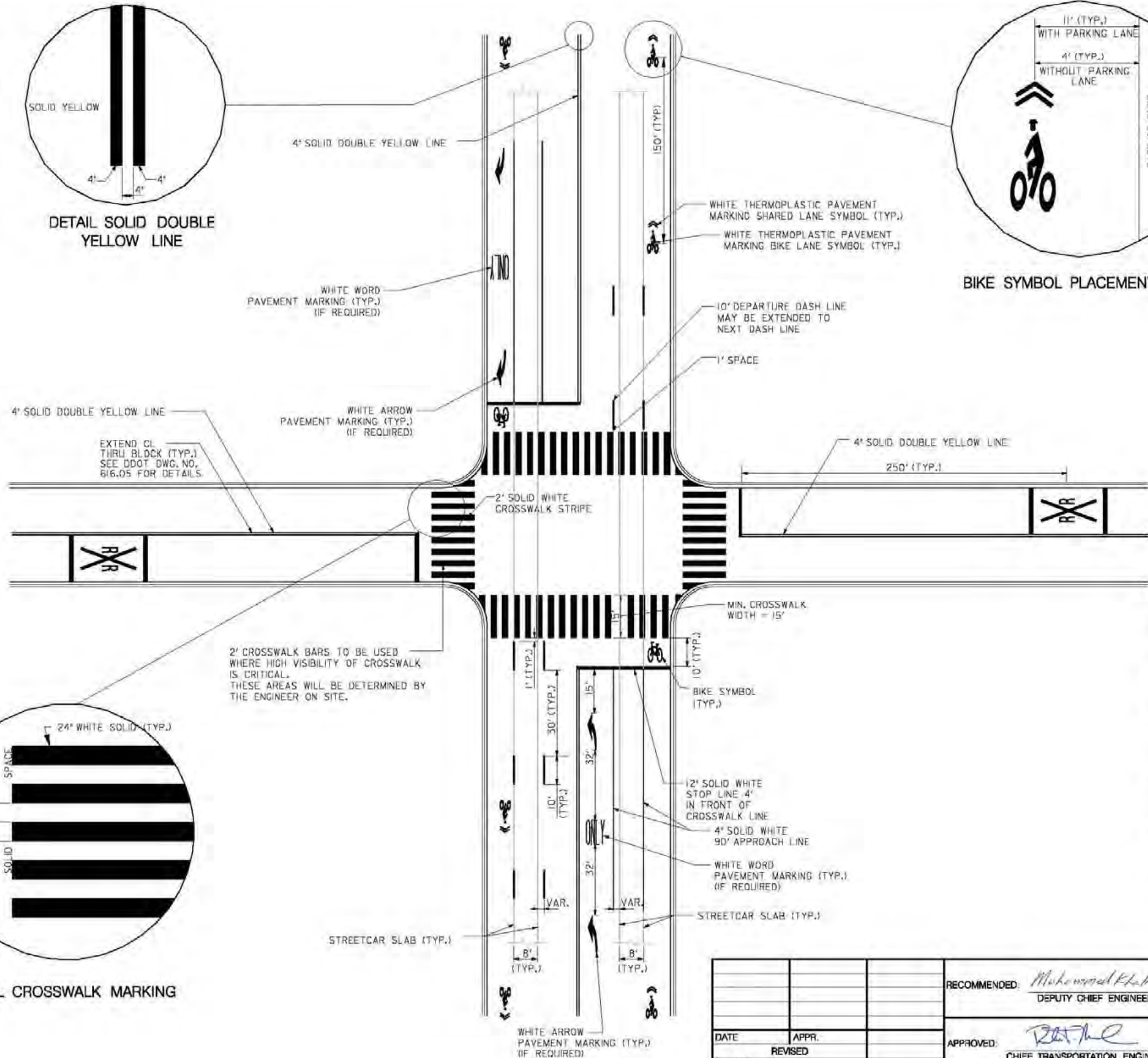
RECOMMENDED:	<i>Muhammad Khalid</i> DEPUTY CHIEF ENGINEER
APPROVED:	<i>[Signature]</i> CHIEF TRANSPORTATION ENGINEER
DATE	APPR.
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ISSUED:	REFERENCE



DETAIL SOLID DOUBLE YELLOW LINE



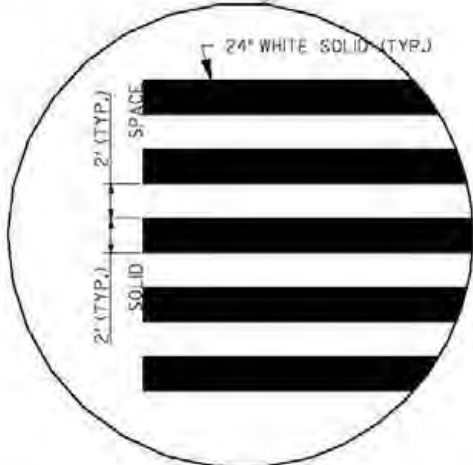
BIKE SYMBOL PLACEMENT DETAIL



2' CROSSWALK BARS TO BE USED WHERE HIGH VISIBILITY OF CROSSWALK IS CRITICAL. THESE AREAS WILL BE DETERMINED BY THE ENGINEER ON SITE.

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6. ALL MARKINGS BETWEEN THE STREET CAR TRACKS MUST BE ADJUSTED TO FIT.

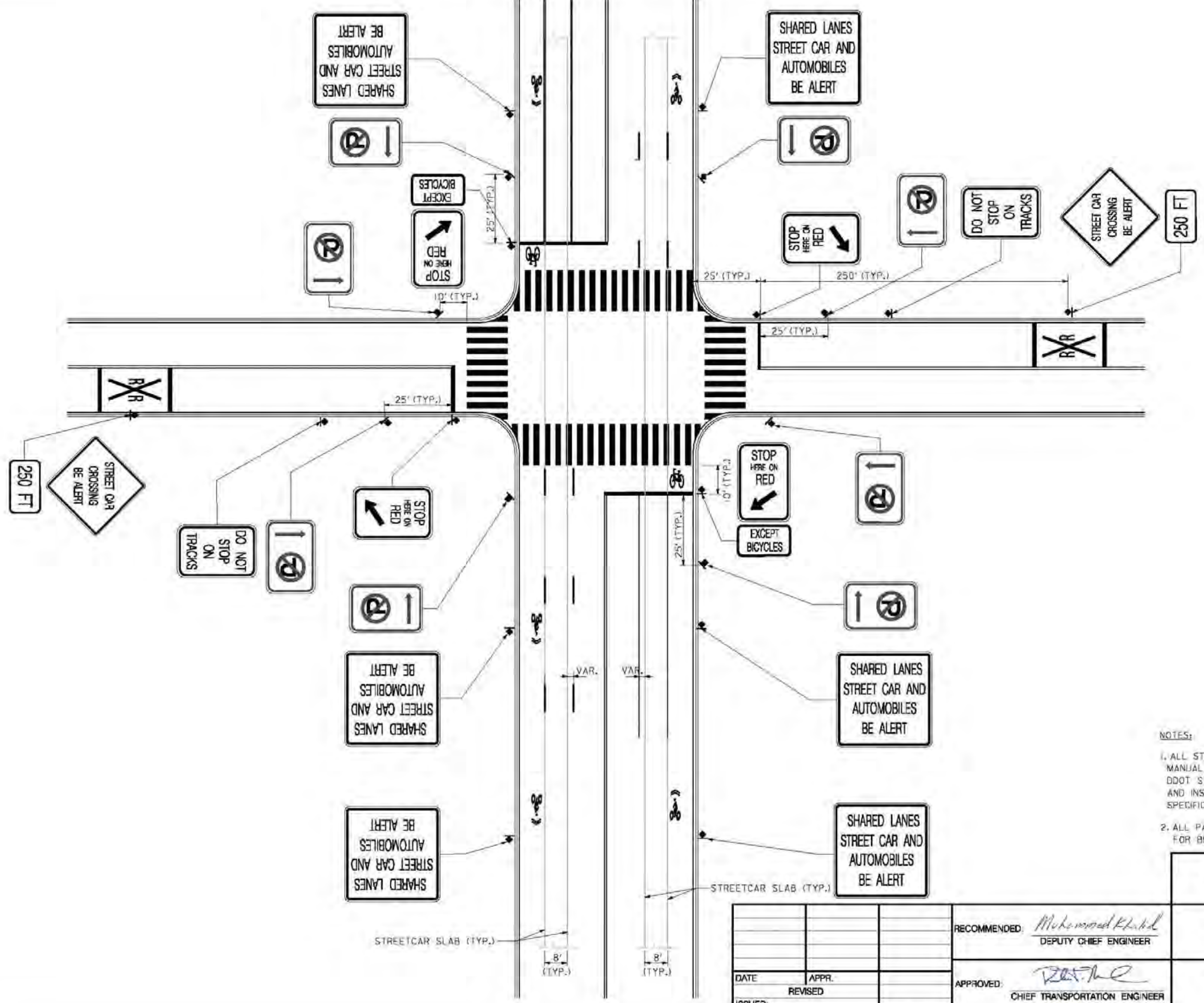


DETAIL CROSSWALK MARKING

D.C. DEPARTMENT OF TRANSPORTATION

RECOMMENDED:	<i>Muhammad Khalil</i> DEPUTY CHIEF ENGINEER
APPROVED:	<i>Patricia</i> CHIEF TRANSPORTATION ENGINEER
DATE	APPR.
ISSUED:	REVISED
	REFERENCE

PROJECT ENG. DESIGNED BY	
CHIEF ENGINEER	
DRAWN BY	
PROJECT MGR.	CV
DIVISION CHIEF	
DATE	
FILE	
DWG. NO.	C-05






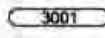

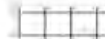
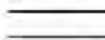


- NOTES:
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 2. ALL PARKING RESTRICTION SIGNS SHALL BE ANGLED @ 45 DEGREES FOR BETTER VISIBILITY.









D.C. DEPARTMENT OF TRANSPORTATION	
STREETCAR STANDARD DRAWINGS	PROJECT ENG. _____ DESIGNED BY _____ CHECKED BY _____ DRAWN BY _____ PROJECT MGR. CV
STREETCAR TYPICAL TRAFFIC SIGNING WITH SHARED BIKE LANE (3 TRAVEL LANES)	DIVISION CHIEF _____ DATE _____ FILE _____ DWG. NO. C-09

RECOMMENDED:	<i>Muhammad Elshah</i> DEPUTY CHIEF ENGINEER
APPROVED:	<i>[Signature]</i> CHIEF TRANSPORTATION ENGINEER
DATE	APPR.
REVISED	
ISSUED:	REFERENCE

TRACK PLANS

-  PAVEMENT RECONSTRUCTION
-  PAVEMENT MILL & OVERLAY
-  SIDEWALK RECONSTRUCTION
-  RESET EXISTING PAVERS
-  TURNOUT IDENTIFICATION SYMBOL
-  CURVE IDENTIFICATION SYMBOL
-  BUMPING POST
-  EXISTING BALLASTED TRACK
-  EXISTING EMBEDDED TRACK

TRACK CHARTS

-  STANDARD STRENGTH 115 RE RAIL
-  HIGH STRENGTH 115 RE RAIL
-  RESTRAINING RAIL
-  EXISTING RAIL
-  STATION PLATFORM SYMBOL
-  EXISTING TRAFFIC SIGNAL
-  NEW SIGNAL PHASE
-  NEW TRAFFIC SIGNAL

HORIZONTAL CURVES

CIRCULAR CURVES ARE DEFINED AND SPECIFIED BY THEIR RADII.

- θ_s SPIRAL ANGLE (IN DEGREES)
- Δ CENTRAL ANGLE OF CIRCULAR CURVE (IN DEGREES)
- CS CURVE TO SPIRAL
- E EXTERNAL DISTANCE
- E_o ACTUAL SUPERELEVATION
- E_u UNBALANCED SUPERELEVATION
- I TOTAL INTERSECTION ANGLE (IN DEGREES)
- L LENGTH OF CIRCULAR CURVE (ARC DEFINITION FOR TRANSIT FACILITIES)
- LC LENGTH OF CHORD
- L_{s1} LENGTH OF FIRST SPIRAL
- L_{s2} LENGTH OF SECOND SPIRAL
- LT_s LENGTH OF SPIRAL TANGENTS
- PC POINT OF CURVE
- PI POINT OF INTERSECTION
- PT POINT OF TANGENCY
- R RADIUS OF CIRCULAR CURVE
- SC SPIRAL TO CURVE
- ST SPIRAL TO TANGENT
- T TANGENT LENGTH OF CIRCULAR CURVE
- TS TANGENT TO SPIRAL
- V VELOCITY (SPEED)

ACTUAL SUPERELEVATION (E_o) WILL BE ATTAINED AND REMOVED LINEARLY THROUGHOUT THE FULL LENGTH OF THE SPIRAL TRANSITION CURVE.

MISCELLANEOUS

- AREMA AMERICAN RAILWAY ENGINEERING & MAINTENANCE OF WAY ASSOCIATION
- ζ CENTER LINE
- CL CLEAR
- HSTR HIGH STRENGTH RAIL
- MAX. MAXIMUM
- MIN. MINIMUM
- NTS NOT TO SCALE
- O.C. ON CENTERS
- PGL PROFILE GRADE LINE
- PITO POINT OF INTERSECTION OF TURNOUT
- PS POINT OF SWITCH
- TRK TRACK
- WWF WELDED WIRE FABRIC

VERTICAL CURVES

- LVC LENGTH OF VERTICAL CURVE
- MO MIDDLE ORDINATE
- PVC POINT OF VERTICAL CURVE
- PVI POINT OF VERTICAL INTERSECTION
- PVT POINT OF VERTICAL TANGENT
- PVI POINT OF VERTICAL INTERSECTION

GENERAL NOTES:

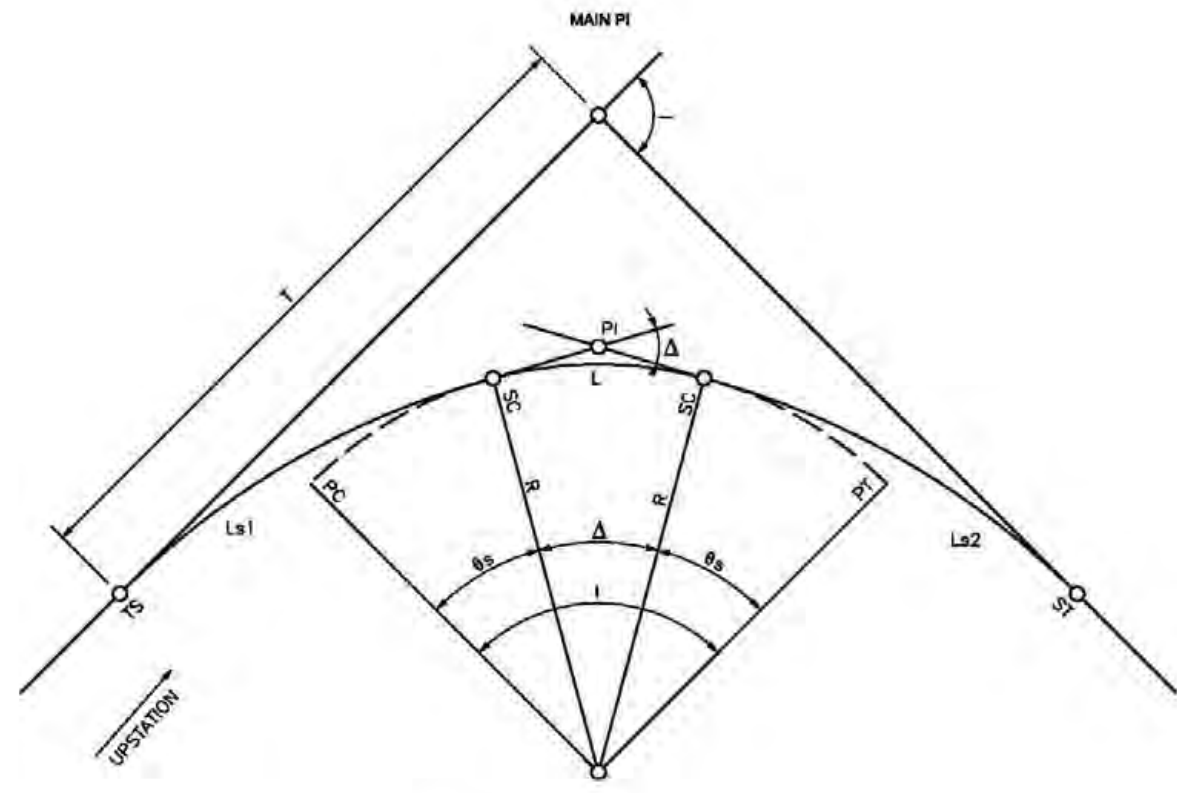
1. TRACK GAUGE SHALL BE 4'-8 1/2" EXCEPT FOR CURVES WITH GAUGE WIDENING USING 115 RE RAIL. GAUGE WIDENING SHALL BE AT A CONSTANT TRANSITION RATE AND NOT MORE THAN 1/4 INCH IN A DISTANCE OF 31 FEET, TO A MAXIMUM OF 1/2 INCH IN 62 FEET. FULL GAUGE WIDENING SHALL BE ACCOMPLISHED ON THE TANGENT IN APPROACH TO THE POINT OF CURVE AND REMOVED FOLLOWING THE POINT OF TANGENT IN THE SIMPLE CURVE. IN SPIRALS, GAUGE WIDENING SHALL BE APPLIED AND REMOVED WITHIN THE SPIRALS. IF THE SPIRAL IS TOO SHORT FOR FULL GAUGE WIDENING TO BE ACCOMPLISHED BEYOND THE RATE EXCEEDING 1/4 INCH IN 31 FEET, SUFFICIENT SUFFICIENT GAUGE WIDENING SHALL BE PLACED IN THE APPROACH TANGENTS TO MEET THE RATE OF 1/4 INCH IN 31 FEET. IF ADJACENT CURVES WITH BOTH REQUIRING WIDENING ARE TOO CLOSE TOGETHER TO ALLOW RUN OUT OF GAUGE WIDENING, THE WIDENED GAUGE SHALL BE MAINTAINED BETWEEN THE CURVES. THE ALIGNMENTS SHOWN ON THE CONTRACT DRAWINGS ARE BASED ON GAUGE.
2. THE TRACK PLANS SHOW ONLY SOME OF THE RAIL JOINTS. LOCATE ADDITIONAL RAIL JOINTS IN ACCORDANCE WITH THE SHOP DRAWINGS.
3. THE ARM LENGTHS OF FROGS ARE NOT ALWAYS DRAWN TO SCALE. THE CONTRACTOR WILL DETERMINE THE EXACT ARM LENGTHS.
4. CONSTRUCT NEW SPECIAL TRACKWORK AS SHOWN ON THE APPROVED SHOP DRAWINGS.
5. THE PROFILE GRADE LINE (PGL) REFERS TO THE TOP OF RAIL ELEVATION.
6. RAILS SHALL HAVE ZERO CANT UNLESS OTHERWISE INDICATED.

D.C. DEPARTMENT OF TRANSPORTATION

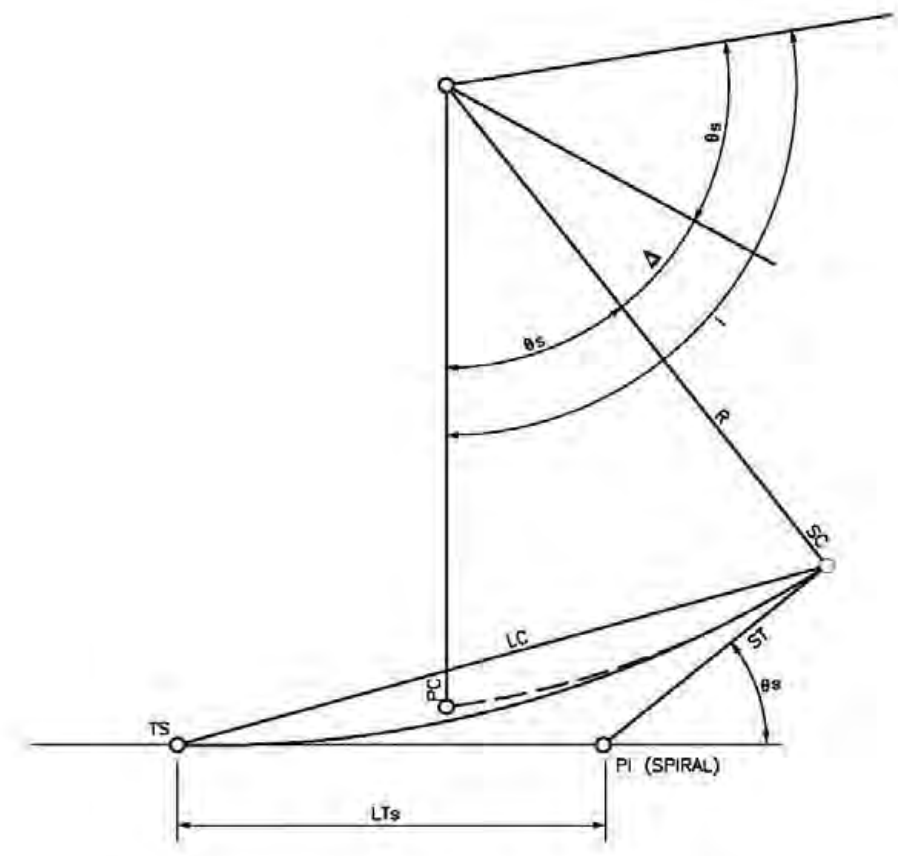
STREETCAR STANDARD DRAWINGS

STANDARD TRACK SYMBOLS, ABBREVIATIONS, & GENERAL NOTES

RECOMMENDED: <i>Mohammed Khalid</i> DEPUTY CHIEF ENGINEER		PROJECT ENG
APPROVED: <i>[Signature]</i> CHIEF TRANSPORTATION ENGINEER		DIVISION CHIEF
DATE	APPR.	DATE
ISSUED	REVISED	FILE
REFERENCE		DWG. NO. T-01



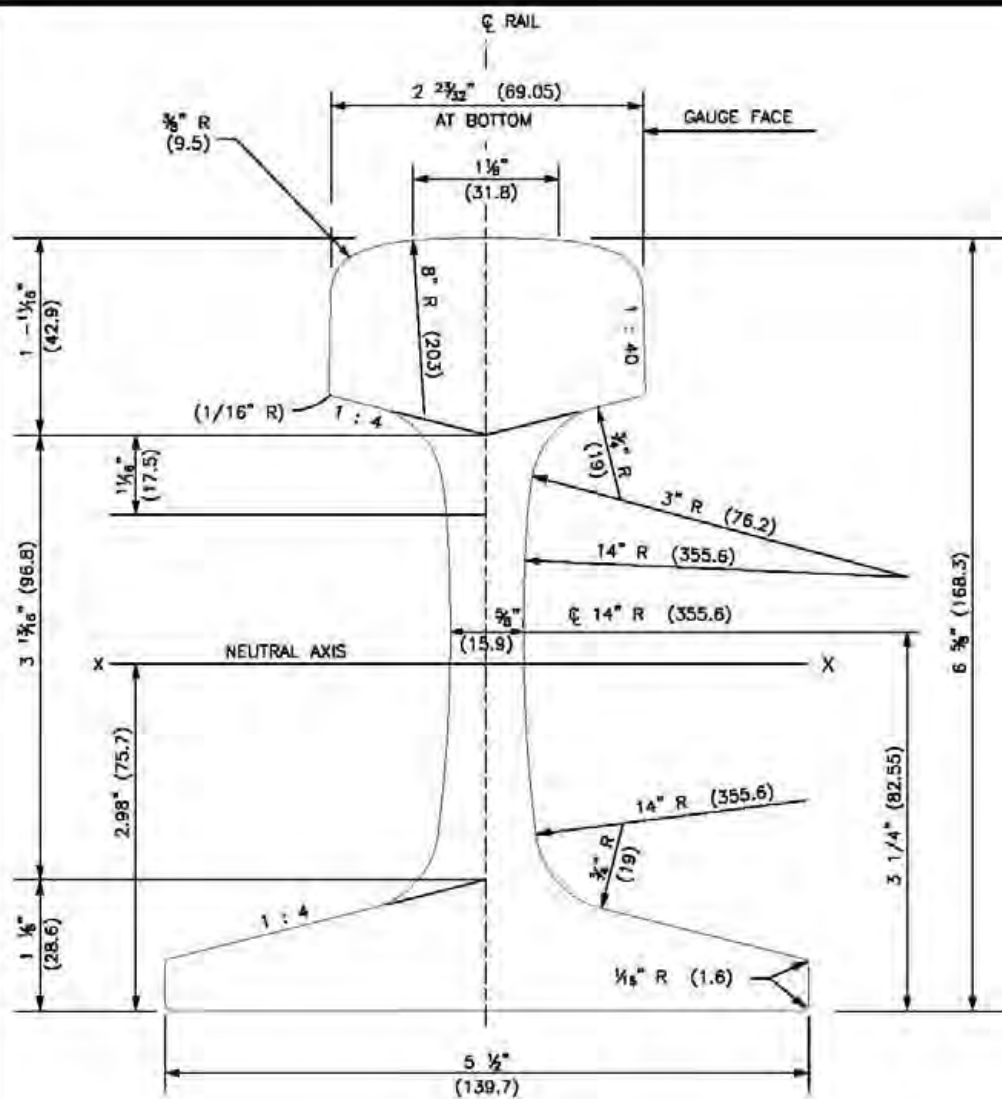
CIRCULAR CURVE WITH SPIRALS



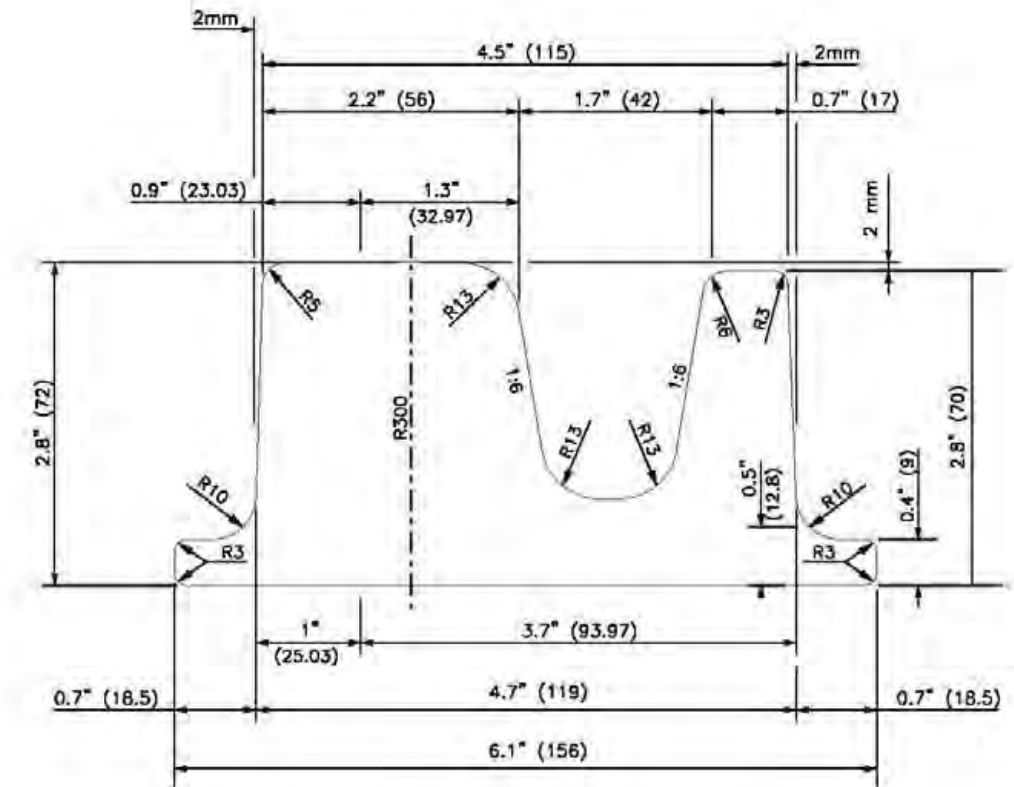
SPIRAL TRANSITION CURVES

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 1/20/2012

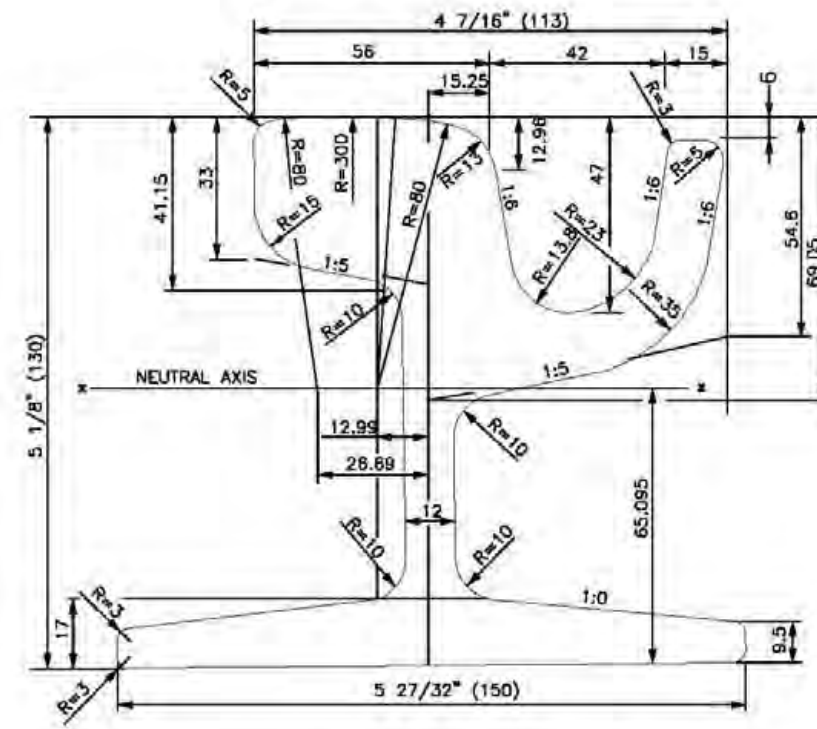
			D.C. DEPARTMENT OF TRANSPORTATION	
			STREETCAR STANDARD DRAWINGS	
			HORIZONTAL CURVES	
RECOMMENDED:		<i>Mohammed Khalid</i> DEPUTY CHIEF ENGINEER		PROJECT ENG
APPROVED:		<i>[Signature]</i> CHIEF TRANSPORTATION ENGINEER		DESIGNED BY
DATE	APPR			CHECKED BY
ISSUED:	REVISED			DRAWN BY
	REFERENCE			PROJECT MGR. CY
				DIVISION CHIEF
				DATE
				FILE
				DWG. NO. T-02



RAIL DETAIL - AREMA 115 RE
 () DIMS ARE IN MM
 AREA= 11.2171 SQ. IN.
 WEIGHT= 114.3757 LB./YD.



RAIL DETAIL - GROOVE BLOCK
 () DIMS ARE IN MM

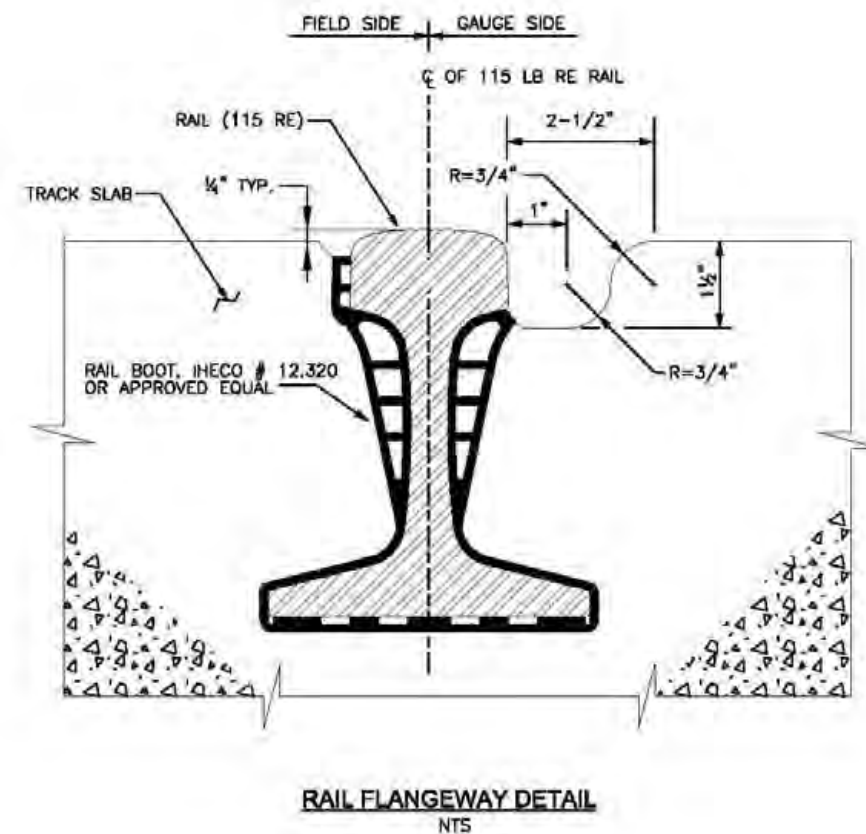
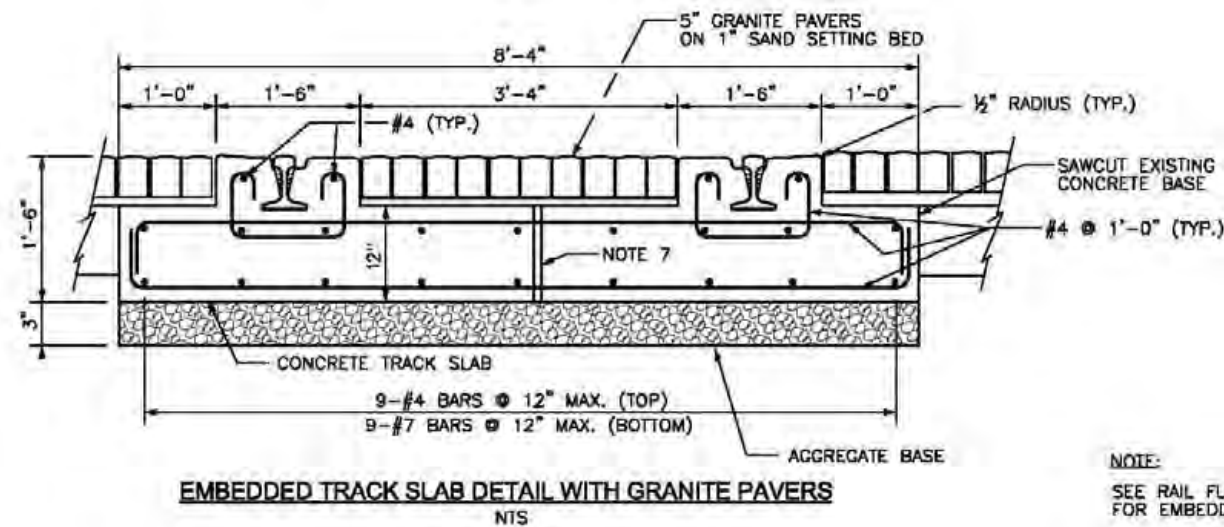
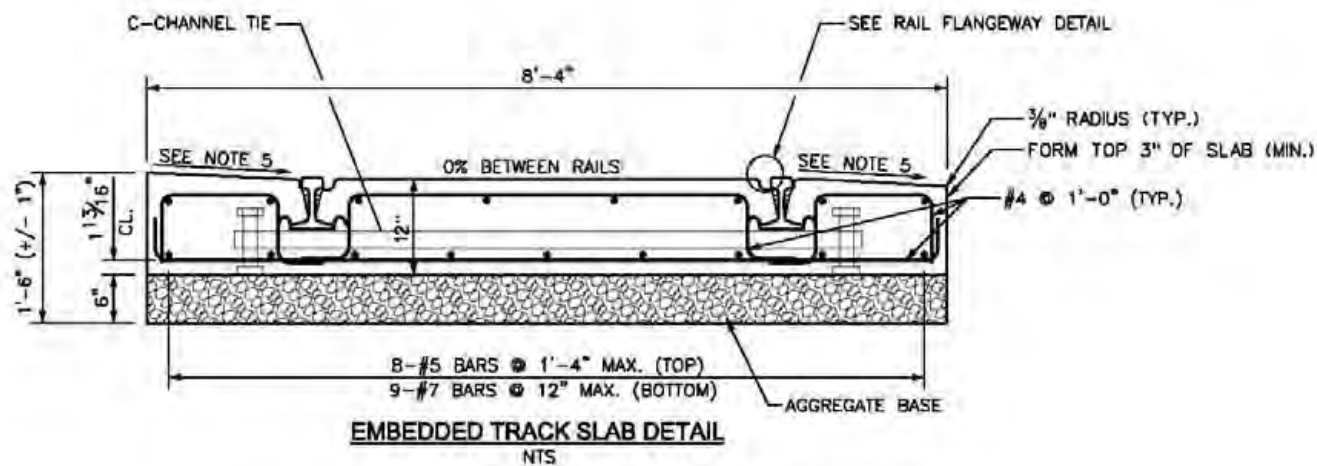


EUROPEAN GIRDER RAIL DETAIL - 51R1
 () DIMS ARE IN MM

D.C. DEPARTMENT OF TRANSPORTATION	
STREETCAR STANDARD DRAWINGS	PROJECT ENG: _____ DESIGNED BY: _____ CHECKED BY: _____ DRAWN BY: _____ PROJECT MGR.: CY
RAIL SECTION DETAILS	DIVISION CHIEF: _____ DATE: _____ FILE: _____ DWG. NO. T-03

RECOMMENDED:	<i>Muhammad Khalid</i> DEPUTY CHIEF ENGINEER
APPROVED:	<i>[Signature]</i> CHIEF TRANSPORTATION ENGINEER
DATE	APPR
ISSUED:	REVISED
	REFERENCE

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 1/20/2012



NOTE:
SEE RAIL FLANGEWAY DETAIL
FOR EMBEDDED TRACK NOTES.

NOTES:

1. REINFORCING SHALL BE UNCOATED, 60KSI STEEL. LONGITUDINAL BARS SHALL BE CONTINUOUSLY LAPPED WITH NEXT BAR FOR TENSION SPLICE. MINIMUM CONCRETE COVER ON ALL BARS SHALL BE 2" EXCEPT AS NOTED. ALL CONTACT AREAS BETWEEN BARS SHALL BE TACK WELDED FOR ELECTRICAL CONTINUITY.
2. JOINT GROOVES TRANSVERSELY ACROSS TRACK SLAB SHALL BE PLACED EVERY 10 FEET ABOVE C-CHANNEL TIES. GROOVE DEPTH SHALL BE 1/2".
3. PROPOSED PROFILE IS TOP OF RAIL. NOTE THAT TOP OF CONCRETE BETWEEN RAILS IS 1/4" BELOW TOP OF RAIL.
4. AVOID DAMAGING THE RAIL BOOT DURING STORAGE AND INSTALLATION. REPAIR ALL PUNCTURES, RIPS, TEARS AND GOUGES IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS TO PREVENT STRAY CURRENT LEAKAGE.
5. CROSS SLOPE VARIES (UP OR DOWN), 5% MAX. REFER TO GRADING PLAN SHEETS.
6. EMBEDDED RAIL IS TO BE INSTALLED WITH ZERO CANT UNLESS SPECIFICALLY SHOWN OTHERWISE.
7. CONTRACTOR SHALL SUBMIT C-CHANNEL TIE ASSEMBLY DESIGN FOR APPROVAL.

D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

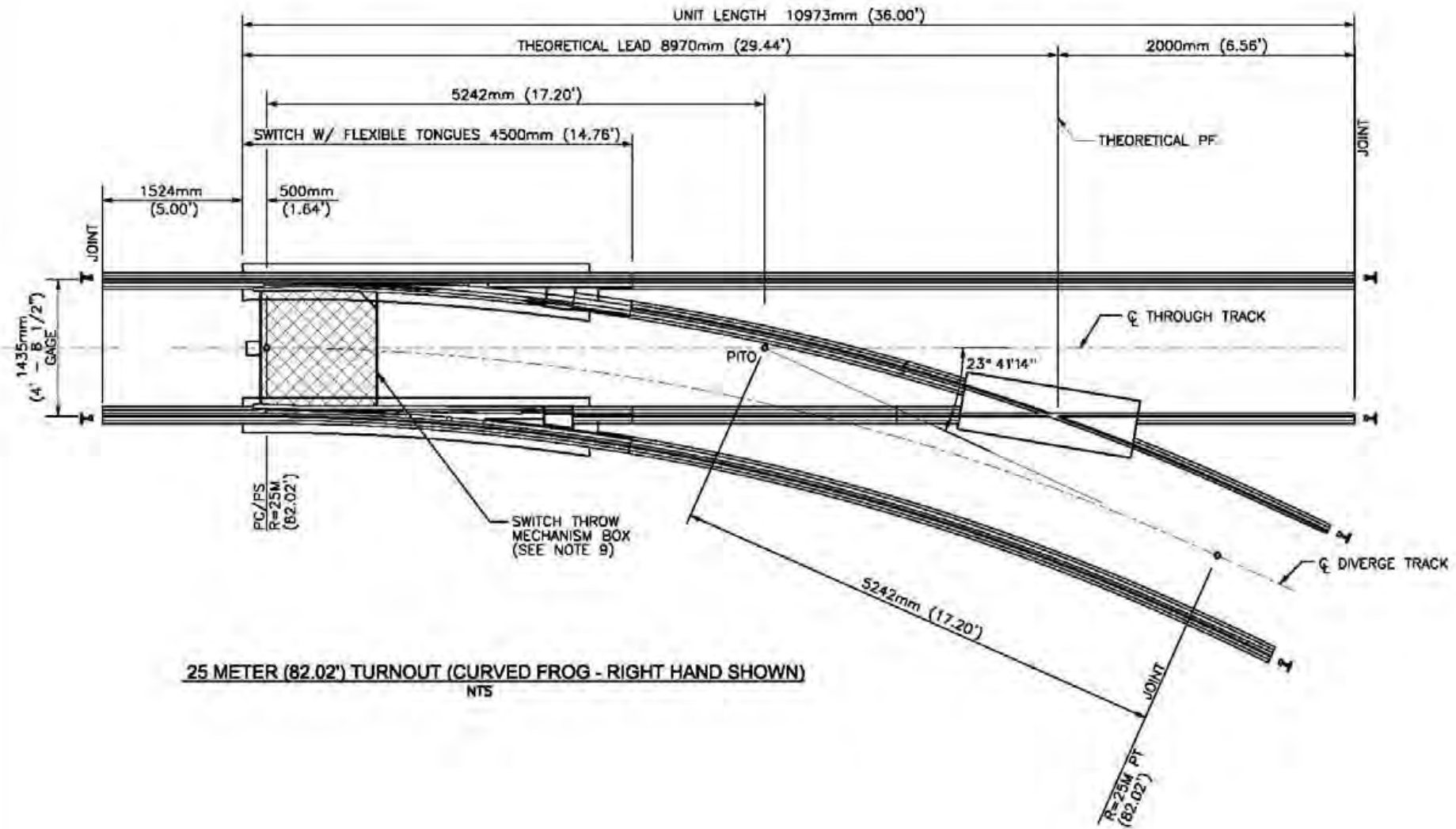
EMBEDDED TRACK SLAB DETAILS

DATE	APPR.	
ISSUED:	REVISED	REFERENCE

RECOMMENDED: *Muhammad Khalid*
DEPUTY CHIEF ENGINEER

APPROVED: *[Signature]*
CHIEF TRANSPORTATION ENGINEER

PROJECT ENG.	
DESIGNED BY	
CHECKED BY	
DRAWN BY	
PROJECT MGR.	CY
DIVISION CHIEF	
DATE	
FILE	
DWG. NO.	T-04



NOTES:

1. THIS DRAWING PROVIDES THE BASIS OF DESIGN FOR BIDDING PURPOSES ONLY. FINAL TURNOUT DESIGN SHALL BE ACCORDING TO SHOP DRAWINGS SUBMITTED BY SUPPLIER AND REVIEWED BY THE ENGINEER.
2. THE SWITCH CONSISTS OF DOUBLE TONGUE FLEXIBLE SWITCH POINTS WITH KEY FASTENED HEELS TO BE INSTALLED IN PAVED TURNOUT CONSTRUCTION.
3. THE RAIL AND COMPONENTS SHALL CONFORM TO 115RE RAIL.
4. SWITCH MACHINES WILL BE EITHER POWER, MANUAL, OR SPRING TYPES. SEE TRACK CHARTS FOR LOCATIONS. POWER AND MANUAL SWITCHES SHALL INCLUDE A SWITCH INDICATOR. SPRING SWITCHES MUST BE TRAILABLE WITH A SPRING AND RETURN MECHANISM (OR OTHER APPROVED MECHANISM).
5. ALL NOTED JOINTS ARE TO BE FIELD WELDED.
6. ALL DIMENSIONS ARE IN MILLIMETERS (FEET).
7. ACTUAL LENGTHS MAY VARY PER TURNOUT SUPPLIER. SEE SHOP DRAWINGS.
8. INSTALL DRAINS FROM SWITCH THROW MECHANISM BOX AND SWITCH HEATER BOX TO STORM SEWER.
9. MANUAL SWITCH MACHINE SHALL BE CONTEC MODEL CSV 34 OR APPROVED EQUAL. POWER SWITCH MACHINE SHALL BE CONTEC MODEL CSV 24 OR APPROVED EQUAL.
10. LEFT HAND TURNOUT SHALL BE OPPOSITE TO THAT SHOWN.

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D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

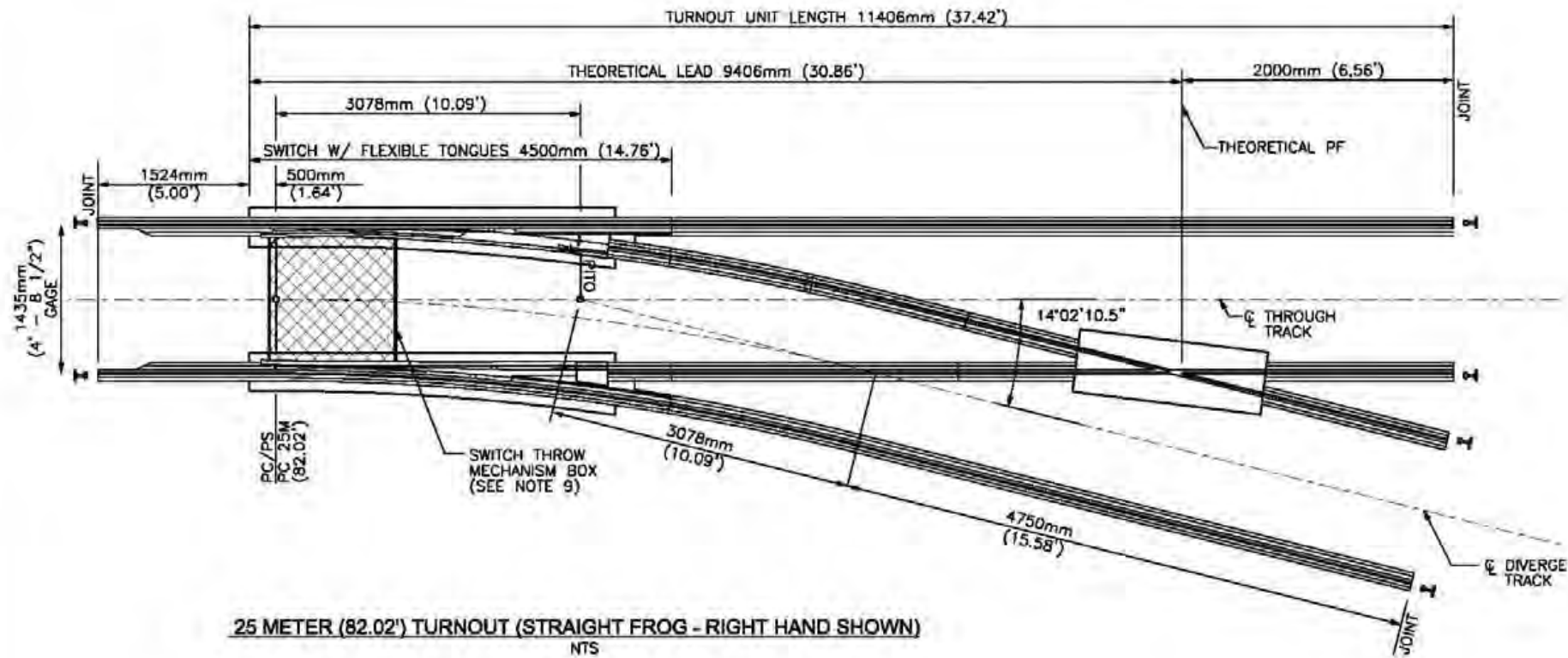
25 METER (82.02') CURVED EMBEDDED TURNOUT DETAIL

DATE	APPR.	
ISSUED:	REVISED	REFERENCE

RECOMMENDED: *Muhammad Khalid*
DEPUTY CHIEF ENGINEER

APPROVED: *Patricia*
CHIEF TRANSPORTATION ENGINEER

PROJECT ENG	_____
DESIGNED BY	_____
CHECKED BY	_____
DRAWN BY	_____
PROJECT MGR.	_____
DIVISION CHIEF	_____
DATE	_____
FILE	_____
DWG. NO.	T-08



25 METER (82.02') TURNOUT (STRAIGHT FROG - RIGHT HAND SHOWN)
NTS

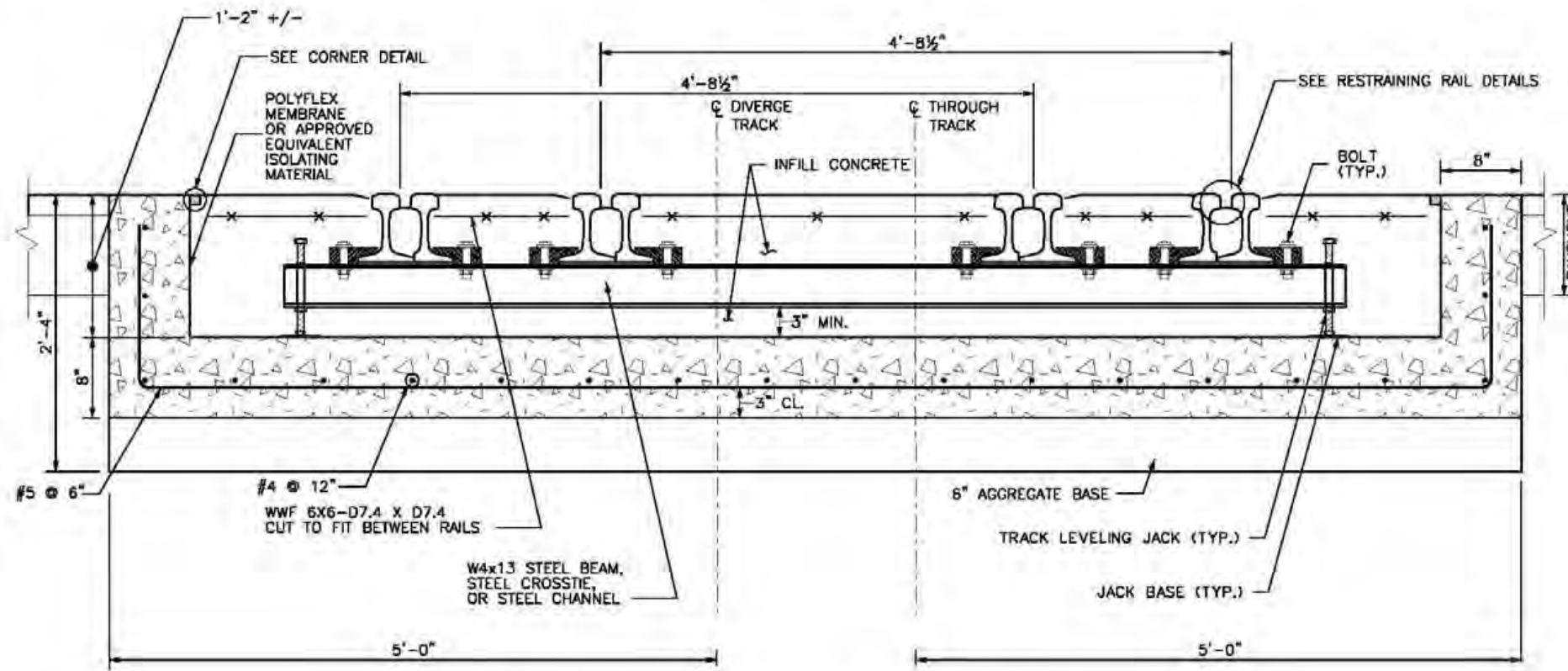
NOTES:

1. THIS DRAWING PROVIDES THE BASIS OF DESIGN FOR BIDDING PURPOSES ONLY. FINAL TURNOUT DESIGN SHALL BE ACCORDING TO SHOP DRAWINGS SUBMITTED BY SUPPLIER AND REVIEWED BY THE ENGINEER.
2. THE SWITCH CONSISTS OF DOUBLE TONGUE FLEXIBLE SWITCH POINTS WITH KEY FASTENED HEELS TO BE INSTALLED IN PAVED TURNOUT CONSTRUCTION.
3. THE RAIL AND COMPONENTS SHALL CONFORM TO 115RE RAIL.
4. SWITCH MACHINES WILL BE EITHER POWER, MANUAL, OR SPRING TYPES. SEE TRACK CHARTS FOR LOCATIONS. POWER AND MANUAL SWITCHES SHALL INCLUDE A SWITCH INDICATOR. SPRING SWITCHES MUST BE TRAILABLE WITH A SPRING AND RETURN MECHANISM (OR OTHER APPROVED MECHANISM).
5. ALL NOTED JOINTS ARE TO BE FIELD WELDED.
6. ALL DIMENSIONS ARE IN MILLIMETERS (FEET).
7. ACTUAL LENGTHS MAY VARY PER TURNOUT SUPPLIER. SEE SHOP DRAWINGS.
8. INSTALL DRAINS FROM SWITCH THROW MECHANISM BOX AND SWITCH HEATER BOX TO STORM SEWER.
9. MANUAL SWITCH MACHINE SHALL BE CONTEC MODEL CSV 34 OR APPROVED EQUAL. POWER SWITCH MACHINE SHALL BE CONTEC MODEL CSV 24 OR APPROVED EQUAL.
10. LEFT HAND TURNOUT SHALL BE OPPOSITE TO THAT SHOWN.

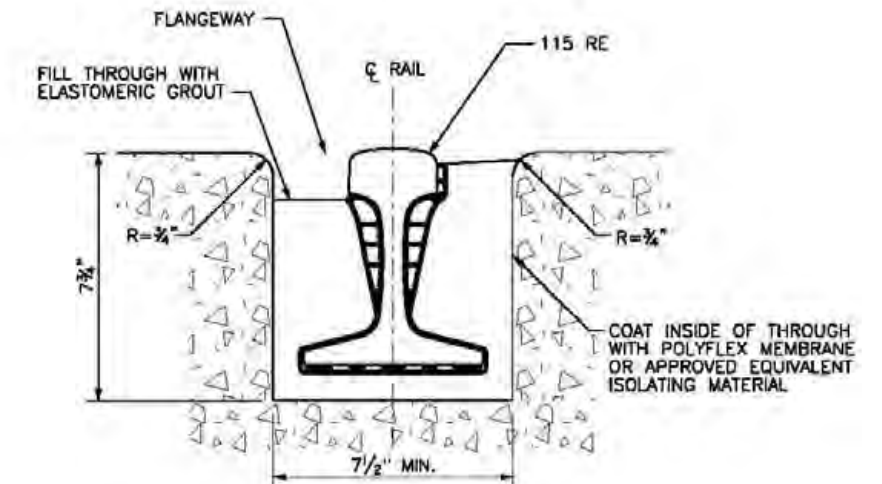
c:\pwworking\p11\4049835\1\15_01-107.dgn
1/20/2012

D.C. DEPARTMENT OF TRANSPORTATION	
	STREETCAR STANDARD DRAWINGS
	25 METER (82.02') STRAIGHT EMBEDDED TURNOUT DETAIL
	<small>PROJECT ENG. _____ DESIGNED BY _____ CHECKED BY _____ DRAWN BY _____ PROJECT MGR. _____ DIVISION CHIEF _____ DATE _____ FILE _____ DWG. NO. _____ T-07</small>

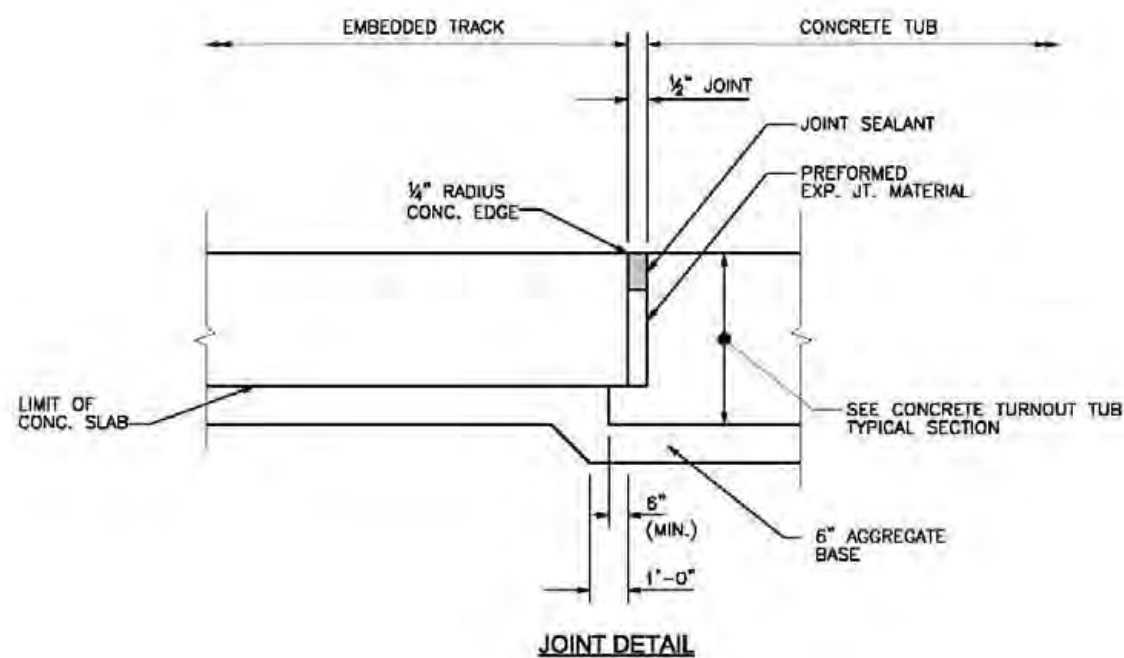
			RECOMMENDED: <i>Muhammad Khalid</i> DEPUTY CHIEF ENGINEER
DATE	APPR.		APPROVED: <i>[Signature]</i> CHIEF TRANSPORTATION ENGINEER
ISSUED:	REVISED	REFERENCE	



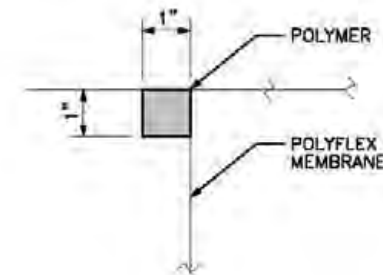
TYPICAL SECTION - CONCRETE TURNOUT TUB



RAIL TROUGH DETAIL



JOINT DETAIL



CORNER DETAIL

NOTES:

- CONTRACTOR SHALL TAKE PRECAUTIONS TO ENSURE POLYFLEX MEMBRANE ISOLATING MATERIAL (OR EQUIVALENT) IS NOT DAMAGED DURING CONSTRUCTION OF THE SKELETON TRACK.

D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

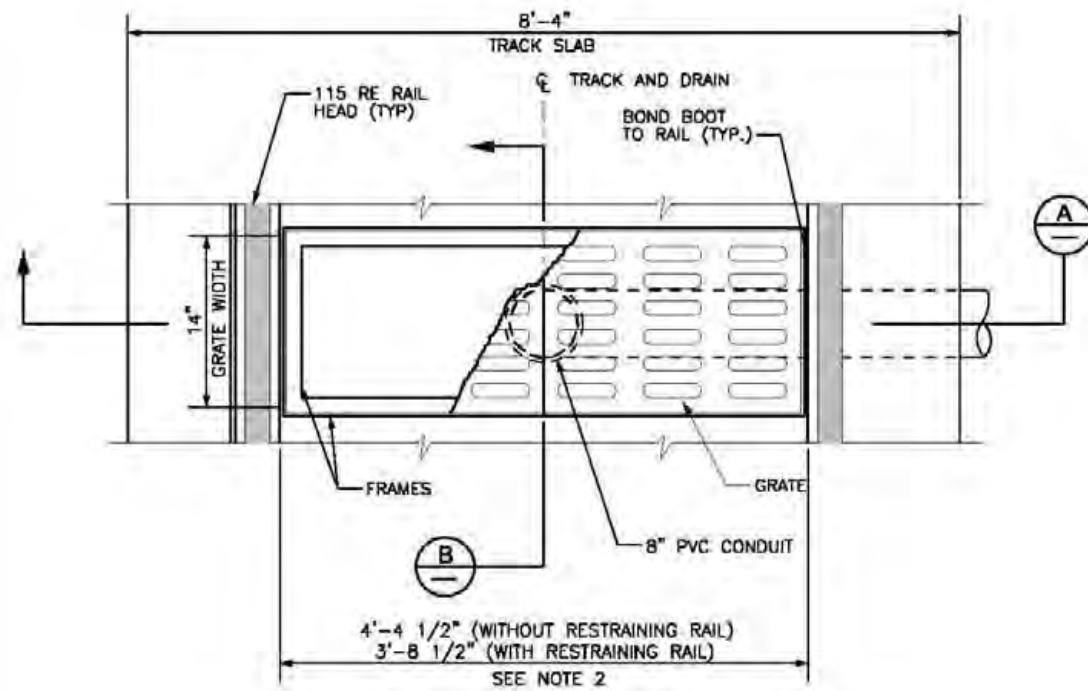
TURNOUT TUB DETAILS
(SHEET 2 OF 2)

RECOMMENDED: *Mohamed Khalil*
DEPUTY CHIEF ENGINEER

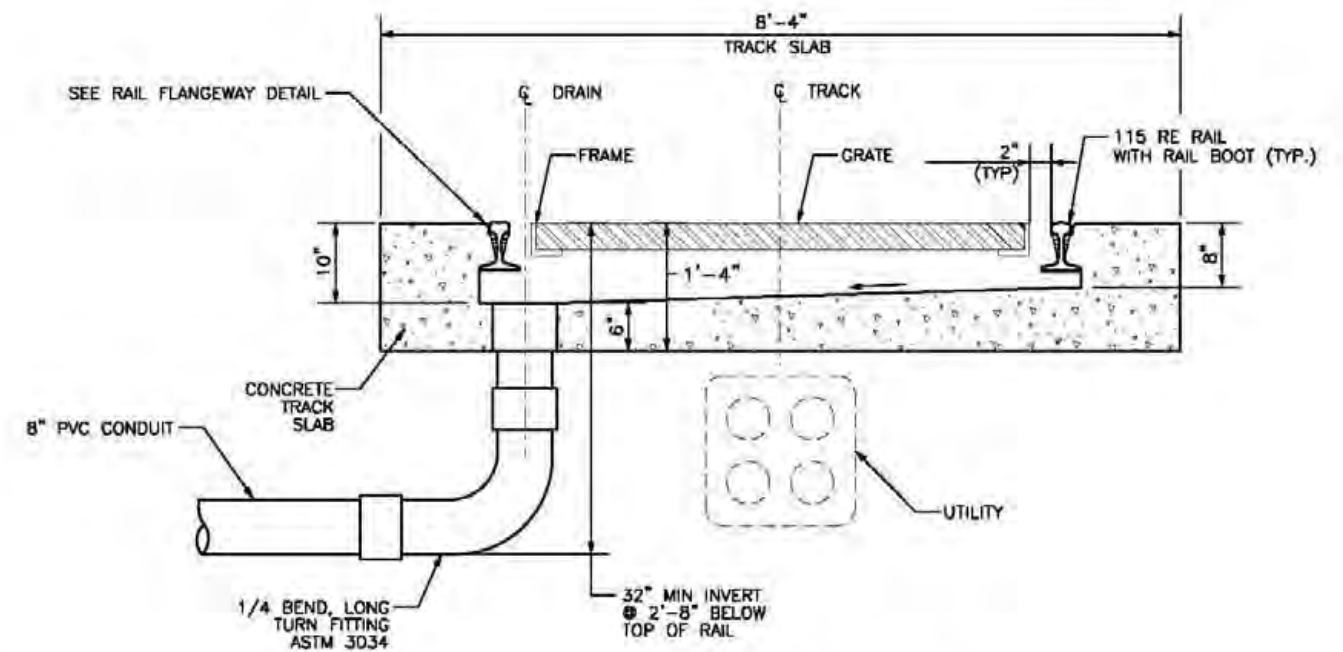
APPROVED: *R. H. E.*
CHIEF TRANSPORTATION ENGINEER

DATE	APPR.	
ISSUED:	REVISED	REFERENCE

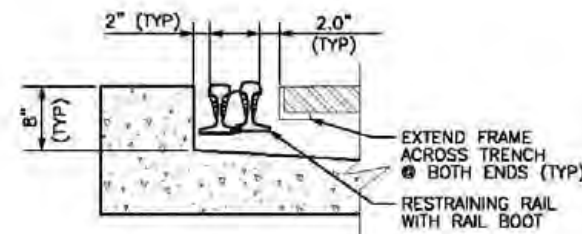
PROJECT ENG.	
DESIGNED BY	
CHECKED BY	
DRAWN BY	
PROJECT MGR.	CY
DIVISION CHIEF	
DATE	
FILE	
DWG. NO.	T-08



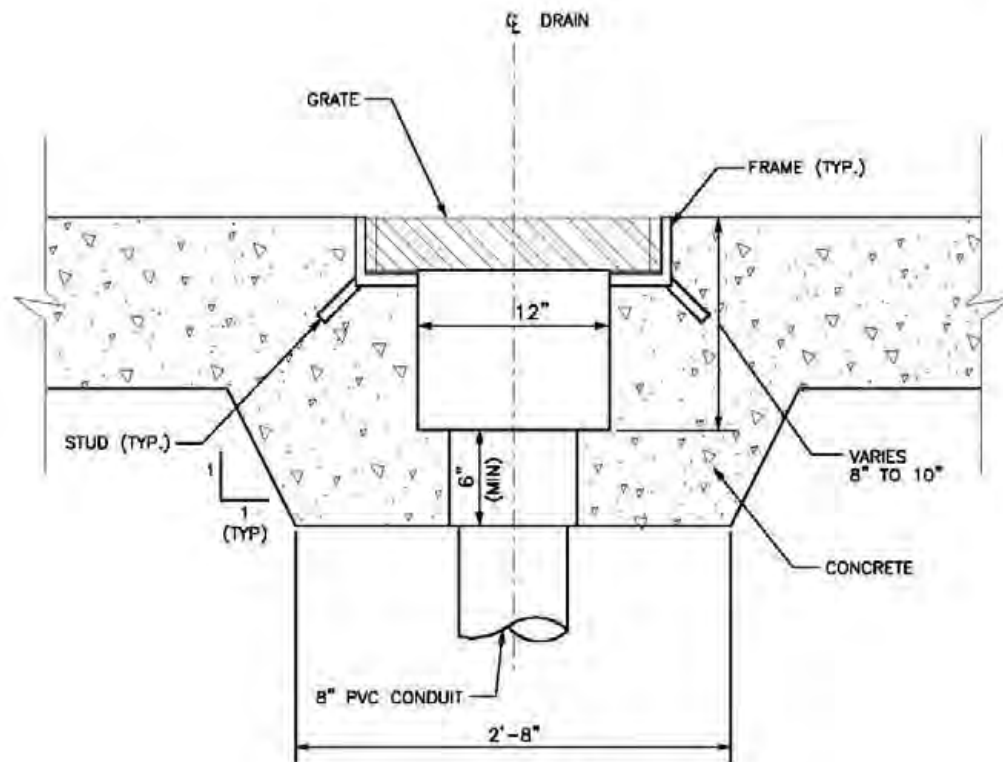
TRACK DRAIN PLAN
NTS



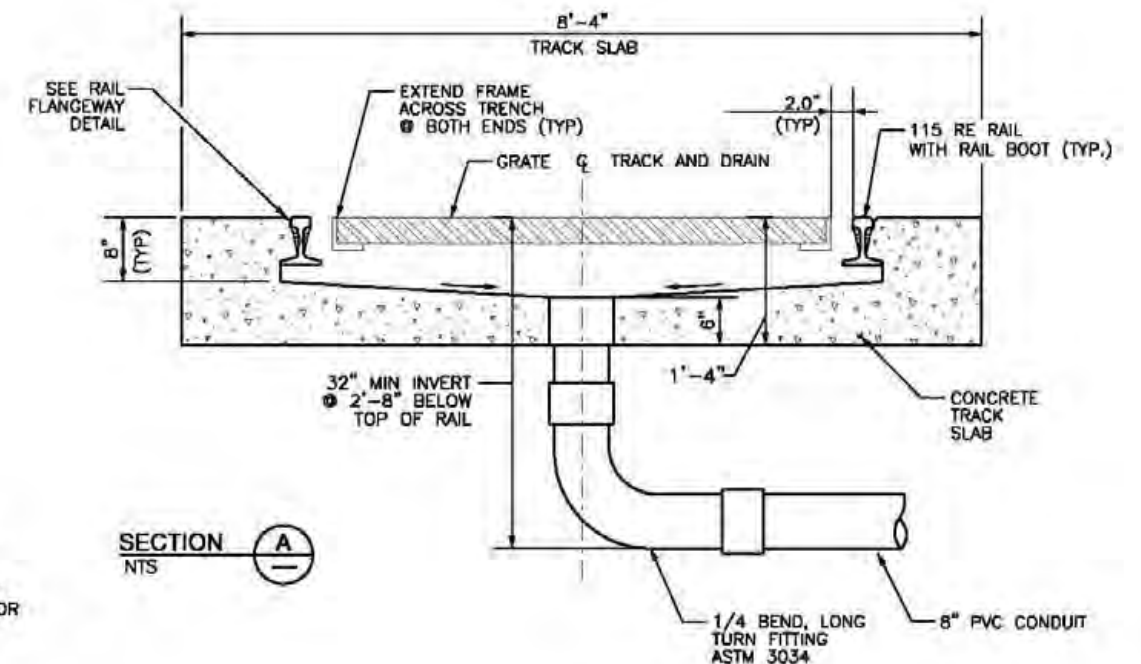
ALTERNATE TRACK DRAIN
NTS



PARTIAL SECTION SHOWING RESTRAINING RAIL
NTS



SECTION B-B
NTS



SECTION A-A
NTS

TRACK DRAIN GENERAL NOTES

1. PROVIDE NEENAH #R4999 DX HEAVY DUTY FRAME AND TYPE "C" GRATE OR APPROVED EQUAL.
2. CONTRACTOR TO SUBMIT ANGLE FRAME AND GRATE SHOP DRAWINGS TO ENGINEER FOR APPROVAL PRIOR TO FABRICATION.

D.C. DEPARTMENT OF TRANSPORTATION

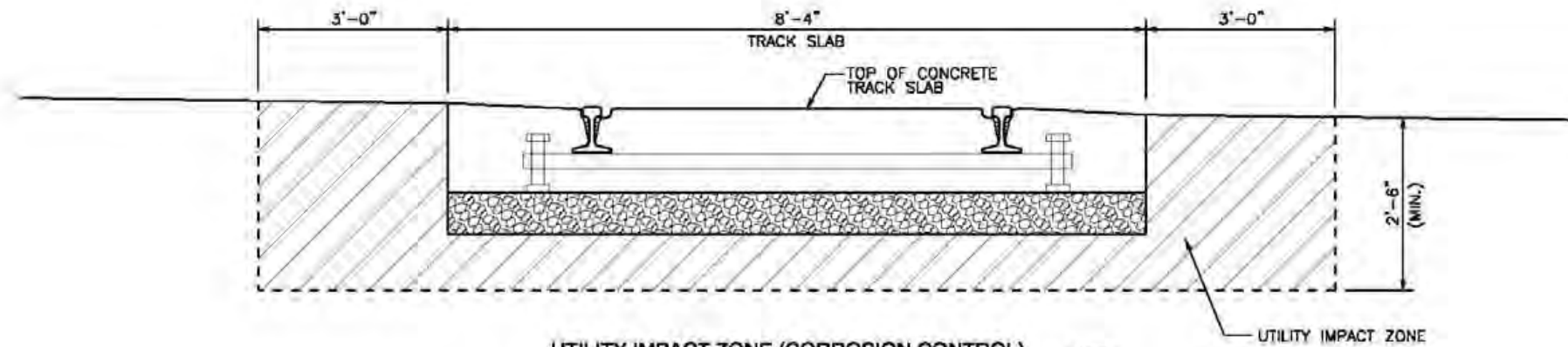
STREETCAR STANDARD DRAWINGS

TRACK DRAIN DETAILS

DATE	APPR.	REVISION	REFERENCE
ISSUED:			

RECOMMENDED:	<i>Muhammad Elshah</i> DEPUTY CHIEF ENGINEER
APPROVED:	<i>Pat H</i> CHIEF TRANSPORTATION ENGINEER

PROJECT ENG.	
DESIGNED BY	
CHECKED BY	
DRAWN BY	
PROJECT MGR.	CY
DIVISION CHIEF	
DATE	
FILE	
DWG. NO.	T-10



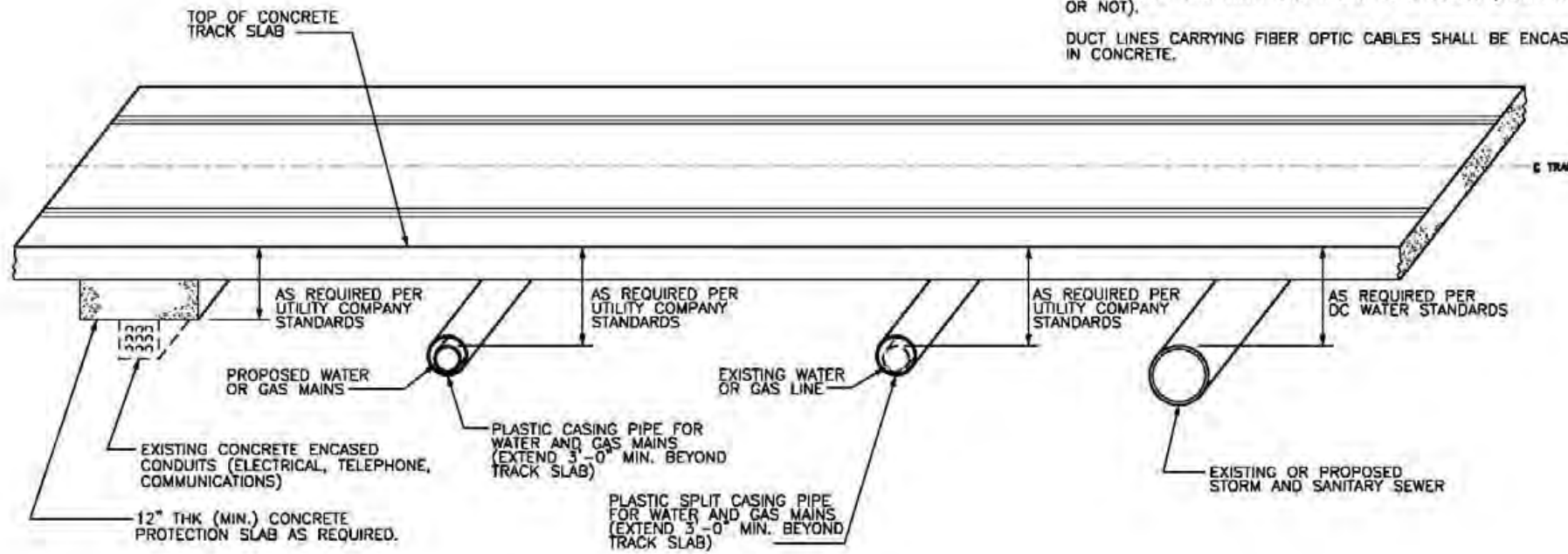
UTILITY IMPACT ZONE (CORROSION CONTROL)
NTS

NOTES:

METALLIC UTILITIES RUNNING PARALLEL DIRECTION UNDERNEATH THE TRACK SLAB AND WITHIN THE UTILITY IMPACT ZONE MAY REQUIRE RELOCATION.

THE UTILITY IMPACT ZONE MAY BE GREATER DEPENDING ON THE SOIL RESISTIVITY AND TRACK SLAB DESIGN (REINFORCED OR NOT).

DUCT LINES CARRYING FIBER OPTIC CABLES SHALL BE ENCASED IN CONCRETE.



UTILITY IMPACT ZONE
NTS

D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

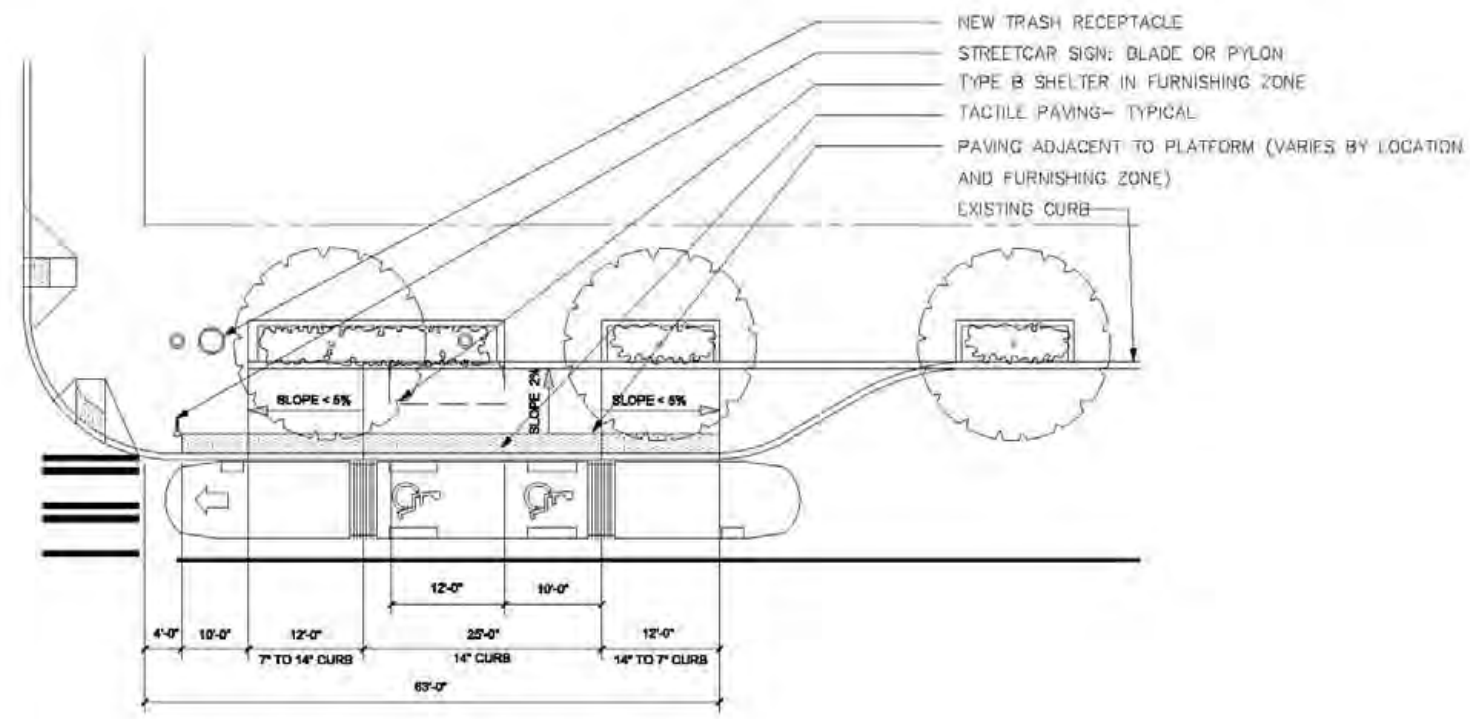
UTILITY IMPACT ZONE

DATE	APPR	ISSUED	REFERENCE

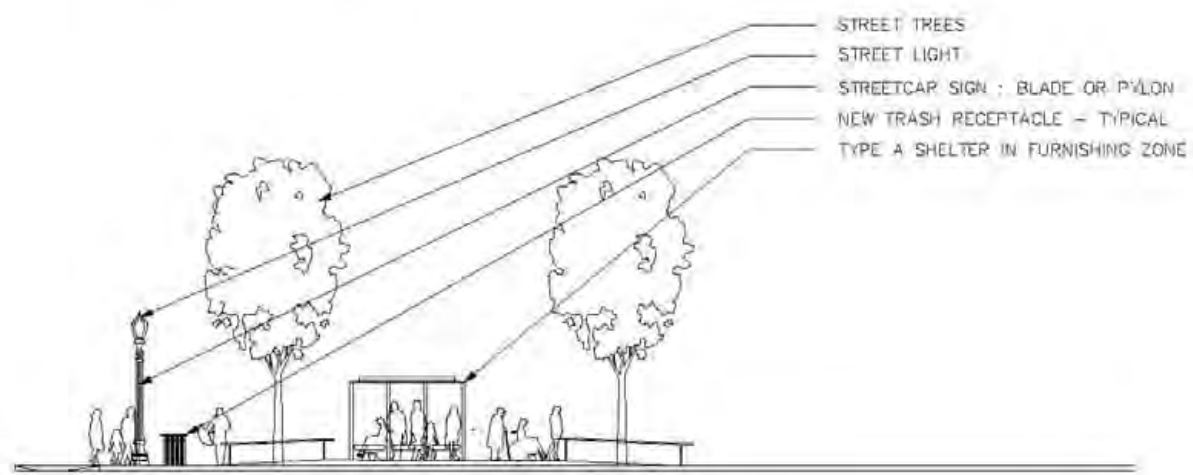
RECOMMENDED: *Mohammed Khalid*
DEPUTY CHIEF ENGINEER

APPROVED: *Rafael*
CHIEF TRANSPORTATION ENGINEER

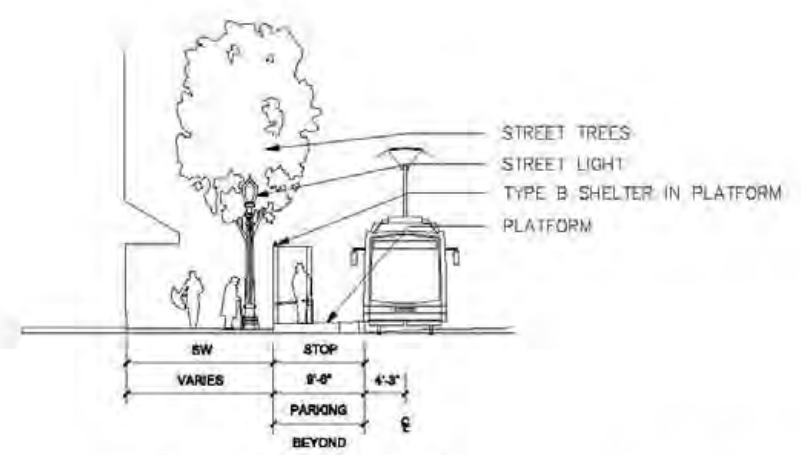
PROJECT ENG	
DESIGNED BY	
CHECKED BY	
DRAWN BY	
PROJECT MGR.	CY
DIVISION CHIEF	
DATE	
FILE	
DWG. NO.	T-12



PLAN CURB EXTENSION B ①
 SCALE: 1:20



SECTION CURB EXTENSION B ②
 SCALE: 1:20

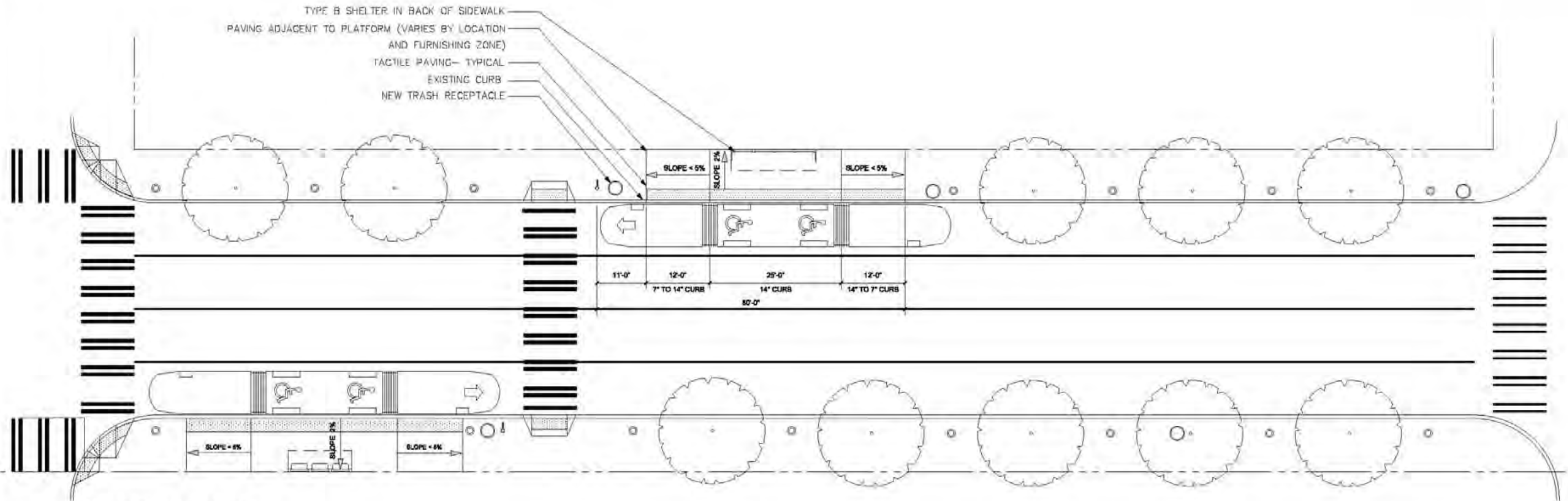


SECTION CURB EXTENSION B ③
 SCALE: 1:20

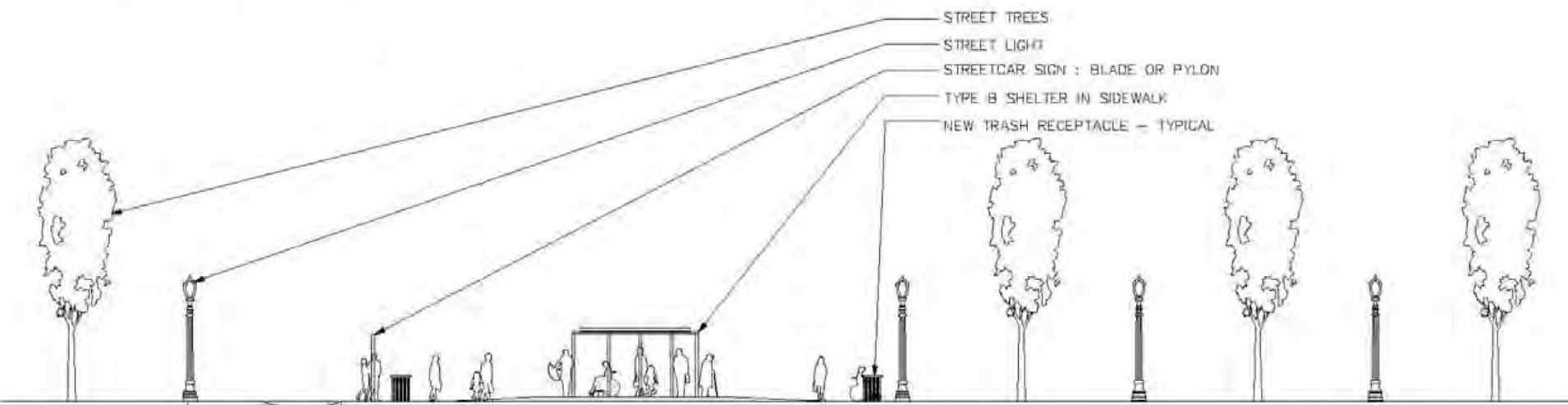
D.C. DEPARTMENT OF TRANSPORTATION	
STREETCAR STANDARD DRAWINGS	PROJECT ENG. _____ DESIGNED BY _____ CHECKED BY _____ DRAWN BY _____ PROJECT MGR. _____
PROTOTYPE PLATFORM CURB EXTENSION B	DIVISION CHIEF _____ DATE _____ FILE _____ DWG. NO. A-02

DATE	APPR.	RECOMMENDED: <i>Muhammad Khalid</i> DEPUTY CHIEF ENGINEER
ISSUED:	REVISED	APPROVED: <i>Ruthie</i> CHIEF TRANSPORTATION ENGINEER
	REFERENCE	

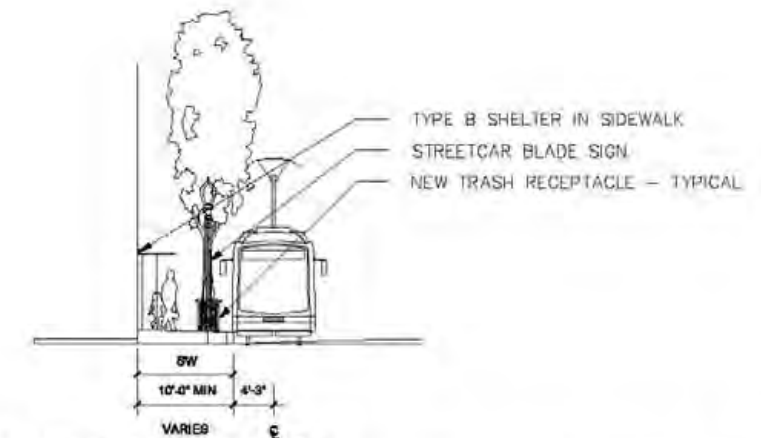
c:\pwworking\ghit\dd5339372\A1-2-PlatformPlans_BourExtension.dwg
 1/20/2012



PLAN SIDE CURB STOP ①
SCALE: 1:20



SECTION SIDE CURB STOP ②
SCALE: 1:20



SECTION SIDE CURB STOP ③
SCALE: 1:20

D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

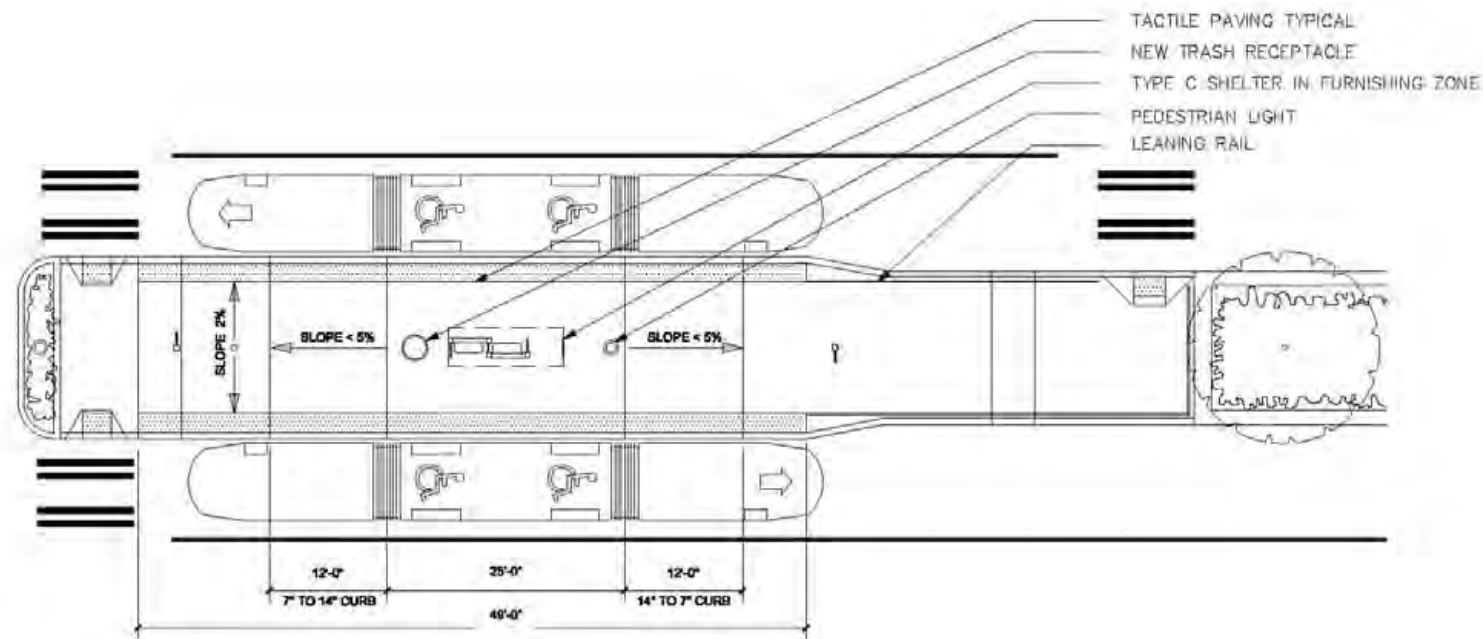
PROTOTYPE PLATFORM
TWO SIDE CURBS

DATE	ISSUED:	APPR.	REVISED	REFERENCE
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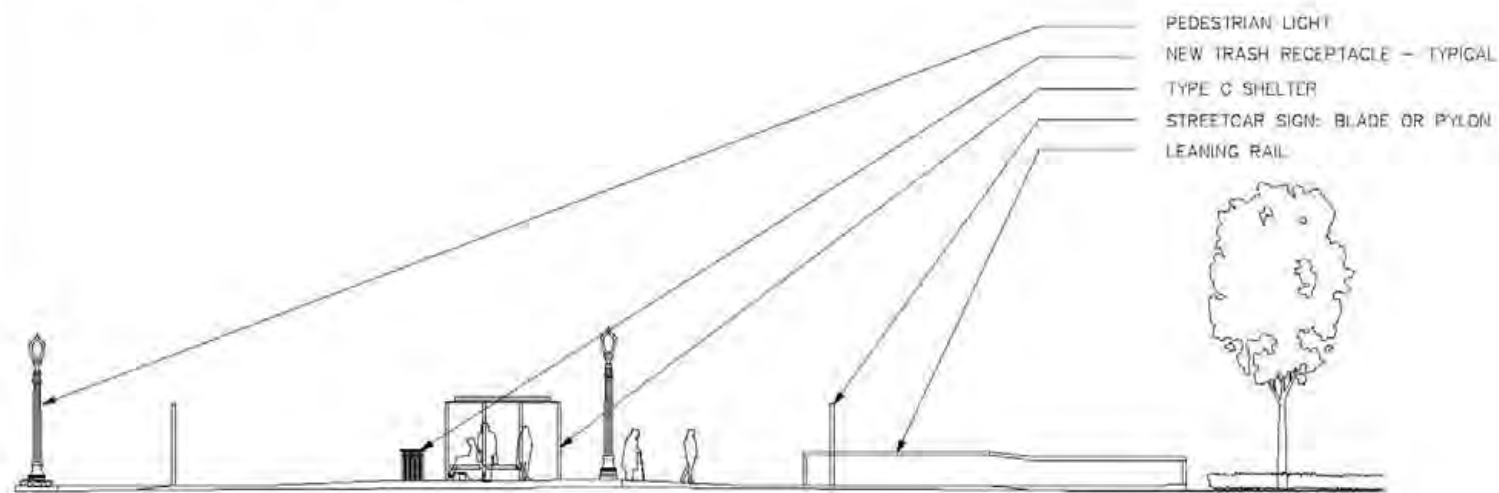
RECOMMENDED: *Mohammad Khadd*
DEPUTY CHIEF ENGINEER

APPROVED: *R. The*
CHIEF TRANSPORTATION ENGINEER

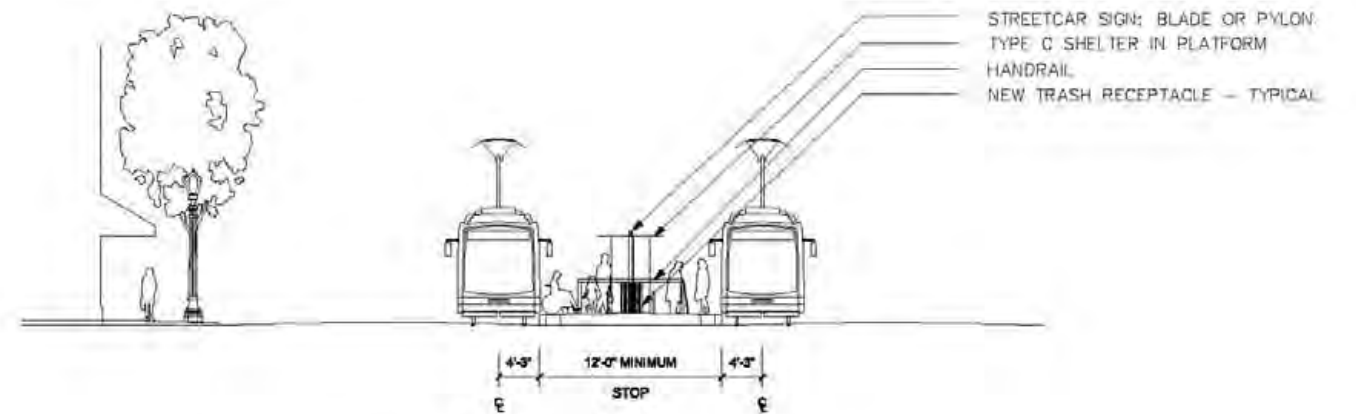
PROJECT ENG.	DESIGNED BY:
CHECKED BY:	DRAWN BY:
PROJECT MGR.	DIVISION CHIEF
DATE	FILE
DWG. NO.	A-03



PLAN CENTER MEDIAN ①
SCALE: 1:20



SECTION CENTER MEDIAN ②
SCALE: 1:20



SECTION CENTER MEDIAN ③
SCALE: 1:20

D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

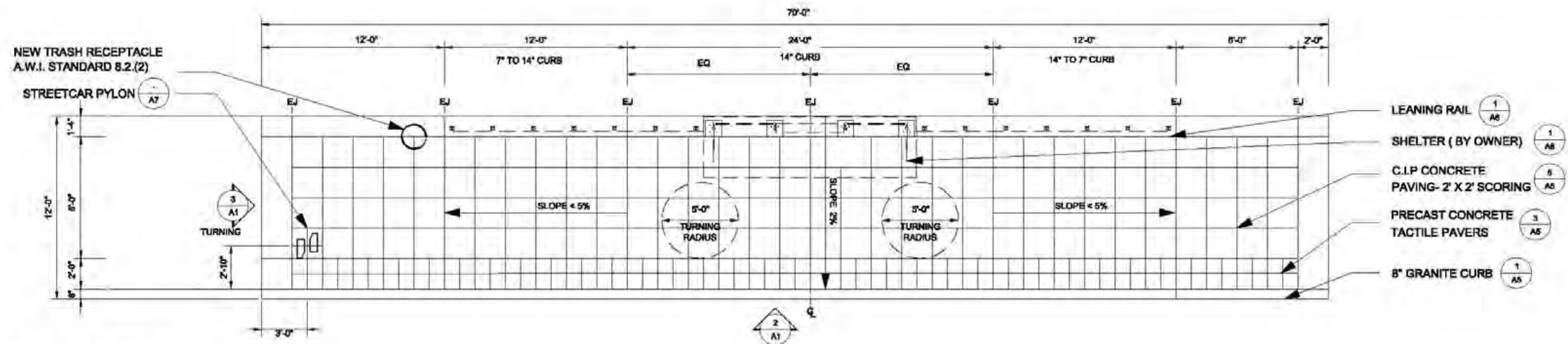
PROTOTYPE PLATFORM
CENTER MEDIAN

DATE	APPR.	REVISION
ISSUED:		REFERENCE

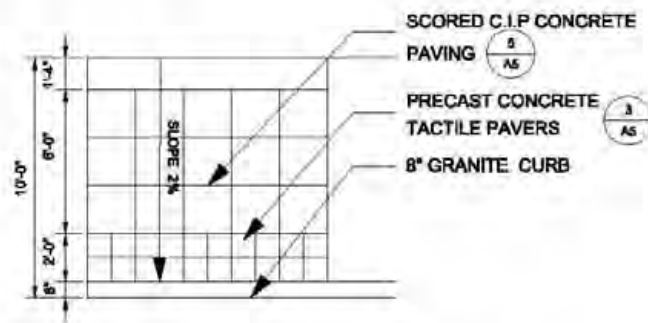
RECOMMENDED: *Muhammad Khalid*
DEPUTY CHIEF ENGINEER

APPROVED: *Rita He*
CHIEF TRANSPORTATION ENGINEER

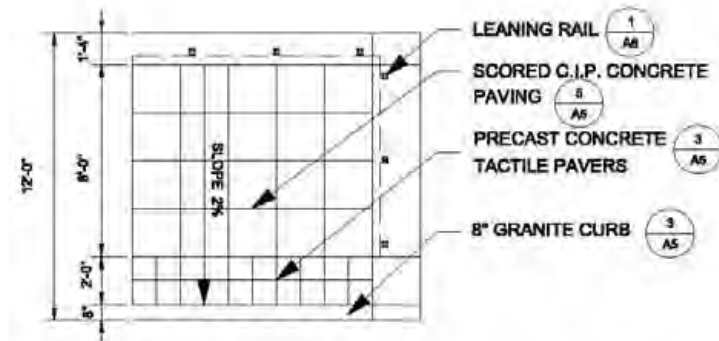
PROJECT ENG.	
DESIGNED BY:	
CHECKED BY:	
DRAWN BY:	
PROJECT MGR.	
DIVISION CHIEF:	
DATE:	
FILE:	
DWG. NO.	A-04



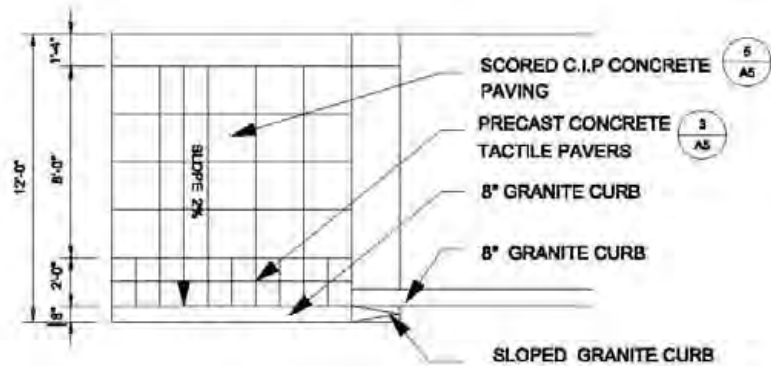
SIDE PLATFORM ELEVATION (1)
SCALE: NOT TO SCALE



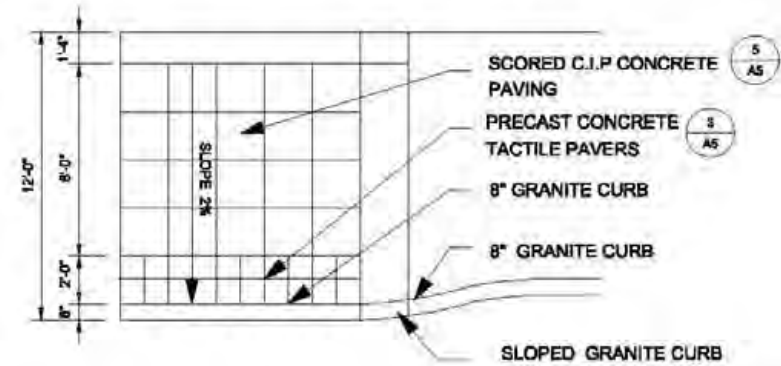
SIDE PLATFORM PARTIAL PLAN - 10 FT WIDE (2)
SCALE: 1/8"=1'-0"



LEANING RAIL AT PLATFORM END - PARTIAL PLAN (5)
SCALE: 1/8"=1'-0"



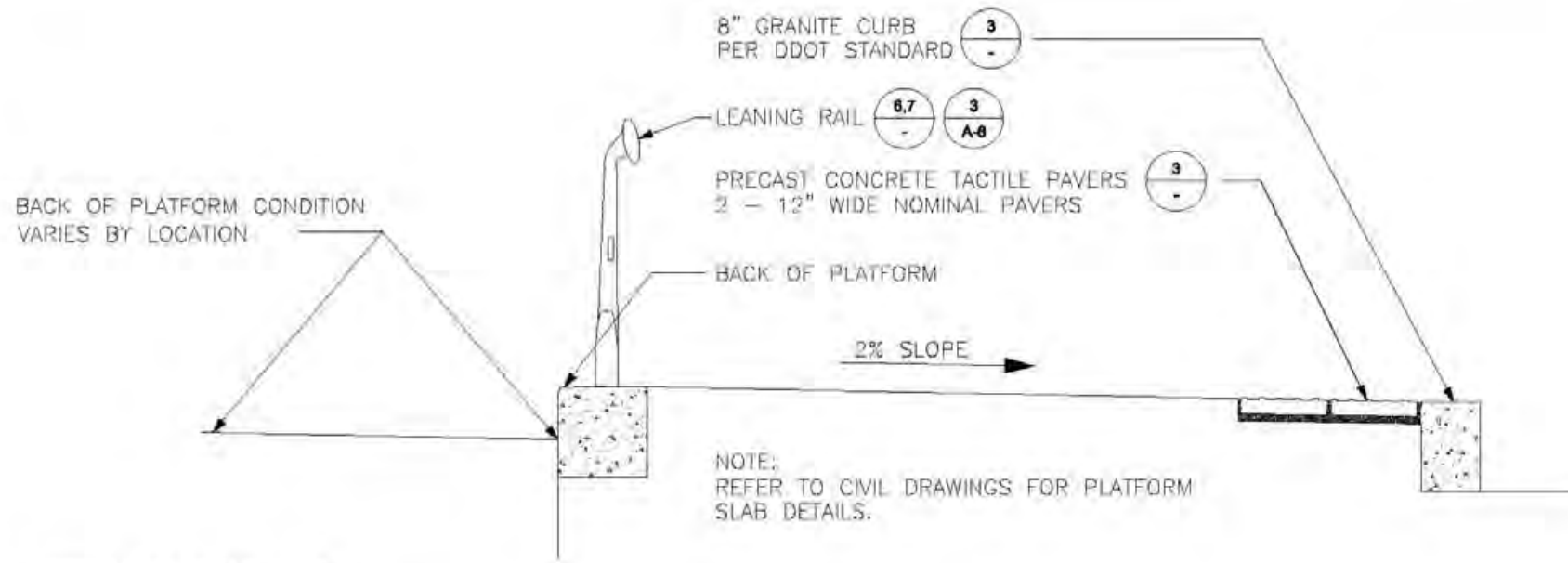
PLATFORM CURB - TRANSITION TO SIDEWALK - PARTIAL PLAN (3)
SCALE: 1/8"=1'-0"



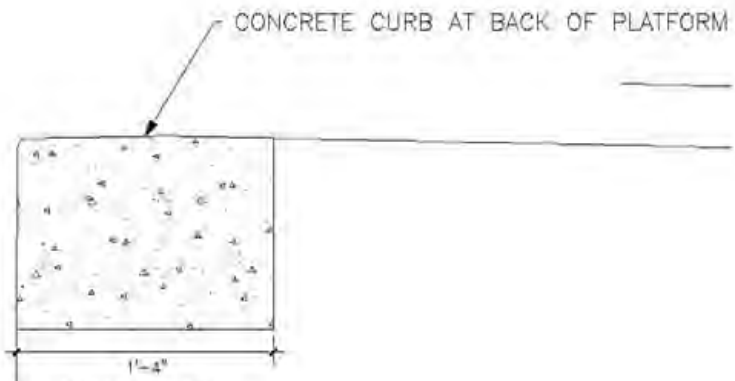
PLATFORM CURB - TRANSITION TO SIDEWALK - PARTIAL PLAN (4)
SCALE: 1/8"=1'-0"

D.C. DEPARTMENT OF TRANSPORTATION

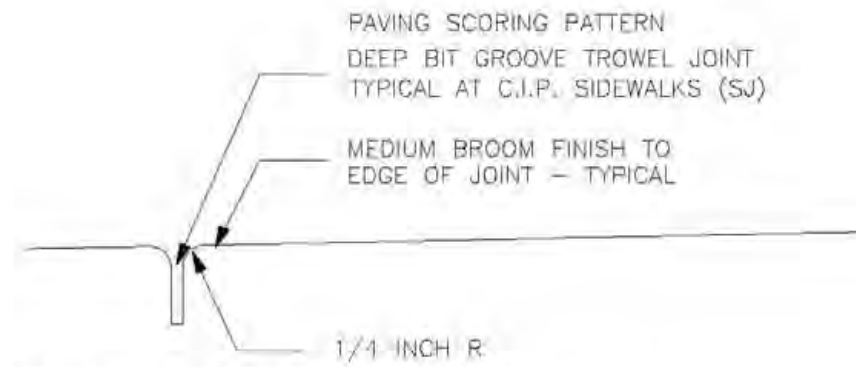
		RECOMMENDED: <i>Mohammed Elshid</i> DEPUTY CHIEF ENGINEER	STREETCAR STANDARD DRAWINGS	PROJECT ENG. _____
		APPROVED: <i>[Signature]</i> CHIEF TRANSPORTATION ENGINEER		DESIGNED BY: _____
DATE	APPR.		PLATFORM TRANSITION CONDITIONS	CHECKED BY: _____
REVISED				DRAWN BY: _____
ISSUED:		REFERENCE		PROJECT MGR. <u> </u> <i> </i> <u> </u> <i> </i>
				DIVISION CHIEF: _____
				DATE: _____
				FILE: _____
				DWG. NO. A-08



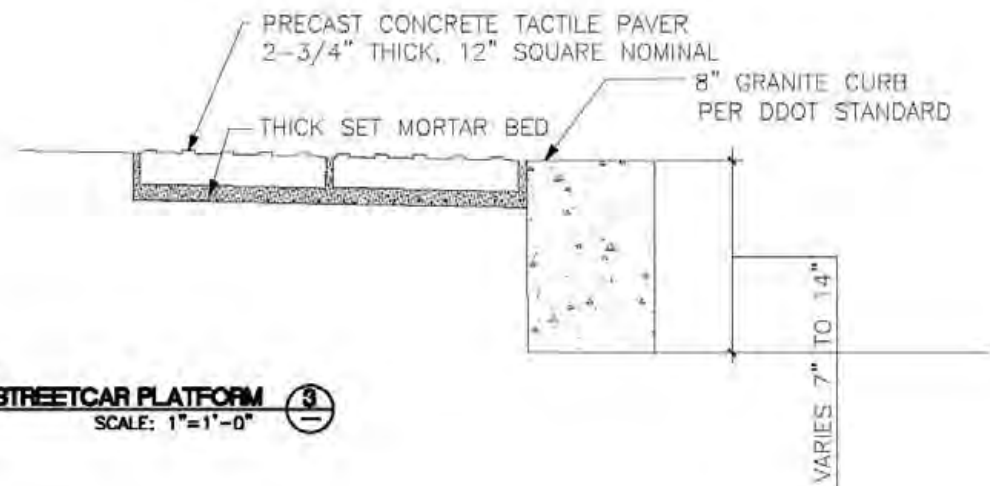
STREETCAR PLATFORM ①
SCALE: 1/2"=1'-0"



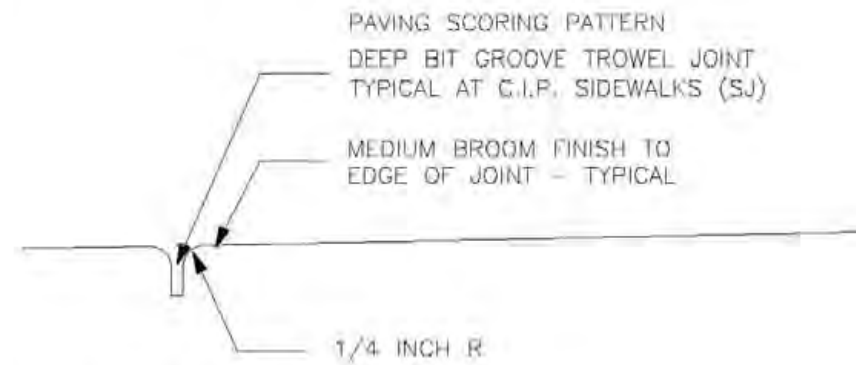
STREETCAR PLATFORM CURB ②
SCALE: 1"=1'-0"



C.I.P. CONTROL JOINT ④
SCALE: 6"=1'-0"



STREETCAR PLATFORM ③
SCALE: 1"=1'-0"



C.I.P. SCORE JOINT ⑤
SCALE: 6"=1'-0"

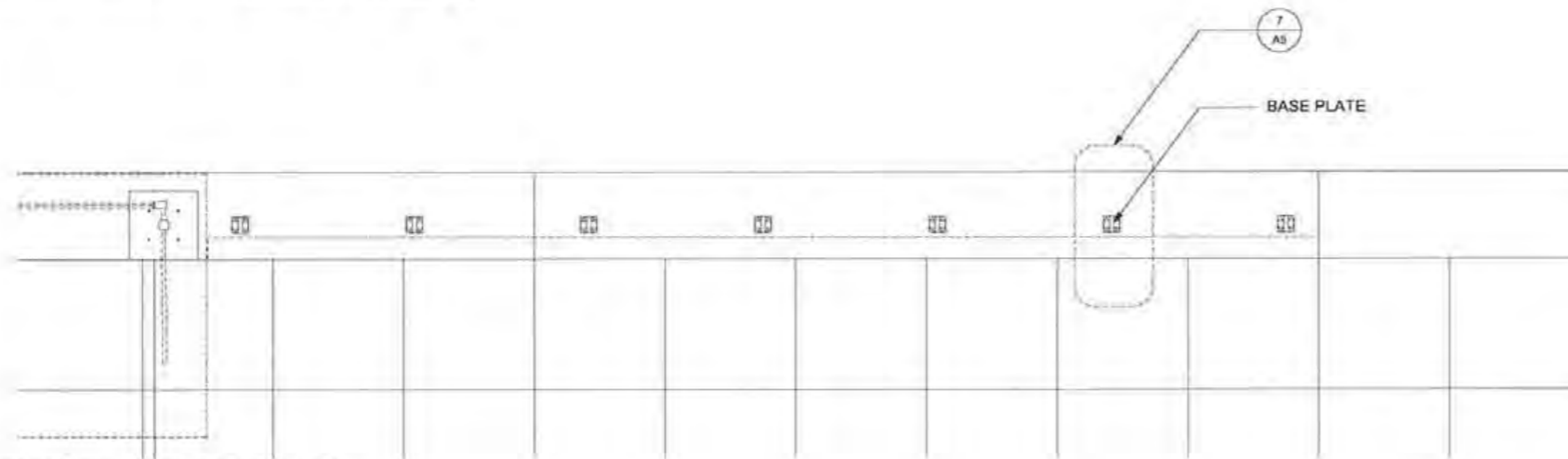
D.C. DEPARTMENT OF TRANSPORTATION	
STREETCAR STANDARD DRAWINGS	PROJECT ENG. _____ DESIGNED BY _____ CHECKED BY _____ DRAWN BY _____ PROJECT MGR. _____
STREETCAR PLATFORM EDGE DETAILS	DIVISION CHIEF _____ DATE _____ FILE _____ DWG. NO. A-07

DATE	APPR.	RECOMMENDED: <i>Muhammad Khalid</i> DEPUTY CHIEF ENGINEER
ISSUED:	REVISED	APPROVED: <i>Robert The</i> CHIEF TRANSPORTATION ENGINEER
	REFERENCE	

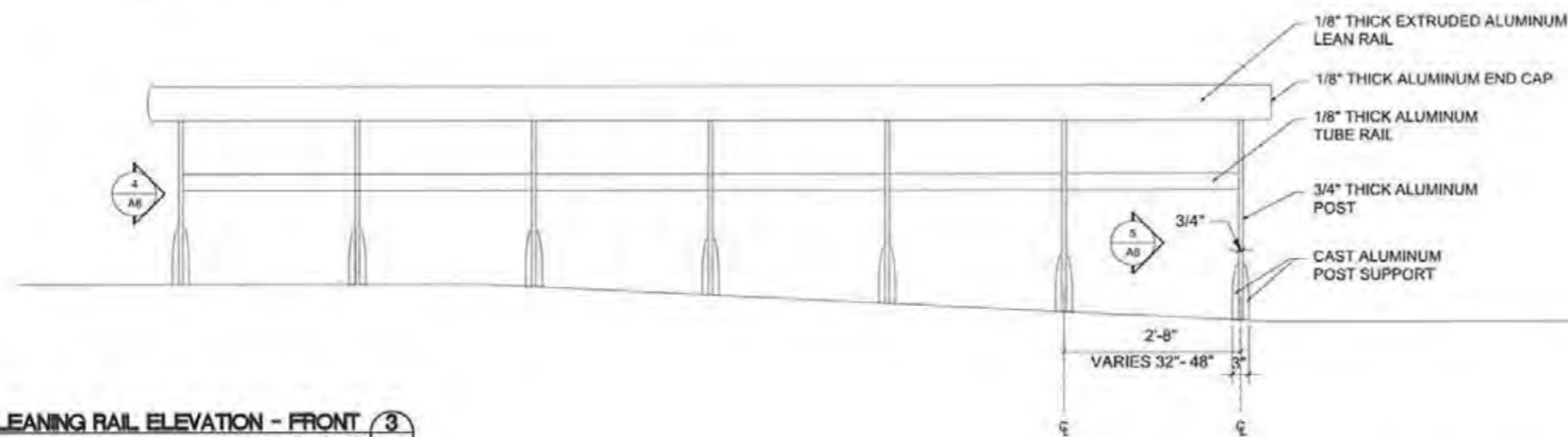
c:\pwworking\p11\d0339372\A1-7-platform.dwg 1/20/2012



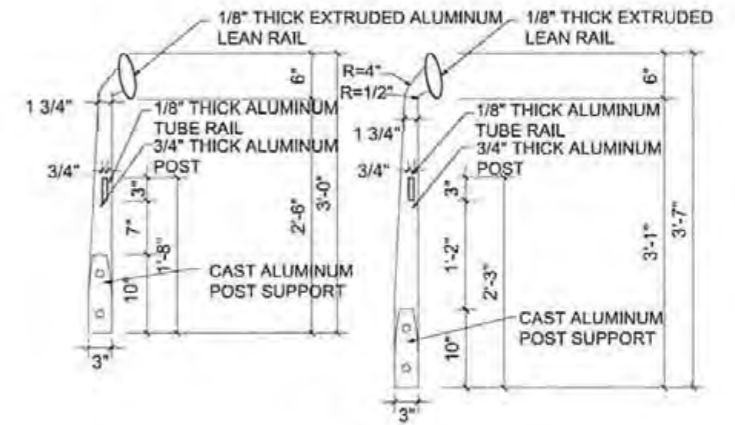
SHELTER AND LEANING RAIL - PERSPECTIVE ①
SCALE: NOT TO SCALE



LEANING RAIL PLAN - PARTIAL ②
SCALE: 1/4"=1'-0"



LEANING RAIL ELEVATION - FRONT ③
SCALE: 3/8"=1'-0"

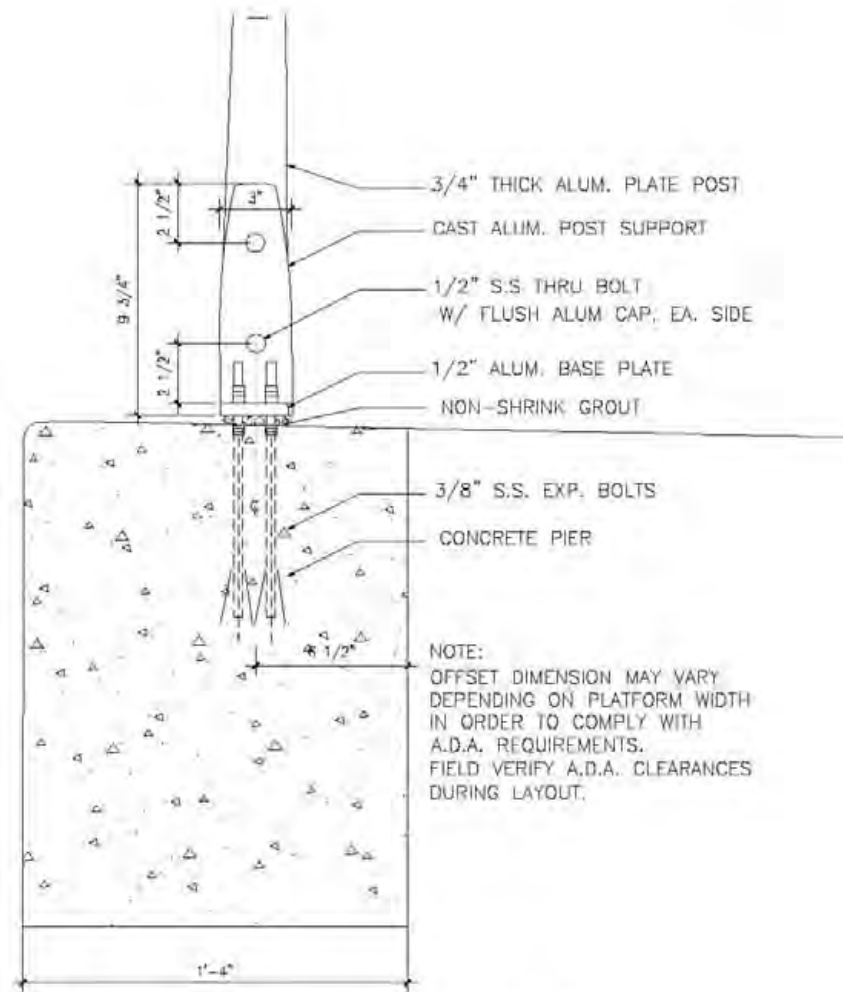


LEANING RAIL SIDE ELEVATION AT HIGH POINT AND LOW POINT OF PLATFORMS ④
SCALE: 1/2"=1'-0"

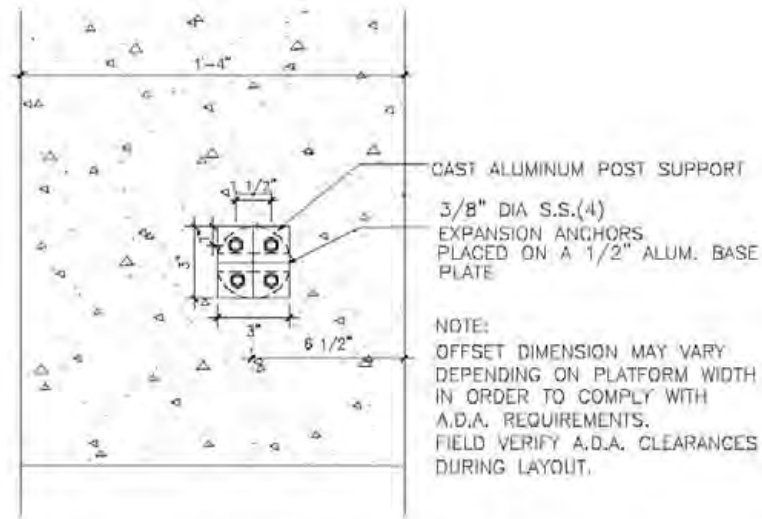
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D.C. DEPARTMENT OF TRANSPORTATION	
STREETCAR STANDARD DRAWINGS	PROJECT ENG. _____ DESIGNED BY _____ CHECKED BY _____ DRAWN BY _____ PROJECT MGR. <u>EV</u>
STREETCAR PLATFORM FURNISHINGS LEANING RAIL PLANS, ELEVATIONS, AND SECTIONS	DIVISION CHIEF _____ DATE _____ FILE _____ DWG. NO. <u>A-08</u>

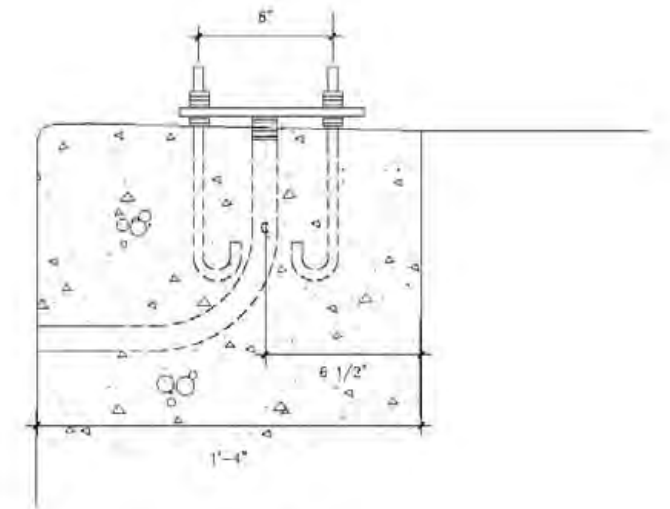
RECOMMENDED:	<i>Muhammad Elabd</i> DEPUTY CHIEF ENGINEER
APPROVED:	<i>R. F. R.</i> CHIEF TRANSPORTATION ENGINEER
DATE	APPR.
ISSUED:	REVISED
	REFERENCE



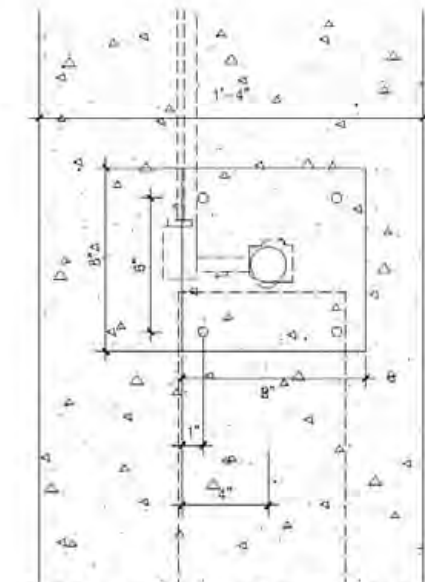
LEANING RAIL INSTALLATION - SECTION 1
 SCALE: 1-1/2"=1'-0"



LEANING RAIL INSTALLATION - PLAN 2
 SCALE: 1-1/2"=1'-0"



SHelter BASE PLATE - SECTION 4
 SCALE: 1-1/2"=1'-0"



SHelter BASE PLATE - PLAN 3
 SCALE: 1-1/2"=1'-0"

D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

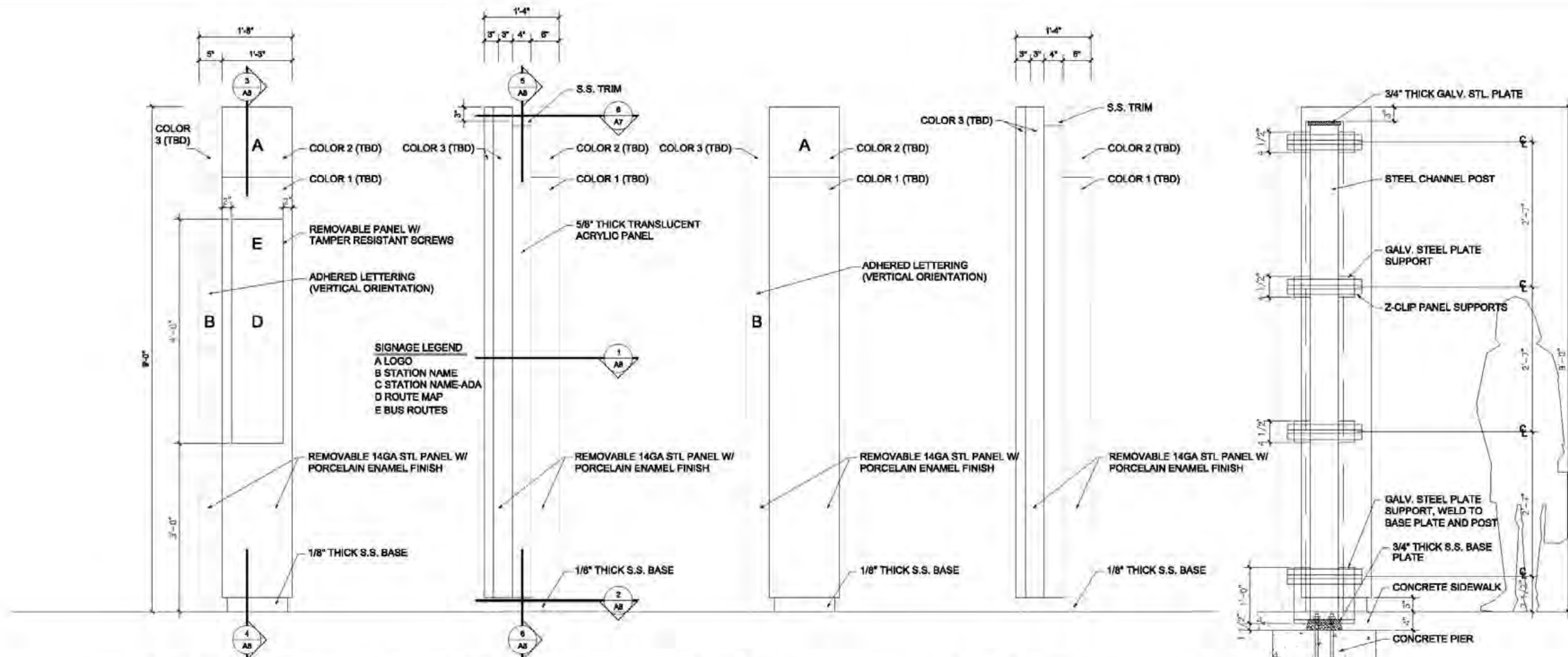
STREETCAR PLATFORM LEANING RAIL
 FOUNDATION AND CURB DETAILS

PROJECT ENG. _____
 DESIGNED BY _____
 CHECKED BY _____
 DRAWN BY _____
 PROJECT MGR. _____
 DIVISION CHIEF _____
 DATE _____
 FILE _____
 DWG. NO. A-09

RECOMMENDED: *Muhammad Khalid*
 DEPUTY CHIEF ENGINEER

APPROVED: *Patricia E.*
 CHIEF TRANSPORTATION ENGINEER

DATE	APPR.	REFERENCE
ISSUED:	REVISED	



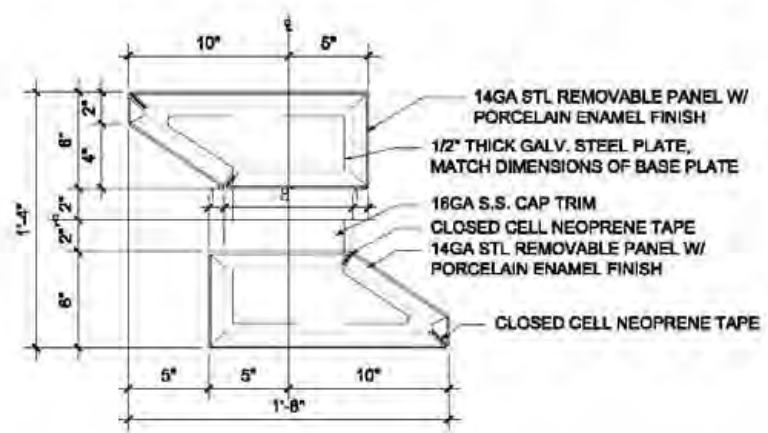
PYLON - ELEVATION ①
SCALE: 1/2"=1'-0"

PYLON - ELEVATION ②
SCALE: 1/2"=1'-0"

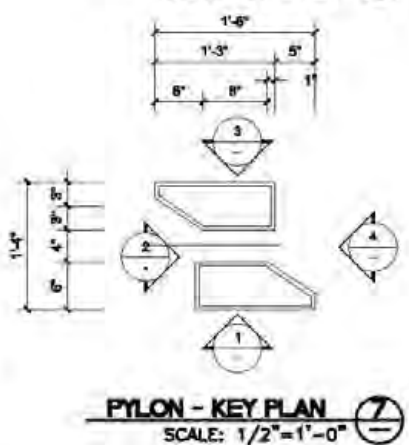
PYLON - ELEVATION ③
SCALE: 1/2"=1'-0"

PYLON - ELEVATION ④
SCALE: 1/2"=1'-0"

PYLON - ELEVATION ⑤
SCALE: 1/2"=1'-0"



PYLON - PLAN DETAIL - TOP ⑥
SCALE: 1"=1'-0"

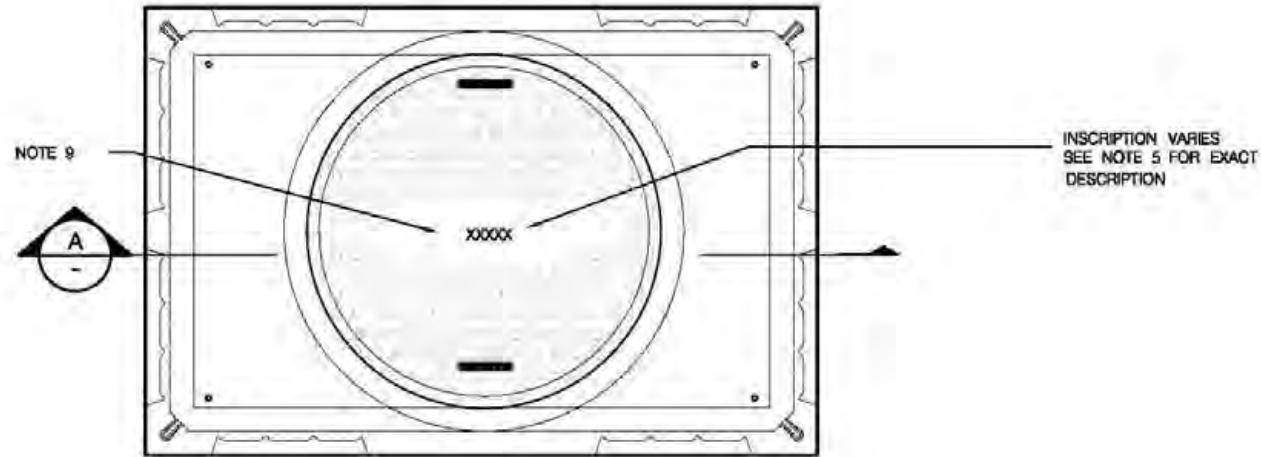
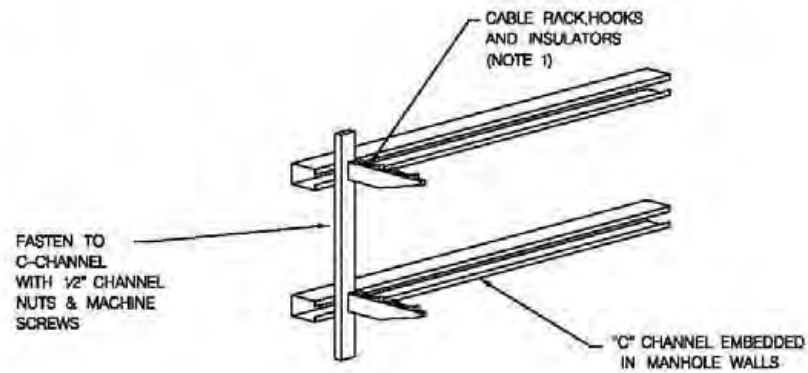


PYLON - KEY PLAN ⑦
SCALE: 1/2"=1'-0"

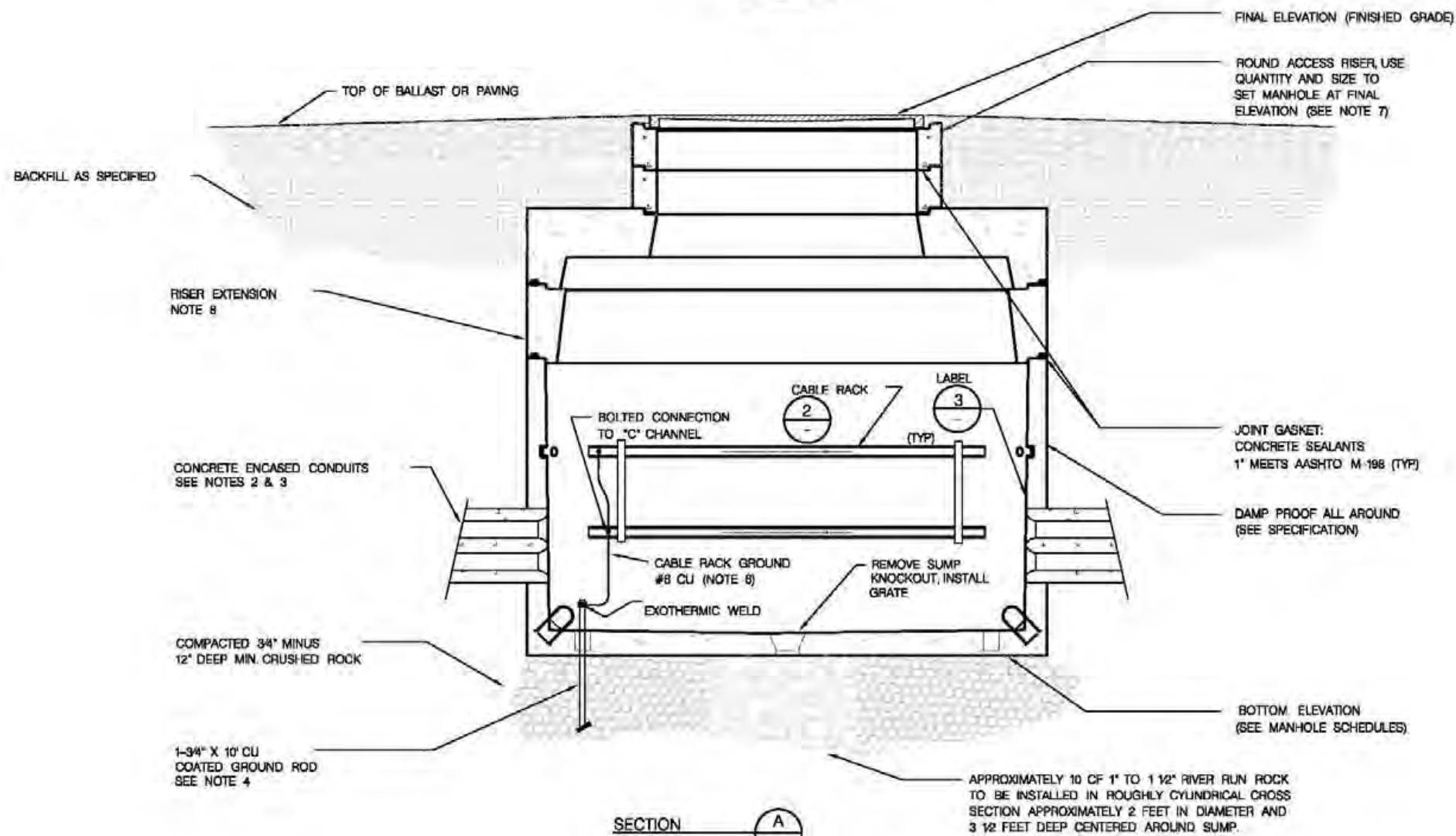
D.C. DEPARTMENT OF TRANSPORTATION	
STREETCAR STANDARD DRAWINGS	PROJECT ENG. _____ DESIGNED BY: _____ CHECKED BY: _____ DRAWN BY: _____ PROJECT MGR. _____
STREETCAR PYLON PLANS AND ELEVATIONS	DIVISION CHIEF: _____ DATE: _____ FILE: _____ DWG. NO. A-10

DATE	ISSUED:	APPR.	REVIS	REFERENCE
		RECOMMENDED: <i>Muhammad Khalid</i> DEPUTY CHIEF ENGINEER		
		APPROVED: <i>[Signature]</i> CHIEF TRANSPORTATION ENGINEER		

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- NOTES:**
1. CABLE RACKS AND INSULATORS SHALL BE FURNISHED WITH MANHOLE AND INSTALLED ON ALL FOUR WALLS; RACKS SHALL BE ADJUSTABLE IN HORIZONTAL AND VERTICAL DIRECTION. SEE MANHOLE DETAILS FOR QUANTITIES.
 2. ALL CONDUITS SHALL ENTER MANHOLE KNOCKOUT OR TERMAUCT ONLY AT 90° TO WALL
 3. ALL CONDUITS SHALL SLOPE CONTINUALLY DOWN AT A MINIMUM OF 3" PER 100'-0" TO PROVIDE POSITIVE DRAINAGE TO MANHOLES
 4. EXERCISE CAUTION IN INSTALLATION OF GROUND RODS SO DAMAGE TO OTHER UTILITIES DOES NOT OCCUR.
 5. CAST IRON COVERS USED FOR TRACTION ELECTRIFICATION SHALL BE MARKED "ELECTRIFICATION".
 6. GROUND ALL CABLE RACKS AND CONDUIT GROUNDING BUSHINGS TO GROUND ROD.
 7. FOR CAST IRON COVERS USE ROUND ACCESS RISERS TO ACHIEVE FINAL ELEVATION. THE TOTAL HEIGHT OF ALL ROUND ACCESS RISERS INSTALLED ON A MANHOLE SHALL NOT EXCEED 30 INCHES.
 8. MANHOLE STATIONING POINT CORRESPONDS TO CENTER POINT OF MANHOLE TOP. (I.E., INTERSECTION OF DIAGONALS)



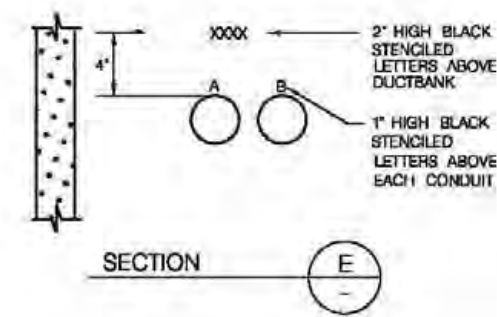
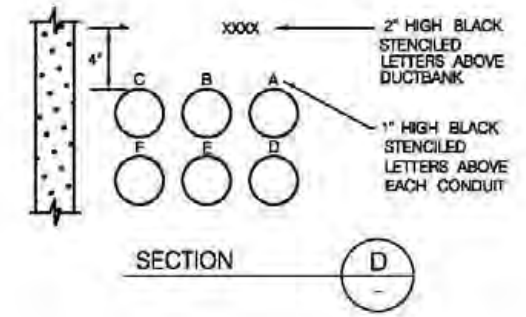
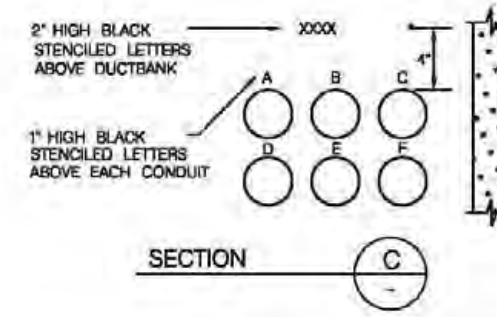
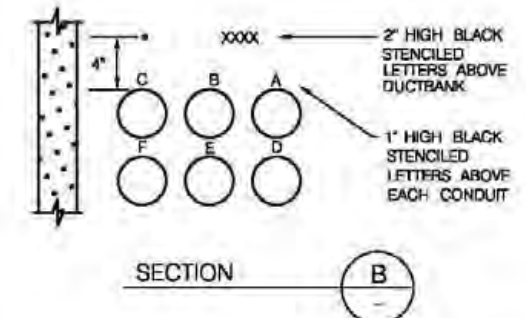
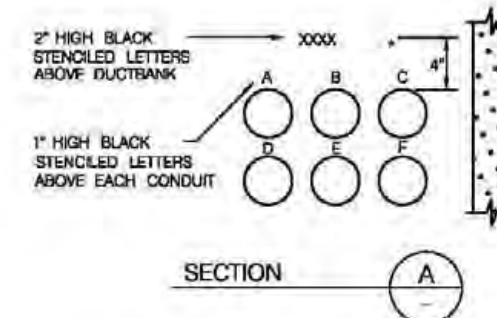
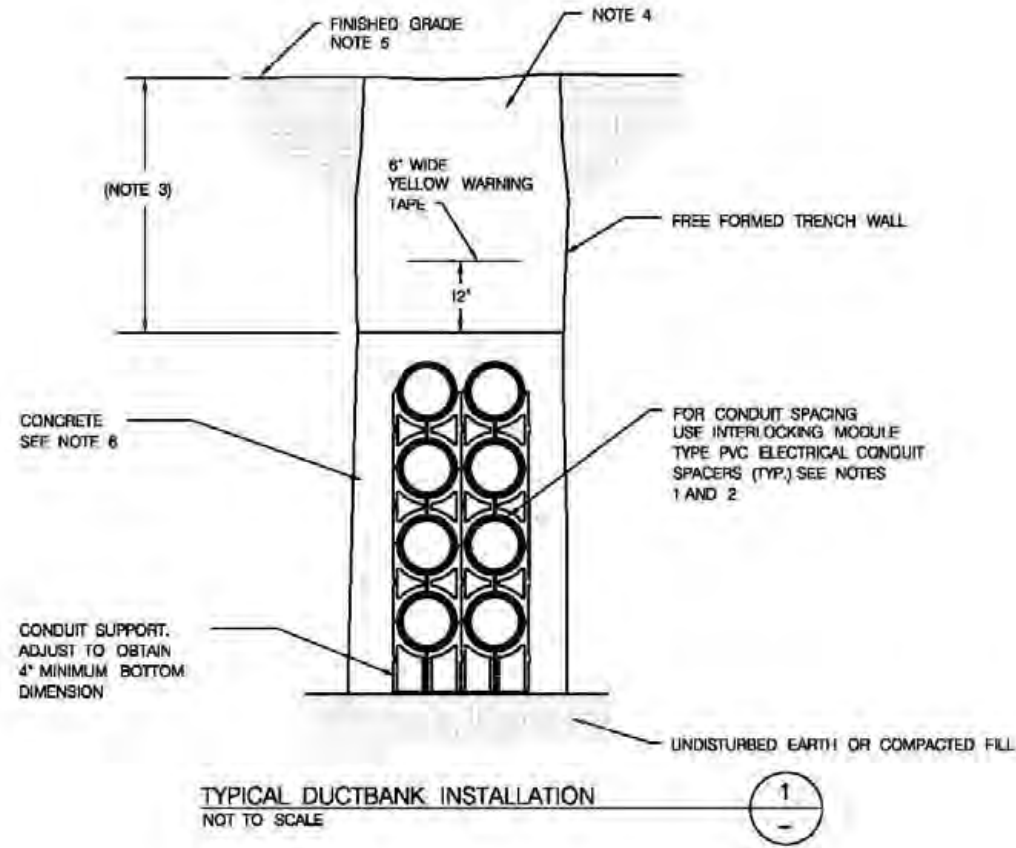
D.C. DEPARTMENT OF TRANSPORTATION	
STREETCAR STANDARD DRAWINGS	PROJECT ENG: _____ DESIGNED BY: _____ CHECKED BY: _____ DRAWN BY: _____ PROJECT MGR.: CY
SYSTEMWIDE ELECTRICAL HIGH VOLTAGE MANHOLE INSTALLATION DETAILS	DIVISION CHIEF: _____ DATE: _____ FILE: _____ DWG. NO. E-02

RECOMMENDED:	<i>Mohammed Khalid</i> DEPUTY CHIEF ENGINEER
APPROVED:	<i>[Signature]</i> CHIEF TRANSPORTATION ENGINEER
DATE	APPR.
ISSUED:	REVISED
	REFERENCE

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NOTES:

1. USE PVC ELECTRICAL CONDUIT SPACERS TO MAINTAIN A SPACING OF 1 1/2" CLEAR BETWEEN CONDUITS FOR SIGNAL/COMMUNICATION AND LV DUCTBANKS. FOR TRACTION ELECTRIFICATION AND HV DUCTBANKS MAINTAIN A SPACING OF 3" CLEAR BETWEEN CONDUITS.
2. INSTALL INTERLOCKING MODULE CONDUIT SPACERS AT 5'-0" ON CENTERS.
3. GROUND COVER OVER TOP OF DUCTBANK SHALL BE A MINIMUM OF 36" UNLESS SPECIFIED OTHERWISE.
4. PROVIDE BACKFILL AND FINISH MATERIALS AS SPECIFIED IN OTHER DIVISIONS OF WORK.
5. TOP OF BALLAST WITHIN TRACKWAY.
6. RED CONCRETE SHALL BE USED FOR ALL TRACTION ELECTRIFICATION AND 15KV DUCTBANK INSTALLATIONS.
7. DUCTBANK REFERENCES SHOWN ARE EXAMPLES ONLY.
8. ALL CONDUITS SHALL BE MANDRILLED, 1/4" PULL CORDS INSTALLED, AND ENDS CAPPED.



D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

SYSTEMWIDE ELECTRICAL CONDUIT INSTALLATION DETAILS

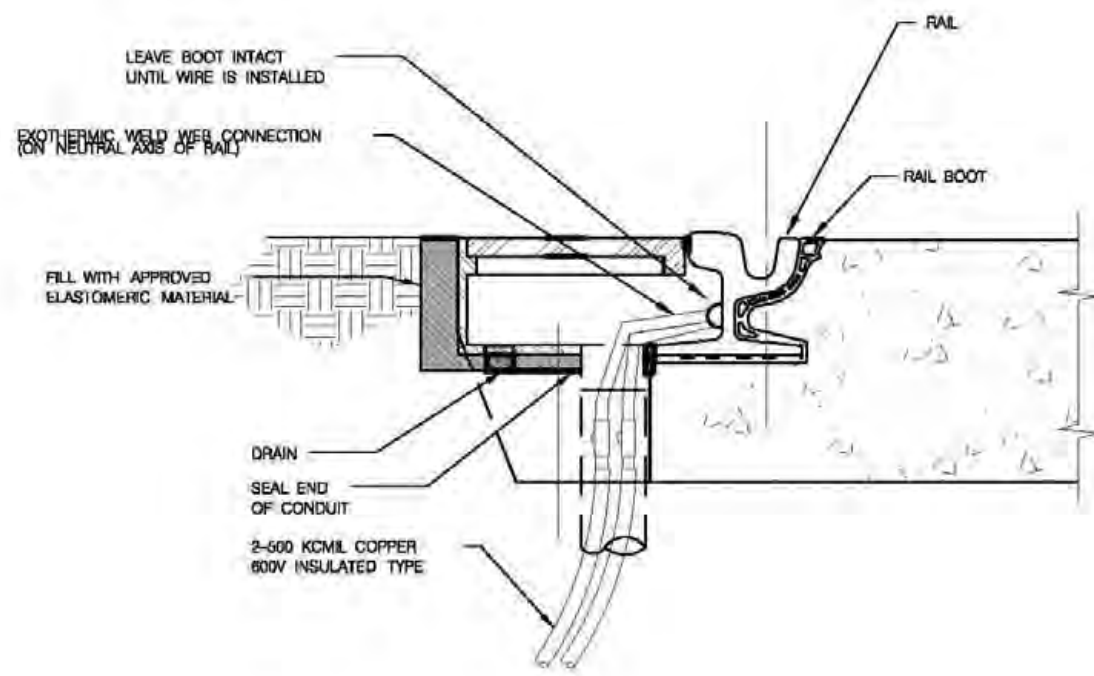
DATE	APPR.	
ISSUED:	REVISED	REFERENCE

RECOMMENDED: *Muhammad Khalid*
DEPUTY CHIEF ENGINEER

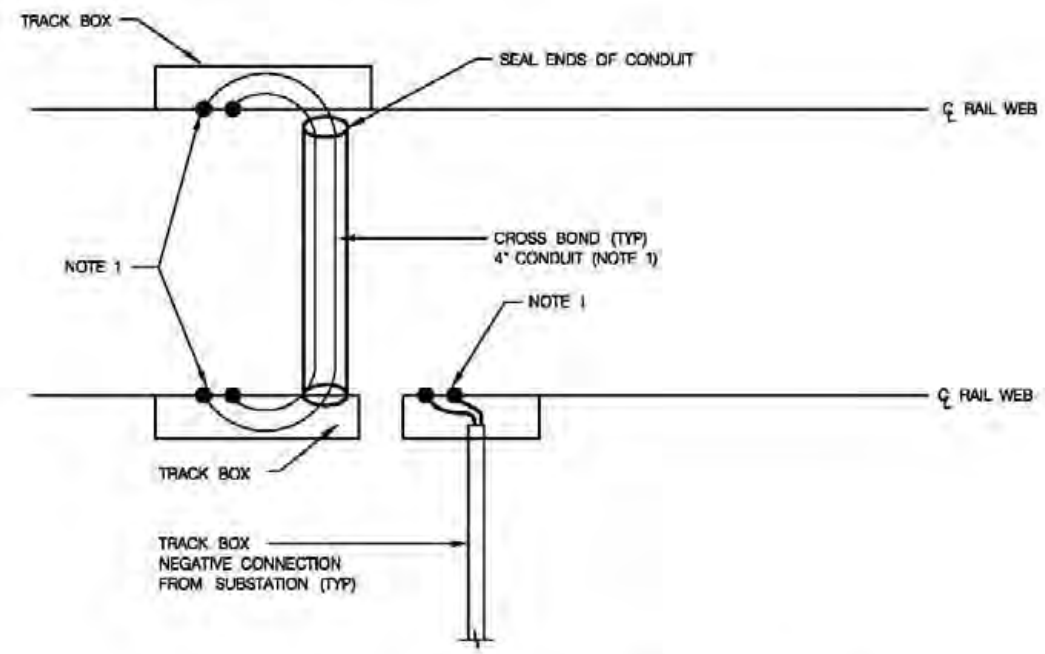
APPROVED: *R. J. H. E.*
CHIEF TRANSPORTATION ENGINEER

PROJECT ENG. _____
DESIGNED BY _____
CHECKED BY _____
DRAWN BY _____
PROJECT MGR. _____
DIVISION CHIEF _____
DATE _____
FILE _____
DWG. NO. E-03

- NOTES:**
1. BOND CABLE TO RAIL BY EXOTHERMIC WELD.
 2. SEE DRAWING pTP-0029 FOR TRACK BOX DETAIL.



RAIL WEB BOND DETAIL FOR NEGATIVE CONNECTIONS AND CROSS BONDS 1



SUBSTATION CROSS BONDING PLAN TYP 2

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D.C. DEPARTMENT OF TRANSPORTATION

DATE	APPR.	RECOMMENDED:	<i>Muhammad Khalid</i> DEPUTY CHIEF ENGINEER
ISSUED:	REVISED	APPROVED:	<i>Robert M. ...</i> CHIEF TRANSPORTATION ENGINEER
		REFERENCE	

STREETCAR STANDARD DRAWINGS		PROJECT ENG	
		DESIGNED BY	
		CHECKED BY	
		DRAWN BY	
		PROJECT MGR.	CY
		DIVISION CHIEF	
		DATE	
		FILE	
		DWG. NO.	E-04

SYSTEMWIDE ELECTRICAL
NEGATIVE CONNECTION TO RAIL

GENERAL NOTES

1. THE DRAWINGS FOR THE OVERHEAD CONTACT SYSTEM IN A PROJECT CONSIST OF BOTH SITE SPECIFIC DRAWINGS AND STANDARD DRAWINGS. ADDITIONALLY, THEY ARE TO BE READ IN CONJUNCTION WITH THE SPECIFICATIONS AND REFERENCED STANDARD DRAWINGS.
2. INSTALLATION OF THE OVERHEAD CONTACT SYSTEM SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE SPECIFICATIONS, NATIONAL ELECTRICAL SAFETY CODE (NEC) AND THE APPLICABLE DISTRICT OF COLUMBIA.
3. ALL OVERHEAD CONTACT SYSTEM EQUIPMENT AND ASSEMBLIES SHALL CLEAR ALL APPROPRIATE CLEARANCE ENVELOPES AND ELECTRICAL CLEARANCE REQUIREMENTS. REFER TO DRAWINGS OCT-08 THROUGH OCT-11 WHEN DETERMINING PANTOGRAPH CLEARANCE REQUIREMENTS.
4. ALL FIELD CONNECTIONS SHALL BE BOLTED UNLESS OTHERWISE NOTED. BOLT HOLES SHALL BE SIZED TO CLEAR BOLTS WITH ALLOWANCE FOR PURPOSE, BOLT DIAMETER, AND GALVANIZING THICKNESS.
5. AESTHETICS SHALL BE A MAJOR CONSIDERATION OF THE DESIGN IN ORDER TO MINIMIZE VISUAL IMPACT. WELL BLENDED ASSEMBLIES AND COMPONENTS ARE DESIRED. ALL MATERIAL, ASSEMBLIES AND COMPONENTS ARE SUBJECT TO APPROVAL OF THE DISTRICT.
6. UNLESS OTHERWISE NOTED, ALL MISCELLANEOUS STEEL BRACKETS, FASTENERS AND FITTINGS SHALL BE DESIGNED AND MANUFACTURED, WELDED AND GALVANIZED IN ACCORDANCE WITH THE SPECIFICATIONS.

STANDARD DRAWINGS

1. STANDARD DRAWINGS INCLUDE TECHNICAL SHEETS, TYPICAL SPAN DRAWINGS, TYPICAL STRUCTURE DRAWINGS, AND ASSEMBLY DRAWINGS.
2. TECHNICAL SHEET DRAWINGS PROVIDE BASIC AND DEVELOPED DATA RELATING TO THE OVERHEAD CONTACT SYSTEM AND ITS RELATIONSHIP WITH OTHER EQUIPMENT AND SYSTEMS.
3. GENERAL ARRANGEMENT DRAWINGS TYPICALLY DEFINE AND SHOW THE REQUIRED RELATIONSHIP BETWEEN MULTIPLE SPANS OF WIRING AND MULTIPLE STRUCTURES.
4. TYPICAL SPAN DRAWINGS SHOW CONTACT WIRE SPANS AND THE RELATIONSHIP BETWEEN VARIOUS OCS ASSEMBLIES NEEDED TO FIT OUT EACH SPAN OF A GIVEN TYPE.
5. TYPICAL STRUCTURE DRAWINGS SHOW A CROSS SECTION VIEW OF INDIVIDUAL STRUCTURE TYPES AND THE RELATIONSHIP BETWEEN VARIOUS OCS ASSEMBLIES NEEDED TO FIT OUT THE STRUCTURE.
6. STANDARD ASSEMBLY DRAWINGS SHOW ONE OR MORE ASSEMBLIES OF GENERIC PARTS WITH REQUIRED DIMENSIONS, INSTALLATION REQUIREMENTS AND A BILL OF MATERIALS TABLE. ASSEMBLIES ARE IDENTIFIED BY DISCRETE REFERENCE NUMBERS.
7. THE DETAILING OF ASSEMBLIES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. UNLESS OTHERWISE NOTED, CONTRACTORS AND SUPPLIERS ARE ENCOURAGED TO PROVIDE THEIR OWN STANDARD ASSEMBLIES AND COMPONENTS PROVIDED THAT THEY MEET THE REQUIREMENTS FOR PURPOSE, DIMENSIONAL PERFORMANCE AND SPECIFICATION. DETAILING SHALL INCLUDE PARTS IDENTIFICATION AND BILL OF MATERIALS TABLE.
8. CONSISTENCY OF ASSEMBLIES AND PARTS SHALL BE MAINTAINED FOR ALL APPLICATIONS THROUGHOUT THE PROJECT.
9. THE LOADING VALUES SHOWN ON STANDARD ASSEMBLY DRAWINGS ARE FOR INFORMATION ONLY. SUCH VALUES MAY HAVE FORMED THE BASIS FOR ASSEMBLIES CALLED FROM OTHER DRAWINGS. THE CONTRACTOR SHALL DETERMINE AND RECORD THE ACTUAL LOADING CAPACITIES FOR THE ASSEMBLIES AND COMPONENTS TO BE PROVIDED.

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D.C. DEPARTMENT OF TRANSPORTATION

			RECOMMENDED: <i>Michael H. ...</i> DEPUTY CHIEF ENGINEER	PROJECT ENG. _____ DESIGNED BY _____ CHECKED BY _____ DRAWN BY _____ PROJECT NO. _____
			APPROVED: <i>[Signature]</i> CHIEF TRANSPORTATION ENGINEER	DIVISION CHIEF _____ DATE _____ FILE _____ DWG. NO. _____ OCT 01
DATE	APPR.			
ISSUED:	REVISED		REFERENCE	

STREETCAR STANDARD DRAWINGS

GENERAL NOTES FOR OCS DRAWINGS

OVERHEAD CONTACT ABBREVIATIONS

<p>A</p> <p>AB ANCHOR BOLT ABUT ABUTMENT AC ALTERNATING CURRENT ACI AMERICAN CONCRETE INSTITUTE ACSR ALUMINUM CONDUCTOR, STEEL REINFORCED ADJ ADJACENT AG AT GRADE AISC AMERICAN INSTITUTE OF STEEL CONSTRUCTION AL ALUMINUM ANC ANCHOR APPROX APPROXIMATE AREMA AMERICAN RAILWAY ENGINEERING AND MAINTENANCE OF WAY ASSOCIATION</p> <p>ASSY ASSEMBLY ASTM AMERICAN SOCIETY OF TESTING & MATERIALS AT ALTO TENSION ATM ALONG TRACK MOVEMENT ATR ABOVE TOP RAIL AVG AVERAGE AWG AMERICAN WIRE GAUGE AWS AMERICAN WELDING SOCIETY</p> <p>B</p> <p>BB BACK TO BACK BIL BASIC INSULATION LEVEL BLDG BUILDING BRKT BRACKET B-SPAN BODY SPAN BW BALANCE WEIGHT BWA BALANCE WEIGHT ANCHOR BZ BRONZE</p> <p>C</p> <p>CANT CANTILEVER CAT. CATENARY CB CIRCUIT BREAKER CF CUBIC FEET CHAM CHAMFER CL CENTERLINE C TO C CENTERLINE TO CENTERLINE CLR CLEARANCE CLEAR COMM COMMUNICATIONS CONC CONCRETE COND CONDUCTOR CONTR CONTRACTOR CS CURVE-TO-SPIRAL CTR CENTER CU COPPER CW CONTACT WIRE CY CUBIC YARD</p> <p>D</p> <p>DB DIRECT BURIED DC DIRECT CURRENT DEG DEGREE DET DETAIL DGA DOWN GUY ANCHOR DIA DIAMETER DIM. DIMENSION DISC DISCONNECT DISC SW DISCONNECT SWITCH DOC DEGREE OF CURVATURE DWG DRAWING</p>	<p>E</p> <p>E EAST EA EACH EB EASTBOUND Ea SUPERELEVATION IN INCHES EHS EXTRA HIGH STRENGTH ELEC ELECTRICAL EL ELEVATION EQ EQUAL EQN EQUATION ES EXTRA STRENGTH ETC ET CETERA EXIST EXISTING</p> <p>F</p> <p>F FAHRENHEIT FAC FACILITY FDN FOUNDATION FDR FEEDER FREQ FREQUENCY FOP FACE OF POLE F.O.S. FACTOR OF SAFETY FT FEET, FOOT F TO F FACE TO FACE FT FIXED TERMINATION (F.T.) FA FIXED ANCHOR FTG FOOTING FUT FUTURE</p> <p>G</p> <p>GALV GALVANIZED GND GROUND GRS GALVANIZED RIGID STEEL GRSC GALVANIZED RIGID STEEL CONDUIT</p> <p>H</p> <p>H.D. HARD DRAWN HH HANDHOLE HEX HEXAGONAL HORIZ HORIZONTAL H.R.L. HIGH RAIL LEVEL H-SPAN HEAD SPAN HSS HIGH STRENGTH STEEL HT HEIGHT HV HIGH VOLTAGE HWY HIGHWAY Hz HERTZ</p> <p>I</p> <p>I INTERLOCK IB INBOUND ID INSIDE DIAMETER IEEE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS IN. INCH, INCHES IJ INSULATED JOINT INCL INCLUDE, INCLUDING INSUL INSULATION I.R. IN RUNNING J JUMPER JCT JUNCTION</p>	<p>K</p> <p>K KIP KCMIL THOUSAND CIRCULAR MILS KA KILOAMPERE KV KILOVOLT KVA KILOVOLT AMPERE KSF KIPS PER SQUARE FOOT KSI KIPS PER SQUARE INCH KW KILOWATT</p> <p>L</p> <p>LB POUND, POUNDS LBF POUNDS FORCE LBFT POUNDS PER FOOT LG LONG, LENGTH LOC LOCATION LS LUMP SUM OR LINE SECTION</p> <p>M</p> <p>M METER (AS A UNIT OF LENGTH) MAX MAXIMUM MW MESSENGER WIRE MH MANHOLE MIN MINIMUM MISC MISCELLANEOUS ML MAIN LINE MPA MID POINT ANCHOR MPH MILES PER HOUR</p> <p>N</p> <p>N NORTH NA NOT APPLICABLE NB NORTH BOUND NBR NON-BRIDGING NC NORMALLY CLOSED NEC NATIONAL ELECTRICAL CODE NEG NEGATIVE NESC NATIONAL ELECTRICAL SAFETY CODE NIC NOT IN CONTRACT NO NORMALLY OPEN No. NUMBER NOM NOMINAL NRN NON-REVENUE NORTHBOUND NRS NON-REVENUE SOUTHBOUND N.R. NOT REGISTERED N.S. NOT SUPPORTED N.S.R. NOT SUPPORTED OR REGISTERED N-SW NEGATIVE SWITCH NTS NOT TO SCALE</p> <p>O</p> <p>OCS OVERHEAD CONTACT SYSTEM OB OUTBOUND OD OUTSIDE DIAMETER OH OVERHEAD OHB OVERHEAD BRIDGE OL OVERLAP OR OUT OF RUNNING</p>	<p>P</p> <p>PC POINT OF CURVE PF POINT OF FROG PGRS POLYVINYL COATED GALVANIZED RIGID STEEL PH PHASE PI POINT OF INTERSECTION PTO POINT OF INTERSECTION OF TURNOUT PL PLATE PLAT. PLATFORM PROP PROPOSED PS POINT OF SWITCH PSF POUNDS PER SQUARE FEET PSI POUNDS PER SQUARE INCH P-SW POSITIVE SWITCH PT POINT OF TANGENT PVC POLYVINYL CHLORIDE OR POINT OF VERTICAL CURVE PWR POWER</p> <p>Q</p> <p>Q QUANTITY</p> <p>R</p> <p>R RADIUS RCP REINFORCED CONCRETE PIPE RECT RECTIFIER REF REFERENCE REV REVISE, REVISION REQD REQUIRED ROW RIGHT OF WAY RR RAILROAD</p> <p>S</p> <p>S SOUTH SA SURGE ARRESTOR SB SOUTHBOUND SECT SECTION SC SPIRAL TO CURVE SCAT SIMPLE CATENARY AUTO TENSION SCFT SIMPLE CATENARY FIXED TERMINATION SCH SCHEDULE SI SECTION INSULATOR SIG SIGNAL SOP SET OUT POINT SPEC SPECIFICATION SPS SMALL PART STEELWORK SPST SINGLE POLE SINGLE THROW SQ SQUARE Sq Ft SQUARE FEET Sq In SQUARE INCHES S-SPAN STEADY SPAN SST STAINLESS STEEL ST SPIRAL TO TANGENT STA STATION, STATIONING STD STANDARD STRUCT STRUCTURE SW SWITCH SWAT SINGLE WIRE AUTO TENSIONED SWFT SINGLE WIRE FIXED TERMINATION</p>	<p>T</p> <p>TBD TO BE DETERMINED TEMP TEMPORARY TERM. TERMINAL, TERMINATION T.O.F. TOP OF FOUNDATION TLR TOP OF LOW RAIL TO. TURNOUT TOC TOP OF CONCRETE TPSS TRACTION POWER SUBSTATION TR TOP OF RAIL TRK TRACK TS TANGENT TO SPIRAL TWA TIE WIRE ANCHOR TYP TYPICAL TL TENSION LENGTH</p> <p>U</p> <p>UG UNDERGROUND UGB UNDERGRADE BRIDGE UNO UNLESS NOTED OTHERWISE US UNDERSIDE UTIL UTILITY</p> <p>V</p> <p>V VOLT VA VOLT AMPS VERT VERTICAL VS VERSINE</p> <p>W</p> <p>W WITH WB WESTBOUND WO WITHOUT WF WIDE FLANGE WWF WELDED WIRE FABRIC</p> <p>X</p> <p>X-ING CROSSING XOVER CROSSOVER X-SECT CROSS SECTION X-SPAN CROSS SPAN</p> <p>Y</p> <p>YRD YARD YL YARD LEAD</p>
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D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

OVERHEAD CONTACT SYSTEM ABBREVIATIONS ON OCS DRAWINGS

RECOMMENDED: *Michael K. Lohd*
 DEPUTY CHIEF ENGINEER

APPROVED: *Robert M. C.*
 CHIEF TRANSPORTATION ENGINEER

DATE	APPR.	REFERENCE
ISSUED:	REVISED	

PROJECT ENG.	DESIGNED BY	CHECKED BY	DRAWN BY	PROJECT MGR.
DIVISION CHIEF				
DATE				
FILE				
DWG. NO.				OCT 02

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 1/20/2012

DESIGN CRITERIA

1. CLIMATIC PARAMETERS

TEMPERATURE	OPEN ROUTE	ICE COVER
NORMAL	60 DEGREES F	
MINIMUM	-5 DEGREES F	
MAXIMUM	125 DEGREES F	
CONDITION	WIND	CW
OPERATING	40 MPH	14" RADIAL
OPERATING	55 MPH	NONE
NON-OPERATING	40 MPH	12" RADIAL
NON-OPERATING	90 MPH	NONE

2. ELECTRICAL CLEARANCES

	DESIGN
	NORMAL
STATIC	4 INCHES
PASSING	3 INCHES

3. CATENARY SYSTEM PARAMETERS

ITEM	UNITS	IN-STREET SECTIONS	YARD SECTION
WIRE SIZE:			
CONTACT	KCMIL	350	350
TENSION AT DESIGN TEMP (60° F)			
CONTACT WIRE	LB	3000	2000
NORMAL CONTACT WIRE HEIGHT - NON EXCLUSIVE ROW	FEET	19.0	19.0
EXCLUSIVE ROW	FEET	—	—
MAXIMUM INSTALLED WIRE HEIGHT	FEET	20.0	20.0
NORMAL SYSTEM HEIGHT	FEET	—	—
MAXIMUM DESIGNED SPAN - EMBEDDED TRACK AT	FEET	120	120
- BALLASTED TRACK, AT	FEET	120	120
MAXIMUM STAGGER	INCHES	9	9
MAXIMUM HALF TENSION LENGTH	FEET	2640	2640
CONTACT WIRE MAXIMUM WEAR-MAXIMUM	% OF ORIGINAL AREA	30	30

4. TOLERANCES AND RELATED INFORMATION

A. TRACK

	EMBEDDED OR DIRECT FIXATION
VERTICAL	0.625 INCHES
HORIZONTAL	1.00 INCH
CROSS LEVEL	0.50 INCH
GAUGE	-0.25 TO +0.25 INCH

B. VEHICLE (ARTICULATED)

LATERAL DISPLACEMENT (EACH SIDE)	2.671 INCHES
ROLL TO EACH SIDE - (FAILED SUSPENSION)	3 INCHES
- (NORMAL OPERATION)	2 INCHES
HEIGHT OF ROLL CENTER	30.7 INCHES
BOUNCE (MAXIMUM)	1 INCH
TRUCK CENTERS	38.7 FEET
TRUCK WHEELBASE	74 INCHES
WIDTH (EXCLUDING MIRRORS)	8.14 FEET
LENGTH (OVER COUPLERS)	66 FEET

C. PANTOGRAPH

OFFSET FROM TRUCK CENTER PIN	0 INCHES
OVERALL WIDTH	66.1 INCHES
CARBON WIDTH	41.3 INCHES

MAXIMUM CARBON WEAR	0.50 INCHES
MAXIMUM PANTOGRAPH LOCKDOWN HEIGHT	13.00 FEET
MAXIMUM DEFLECTION RELATIVE TO CAR (SWAY)	1.50 INCHES TO EACH SIDE

5. FOUNDATION INSTALLATION AND POLE TOLERANCES

	TOLERANCE	UNITS
FOUNDATION LOCATION ALONG TRACK		
- OPEN TRACK	+/-5.0	FEET
- TRACK CURVE LESS THAN 500 FT RADIUS	+/-2.0	FEET
- ADJACENT TO SPECIAL TRACKWORK	+/-2.0	FEET
- SPAN CHANGE BETWEEN TWO ADJACENT	+/-6.0	FEET
FOUNDATION OFFSET	+/-2.0	INCHES
STRUCTURE (FOUNDATION) LOCATION ACROSS TRACK	+/-1.0	INCHES
FOUNDATION ELEVATION	+/-0.25	INCHES
FOUNDATION DEFLECTION (MAX.)	0.50	DEGREES
POLE BASEPLATE ELEVATION	+/-1.00	INCHES
MAXIMUM POLE DEFLECTION AT CONTACT WIRE HEIGHT DUE TO LIVE LOAD (NOTE 4)	1.1-1.0	INCH

6. WIRING INSTALLATION TOLERANCES

	TOLERANCE	UNITS
CONDUCTOR HEIGHT AT SUPPORTS (SEE NOTE 1)		
- OPEN ROUTE	+/-1.00	INCHES
- BRIDGES OVER RAIL WITHIN 100 FEET OF A BRIDGE	+/-0.50	INCH
STAGGER AT SUPPORTS	+/-1.00	INCH
WIRE TENSION	+/-50	POUNDS
MINIMUM PANTOGRAPH SECURITY	3.00	INCHES
MAXIMUM CONTACT WIRE GRADIENT RELATIVE TO TRACK		
- FULL SPANS	1:6 x MAX TRACK SPEED IN M.P.H.	
- TRANSITION SPANS	1:10 x MAX TRACK SPEED IN M.P.H.	
- BRIDGES & TUNNELS		

7. MINIMUM ASBUILT CONTACT WIRE HEIGHT

	FT.	IN.
TRACK VERTICAL TOLERANCE	0	0.5
MAXIMUM VEHICLE PANTOGRAPH LOCKDOWN HEIGHT	13	0
MINIMUM PASSING CLEARANCE	0	3
VEHICLE VERTICAL BOUNCE	0	1
REQUIRED MINIMUM ASBUILT CONTACT WIRE HEIGHT UNDER ANY OPERATING CONDITION	13	4.5

NOTES:

- THE TOLERANCES GIVEN AT THE SUPPORTS FOR THE CONDUCTOR HEIGHTS ARE TO BE REDUCED WHERE APPLICABLE TO PROVIDE ACCEPTABLE CONDUCTOR GRADIENT AND CLEARANCES.
- FOR PANTOGRAPH CLEARANCE ENVELOPE SEE DESIGN CRITERIA AND DWGS OCT-08 TO OCT-11.
- CONTACT WIRE HAS NO DESIGNED PRESAG.
- NORMAL OPERATING ACROSS TRACK POLE DEFLECTION DUE TO LIVE LOADS SHALL NOT EXCEED 1" IN EITHER DIRECTION LATERALLY.
- MAXIMUM OPERATING CONDITION IS EITHER: 1. THE PRESENCE OF A 55 MPH WIND AND NO ICE COVERING, OR 2. THE PRESENCE OF A 40 MPH WIND AND 14" RADIAL ICE COVER ON THE CONTACT WIRE OPERATING CONDITION IS TO BE APPLIED IN CALCULATIONS AND DIMENSIONS RELATING TO NORMAL TRAIN OPERATIONS.
- MAXIMUM NON-OPERATING CONDITION IS EITHER: 1. THE PRESENCE OF A 90 MPH WIND AND NO ICE COVER, OR 2. THE PRESENCE OF A 40 MPH WIND AND 12" RADIAL ICE COVER ON THE CONTACT WIRE. NON-OPERATING CONDITION IS TO BE APPLIED IN CALCULATIONS RELATING TO STRENGTH OF OCS AND SUPPORTING EQUIPMENT.

D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

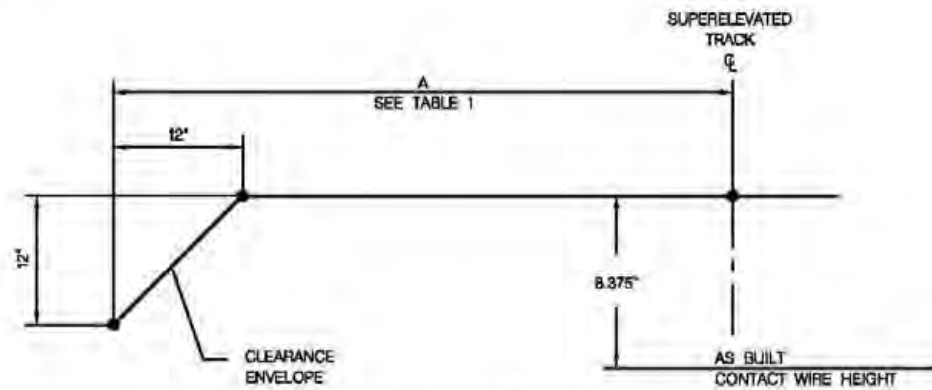
OVERHEAD CONTACT SYSTEM
TECHNICAL SHEET
SUMMARY OF DESIGN CRITERIA, TOLERANCES
AND WIRE HEIGHT

RECOMMENDED: *Mohammed Elshah*
DEPUTY CHIEF ENGINEER

APPROVED: *R. J. The*
CHIEF TRANSPORTATION ENGINEER

DATE	APPR.	REFERENCE
ISSUED:		
REVISED:		

PROJECT ENG.	
DRAWN BY	
CHECKED BY	
DRAWN BY	
PROJECT MGR.	CT
DIVISION CHIEF	
DATE	
FILE	
DWG. NO.	OCT 05

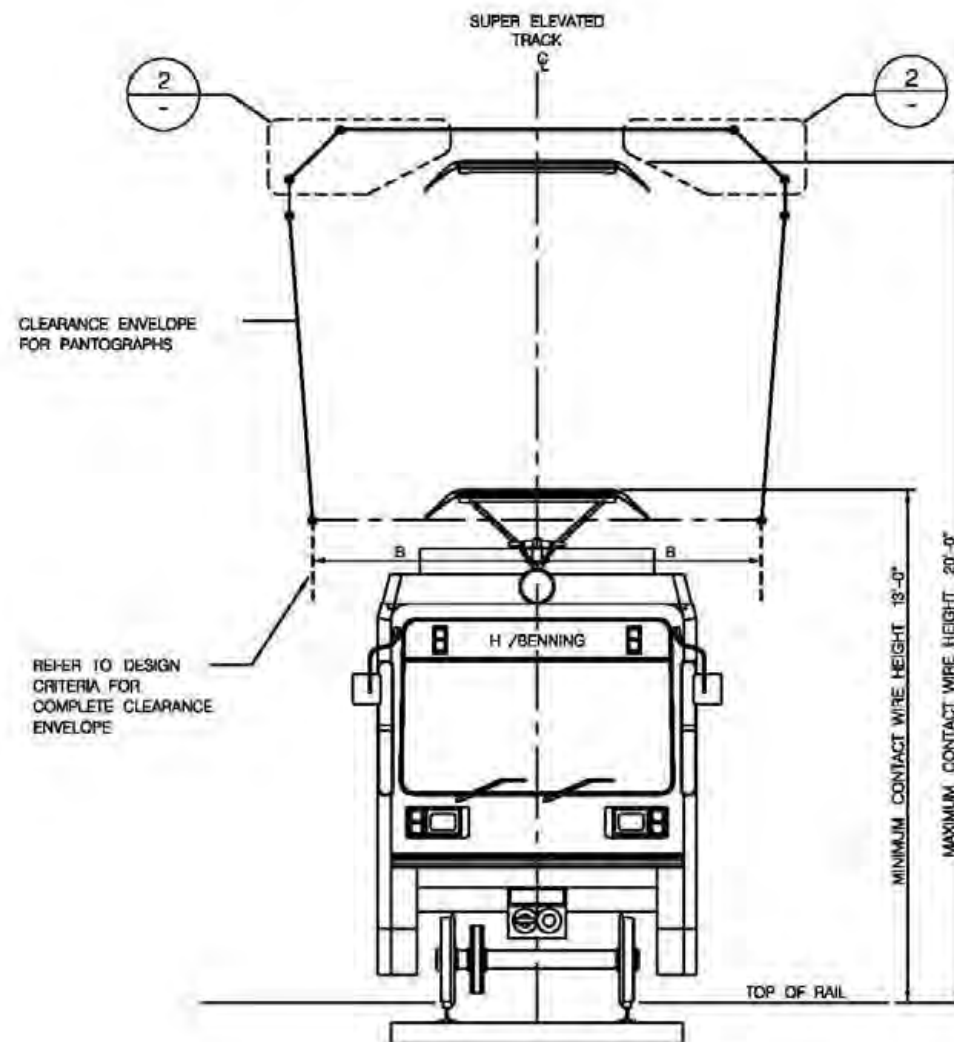


DETAIL 2
SCALE: NTS

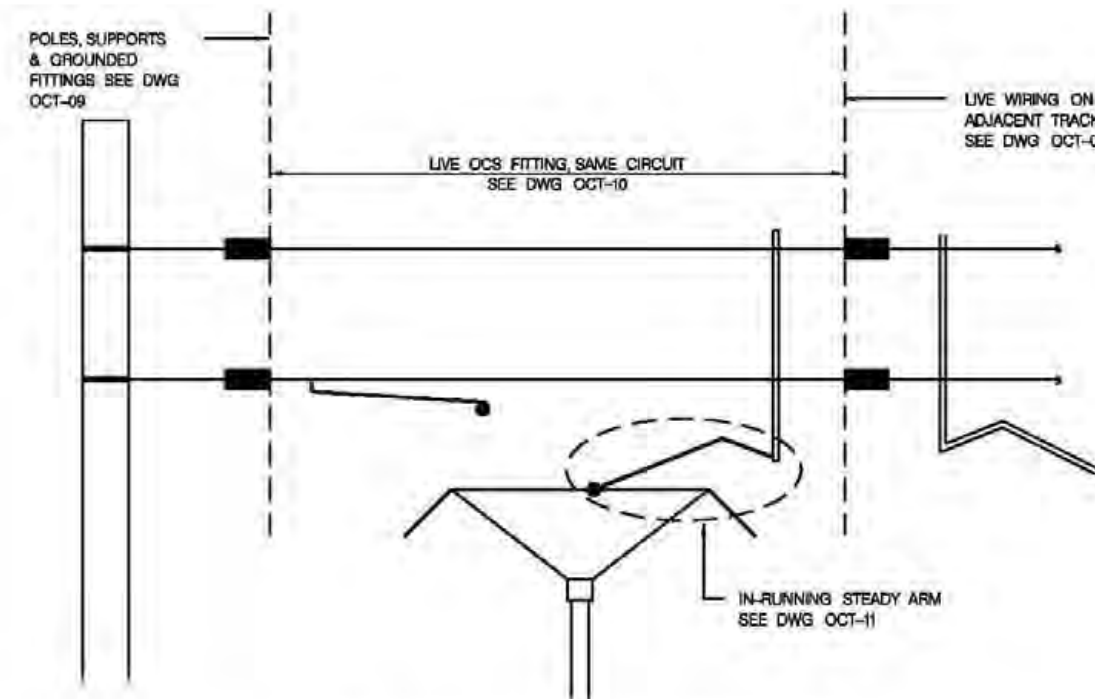
TABLE 1: DIMENSIONS TABLE		
CONTACT WIRE HEIGHT	EMBEDDED TRACK	
	INSIDE CURVE	TANGENT OR OUTSIDE CURVE
DIMENSION A (INCHES)		
20'-0"	60.2"	60.2"
19'-0"	59.2"	59.2"
13'-0"	54.0"	54.0"

NOTES:

1. THIS DRAWING PROVIDES A SIMPLIFIED PANTOGRAPH CLEARANCE ENVELOPE FOR USE WITH AS BUILT OCS EQUIPMENT. TRACK AND POLES, MASONRY WALLS AND STRUCTURES THE DIMENSIONS ARE TO BE MEASURED RELATIVE TO THE SUPERELEVATED TRACK.
2. OBSTRUCTIONS NOT CLEARING THIS OUTLINE MAY BE FURTHER EXAMINED AGAINST THE CONDITIONS AND MINIMUM CLEARANCES OF DWGS OCT-09, OCT-10, AND OCT-11. SEE DETAIL 3.
3. FOR VALUES OF CONTACT WIRE HEIGHT BETWEEN THOSE LISTED IN TABLE 1, USE LINEAR INTERPOLATION TO DETERMINE A VALUE FOR DIMENSION A.
4. MINIMUM CLEARANCES FOR USE PRIOR TO CONSTRUCTION ARE TO BE CALCULATED USING ALLOWANCES SHOWN ON DRAWINGS OCT-09, OCT-10 AND OCT-11.
5. MINIMUM CLEARANCES BETWEEN LIVE WIRES OR FITTINGS AND OTHER FIXED INFRASTRUCTURE SHALL BE DETERMINED FROM NATIONAL ELECTRIC SAFETY CODE (N.E.S.C) AND DRAWINGS OCT-03 AND OCT-04.



SIMPLIFIED PANTOGRAPH CLEARANCE ENVELOPE FOR AS-BUILT CONDITIONS 1
SEE NOTE 1



RELATED MINIMUM CLEARANCE DETAILS 3
SCALE: NTS

c:\pwworking\pht\40537342\OCT-07.dwg 1/20/2012

D.C. DEPARTMENT OF TRANSPORTATION

DATE	APPR.	ISSUED:	REFERENCE

RECOMMENDED: *Muhammad Khalid*
DEPUTY CHIEF ENGINEER

APPROVED: *[Signature]*
CHIEF TRANSPORTATION ENGINEER

PROJECT ENG: _____
DESIGNED BY: _____
CHECKED BY: _____
DRAWN BY: _____
PROJECT MGR: CY

DIVISION CHIEF: _____
DATE: _____
FILE: _____
DWG. NO. OCT-07

STREETCAR STANDARD DRAWINGS

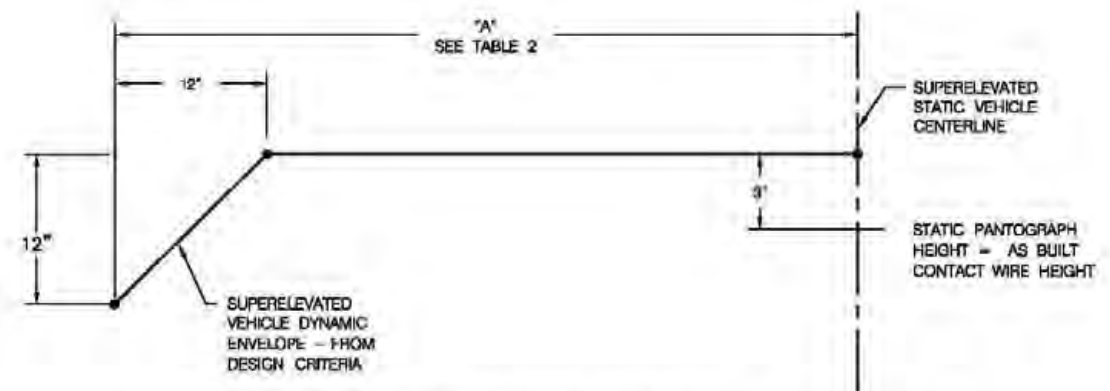
OVERHEAD CONTACT SYSTEM
TECHNICAL SHEET
SIMPLIFIED PANTOGRAPH CLEARANCE

AS-BUILT CW HEIGHT ABOVE RAIL	SUPERELEVATION (INCHES)					
	1	2	3	4	5	6
20'-0"	4.3	8.6	13.0	17.3	21.6	25.9
19'-0"	4.1	8.2	12.3	16.4	20.5	24.6
18'-0"	2.8	5.6	8.4	11.2	14.1	16.9

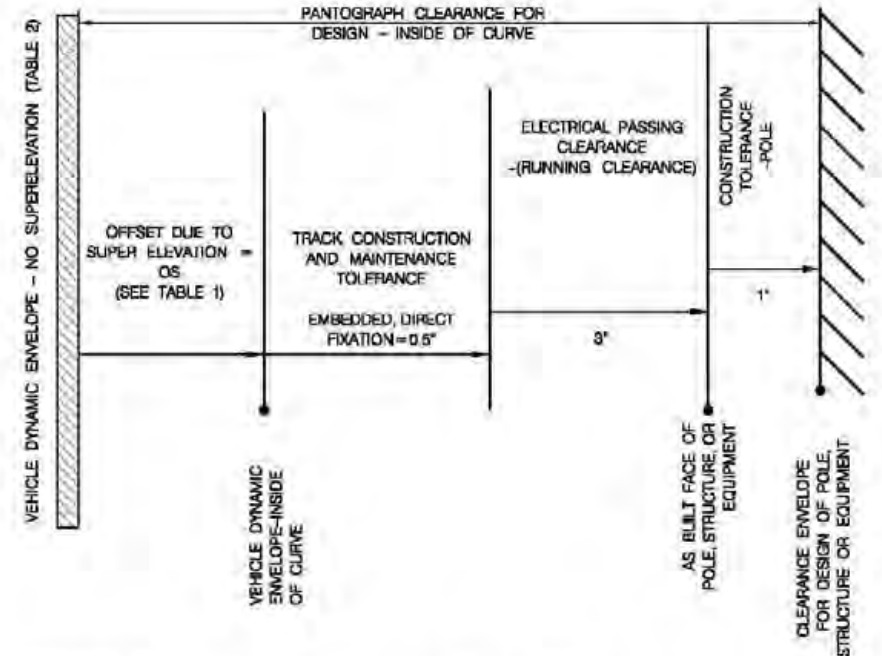
AS-BUILT CW HT	DIMENSION A INCHES	
	INSIDE CURVE	OUTSIDE CURVE
20'-0"	55.7	56.7
19'-0"	54.7	54.7
18'-0"	49.5	49.5

NOTES:

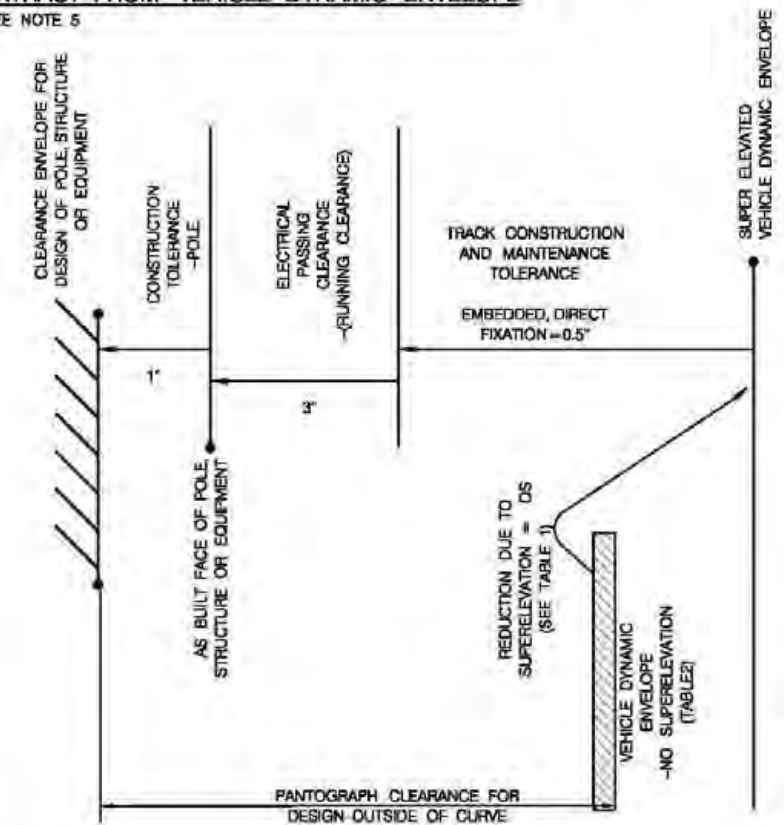
- THIS DRAWING PROVIDES DETAILED RELATIONSHIPS AND DIMENSIONS FOR DETERMINATION OF MINIMUM CLEARANCES BETWEEN A PANTOGRAPH AND ADJACENT FIXED INFRASTRUCTURE. THESE CLEARANCES MAY BE FURTHER REDUCED ONLY FOR THOSE CASES LISTED IN NOTE 2.
- FOR THE PURPOSE OF DETERMINATION OF CLEARANCES TO A PANTOGRAPH, AN OCS FITTING SHALL BE CONSIDERED LIVE WHERE IT IS SEPARATED FROM GROUNDED POLES OR LIVE WIRING OF ADJACENT TRACKS, BY AT LEAST ONE LEVEL OF SYSTEM RATED INSULATION.
 - FOR IN-RUNNING LIVE STEADY ARMS, SEE DRAWING pTD-0051
 - FOR OTHER LIVE OCS EQUIPMENT, SEE DRAWING pTD-0050
 - ALL OTHER STRUCTURES, POLES OR EQUIPMENT REQUIRE PANTOGRAPH CLEARANCES DETERMINED FROM THIS DRAWING
- FOR OBJECTS DIAGONALLY SEPARATED, BOTH HORIZONTAL AND VERTICAL CLEARANCES ARE TO BE APPLIED. RUNNING CLEARANCES COMPONENTS MAY BE MEASURED RADIALLY.
- MINIMUM CLEARANCES BETWEEN LIVE WIRES OR FITTINGS AND OTHER FIXED INFRASTRUCTURE SHALL BE DETERMINED FROM NATIONAL ELECTRIC SAFETY CODE (N.E.S.C.) AND DRAWINGS OCT-03 AND OCT-04.
- VEHICLE DYNAMIC ENVELOPE DETERMINED FOR SUPERELEVATION = 0" FROM CLEARANCE REQUIREMENTS OF THE DISTRICT DESIGN CRITERIA.
- SUPERELEVATION OFFSET (OS) IS TO BE CONSIDERED WHEN MEASUREMENTS ARE TAKEN FROM VERTICAL TRACK CENTERLINE.
- COLLECTOR HEAD TILT TO BE CONSIDERED ONLY WHERE ALL IN-RUNNING CONTACT WIRES ARE STAGGERED TO THE FAR SIDE OF THE SUPERELEVATED VEHICLE CENTERLINE.



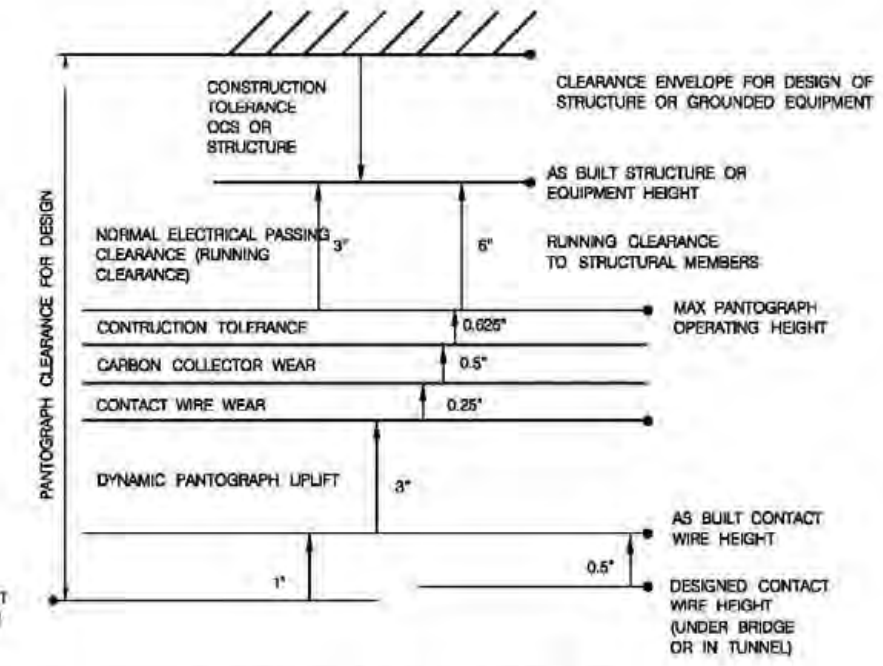
EXTRACT FROM VEHICLE DYNAMIC ENVELOPE
SEE NOTE 5



MINIMUM HORIZONTAL CLEARANCE TO OBJECTS
ON THE INSIDE OF CURVE FROM A PANTOGRAPH



MINIMUM HORIZONTAL CLEARANCE TO OBJECTS
ON THE OUTSIDE OF CURVE FROM A PANTOGRAPH



MINIMUM VERTICAL CLEARANCE TO OBJECTS
ABOVE THE TRACK FROM A PANTOGRAPH

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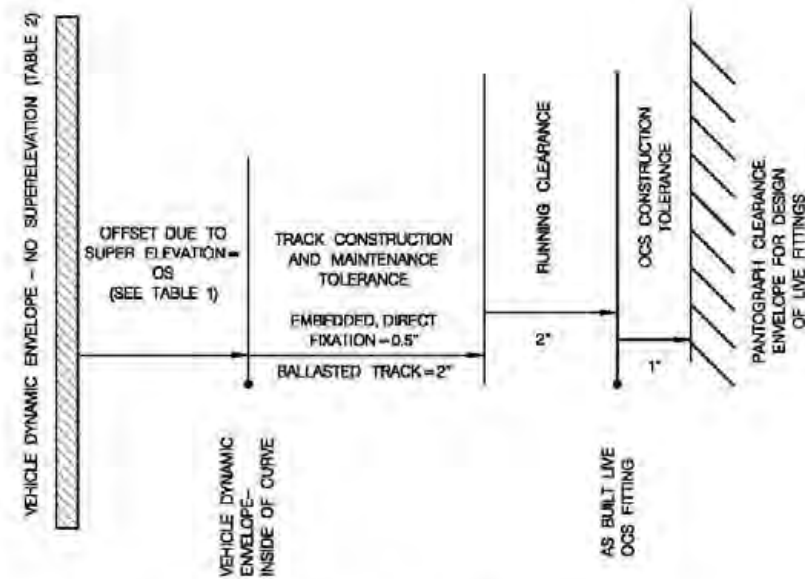
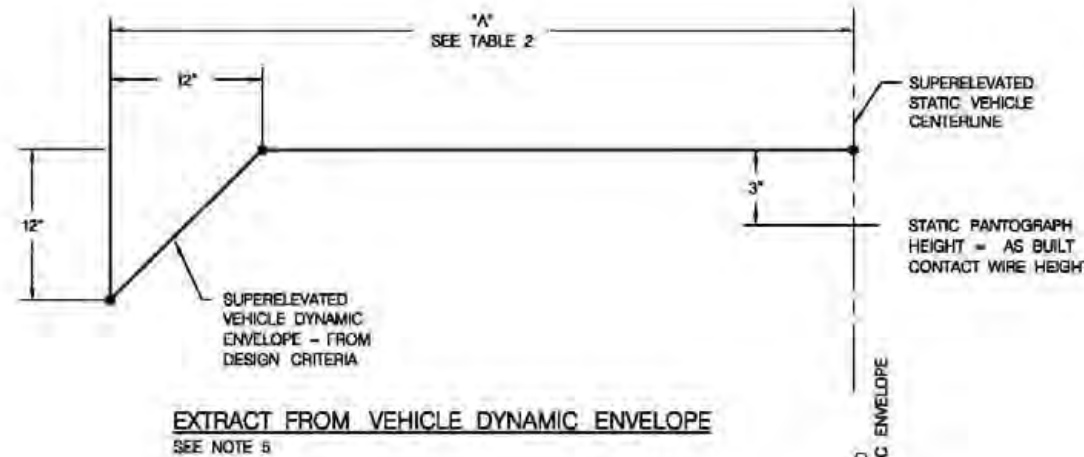
DATE		APPR	RECOMMENDED:	D.C. DEPARTMENT OF TRANSPORTATION	
REVISED			DEPUTY CHIEF ENGINEER		STREETCAR STANDARD DRAWINGS
ISSUED:		REFERENCE	APPROVED:		
			CHIEF TRANSPORTATION ENGINEER		OVERHEAD CONTACT SYSTEM TECHNICAL SHEET PANTOGRAPH CLEARANCE TO GROUNDED ITEMS AND DIFFERENT ELECTRICAL CIRCUITS
					DIVISION CHIEF
					DATE
					FILE
					DWG. NO. OCT-08

C/W HEIGHT ABOVE RAIL	SUPERELEVATION (INCHES)					
	1	2	3	4	5	6
20'-0"	4.3	8.6	13.0	17.3	21.6	25.9
19'-0"	4.1	8.2	12.3	16.4	20.5	24.6
13'-0"	2.8	5.6	8.4	11.2	14.1	16.9

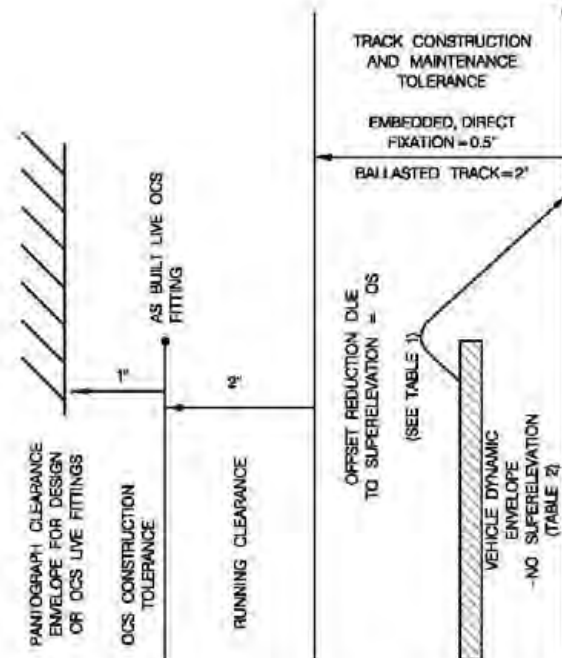
AS-BUILT C/W HT	DIMENSION A INCHES	
	INSIDE CURVE	OUTSIDE CURVE
20'-0"	55.7"	55.7"
19'-0"	54.7"	54.7"
13'-0"	48.5"	48.5"

NOTES:

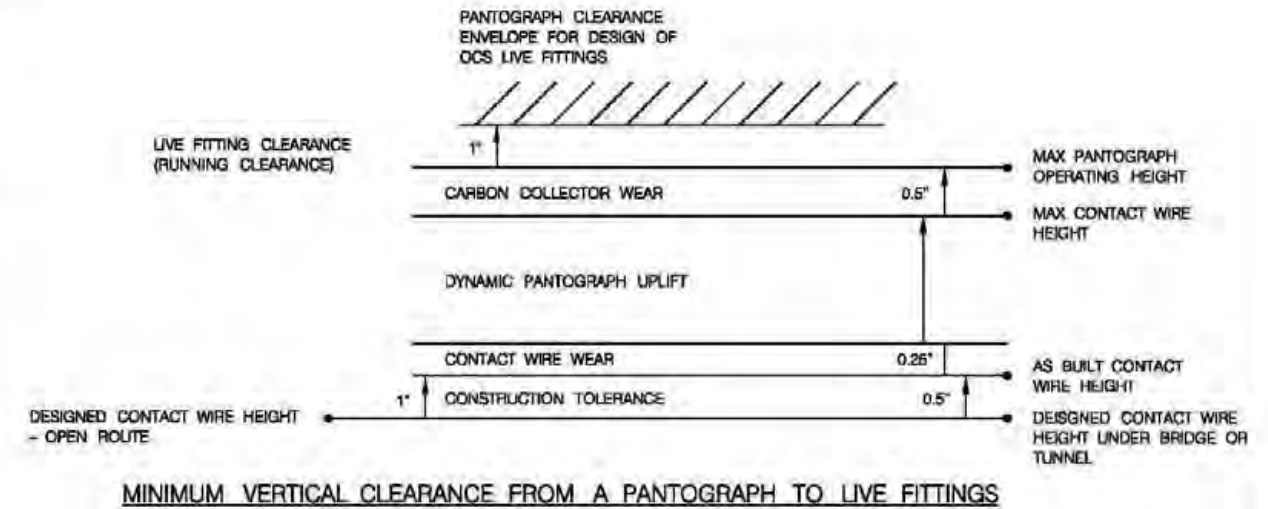
1. THE DRAWING PROVIDES RELATIONSHIPS AND DIMENSIONS FOR DETERMINATION OF MINIMUM CLEARANCES BETWEEN A PANTOGRAPH AND ADJACENT LIVE OCS, FITTINGS, EXCEPTING FOR IN-RUNNING STEADY ARMS.
2. FOR THE PURPOSE OF DETERMINATION OF CLEARANCES TO A PANTOGRAPH, AN OCS FITTING SHALL BE CONSIDERED LIVE ONLY WHERE IT IS SEPARATED FROM GROUNDED POLES OR LIVE WIRING OF ADJACENT TRACKS, BY AT LEAST ONE LEVEL OF SYSTEM RATED INSULATION.
 - FOR IN-RUNNING STEADY ARM, SEE DRAWING OCT-11
 - CLEARANCES FOR OTHER LIVE OCS FITTINGS TO BE DETERMINED FROM THIS DRAWING
 - ALL OTHER STRUCTURES, POLES OR EQUIPMENT REQUIRE CLEARANCES DETERMINED FROM DRAWING OCT-09
3. FOR OBJECTS DIAGONALLY SEPARATED, BOTH HORIZONTAL AND VERTICAL CLEARANCES ARE TO BE APPLIED. RUNNING CLEARANCE COMPONENTS MAY BE MEASURED RADIIALLY.
4. MINIMUM CLEARANCES BETWEEN LIVE WIRES OR FITTINGS AND OTHER FIXED INFRASTRUCTURE SHALL BE DETERMINED FROM NATIONAL ELECTRIC SAFETY CODE (N.E.S.C.) AND DRAWINGS OCT-03 AND OCT-04.
5. VEHICLE DYNAMIC ENVELOPE DETERMINED FROM CLEARANCE REQUIREMENTS OF THE DISTRICT DESIGN CRITERIA.
6. SUPERELEVATION OFFSET (OS) IS TO BE CONSIDERED WHEN MEASUREMENTS ARE TAKEN FROM VERTICAL TRACK CENTERLINE.
7. COLLECTOR HEAD TILT TO BE CONSIDERED ONLY WHERE ALL IN-RUNNING CONTACT WIRES ARE STAGGERED TO THE FAR SIDE OF THE SUPERELEVATED VEHICLE CENTERLINE.



MINIMUM HORIZONTAL CLEARANCE TO LIVE FITTINGS ON THE OUTSIDE OF CURVE FROM A PANTOGRAPH



MINIMUM HORIZONTAL CLEARANCE TO LIVE FITTINGS ON THE OUTSIDE OF CURVE FROM A PANTOGRAPH



MINIMUM VERTICAL CLEARANCE FROM A PANTOGRAPH TO LIVE FITTINGS

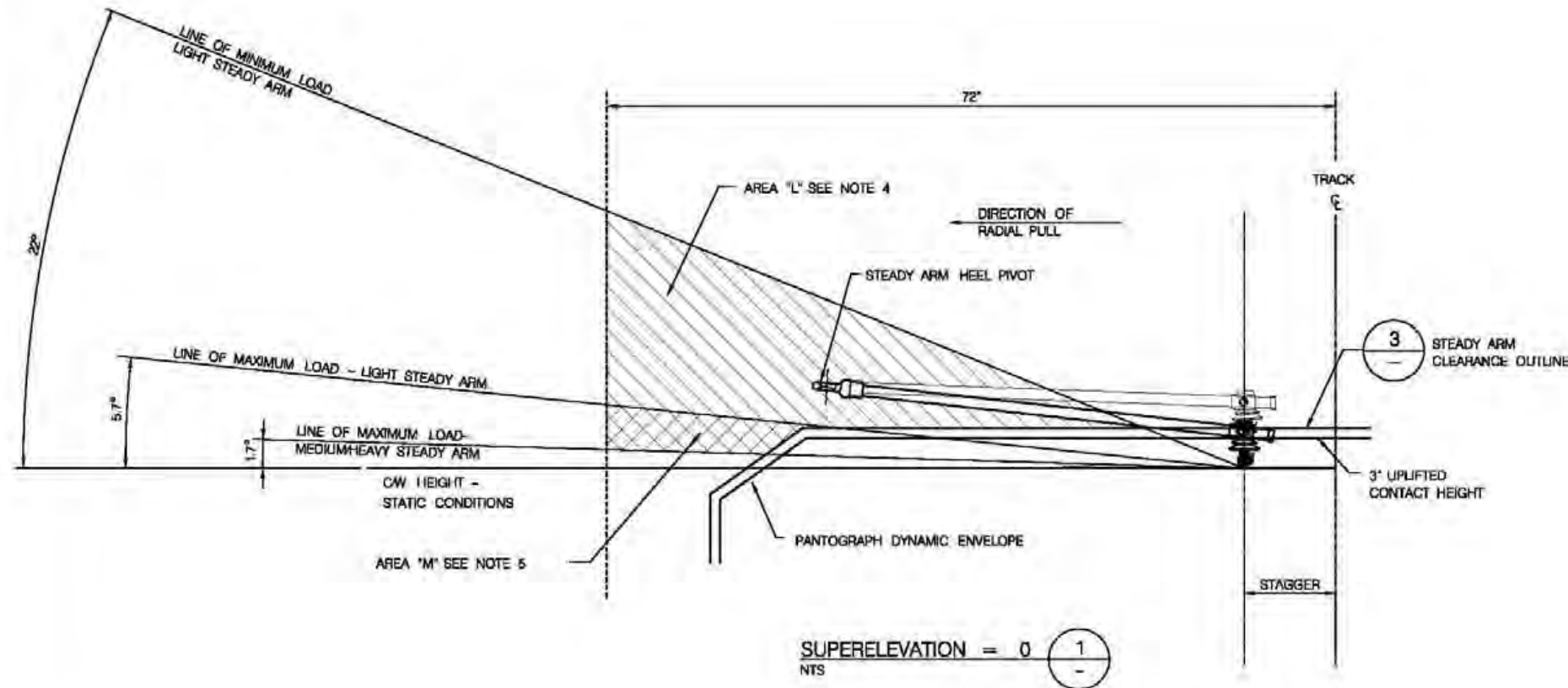
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DATE	APPR.	
ISSUED	REVISED	REFERENCE

RECOMMENDED: *Mohammed Khalil*
DEPUTY CHIEF ENGINEER

APPROVED: *RATHE*
CHIEF TRANSPORTATION ENGINEER

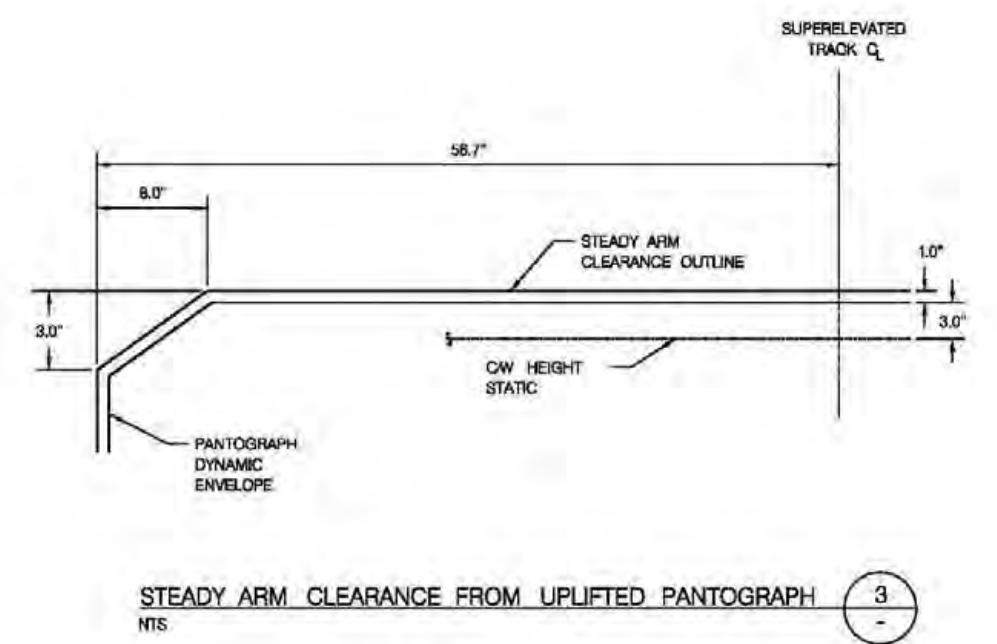
D.C. DEPARTMENT OF TRANSPORTATION	
STREETCAR STANDARD DRAWINGS	
OVERHEAD CONTACT SYSTEM TECHNICAL SHEET PANTOGRAPH CLEARANCE TO LIVE OCS FITTINGS	
PROJECT ENG.	DESIGNED BY
CHECKED BY	DRAWN BY
PROJECT MGR.	DATE
DIVISION CHIEF	FILE
DWG. NO.	OCT-05



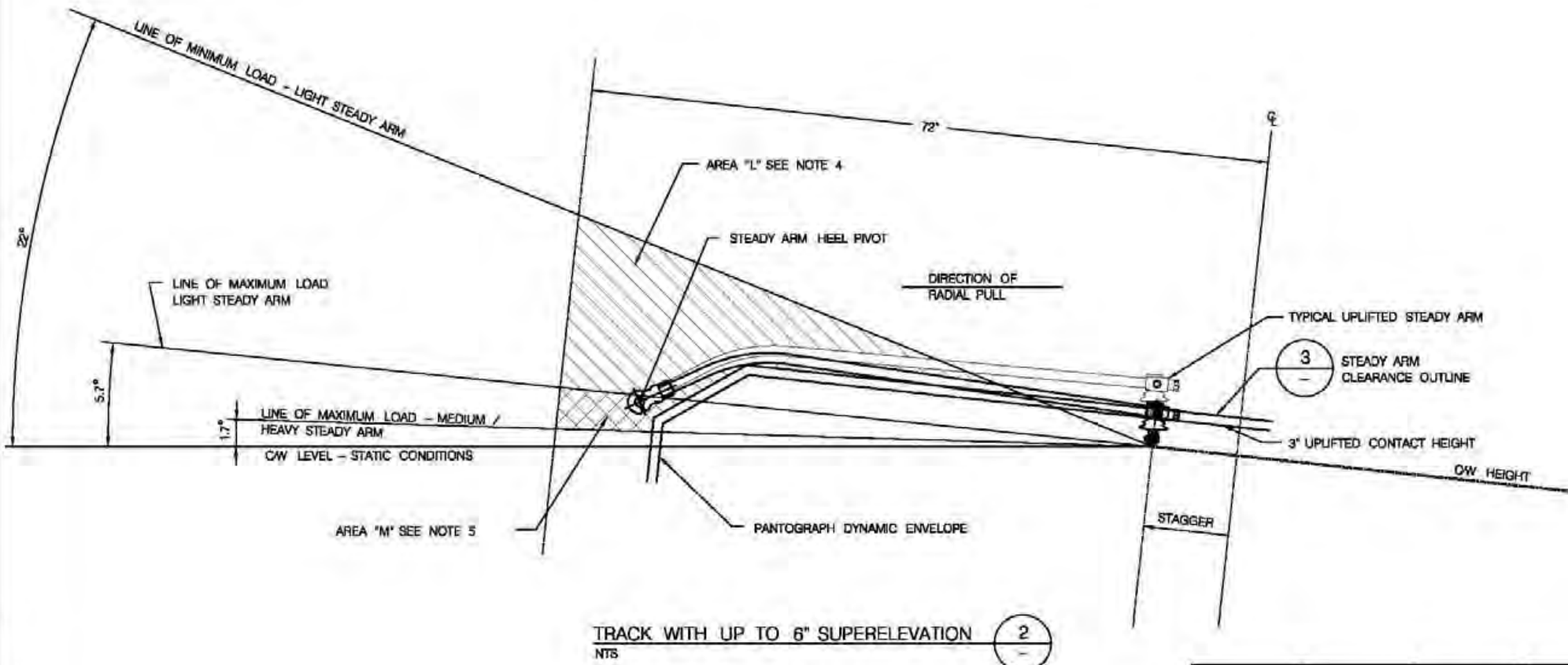
SUPERELEVATION = 0
NTS

NOTES:

1. THIS DRAWING IS TO BE USED FOR THE DESIGN AND APPLICATION OF STEADY ARMS REGISTERING IN-RUNNING CONTACT WIRES. IT DOES NOT APPLY TO UPUFT RESTRICTING STEADY ARMS SPECIFIED FOR USE IN TUNNELS.
2. ALL STEADY ARMS SHALL BE SHAPED SO AS NOT TO ENCR OACH INSIDE THE STEADY ARM CLEARANCE OUTLINE OR WITHIN 1" RUNNING CLEARANCE OF THE PANTOGRAPH DYNAMIC ENVELOPE EXCEPTING FOR CONTACT WIRE CLAMP COMPONENTS.
3. THE DIRECTION OF LOAD PULL IS TO BE MEASURED FROM THE STATIC CONTACT WIRE HEIGHT, WITH THE ANGLE RELATIVE TO LEVEL.
4. LIGHT LOAD STEADY ARMS ARE TO BE SUITABLE FOR RADIAL LOADS UP TO 200 POUNDS. THE STEADY ARM HEEL PIVOT POINT IS TO FALL WITHIN AREA "L" SHOWN.
5. MEDIUM LOAD STEADY ARMS ARE TO BE SUITABLE FOR RADIAL LOADS UP TO 500 POUNDS. THE STEADY ARM HEEL PIVOT POINT IS TO FALL WITHIN AREA "M" SHOWN.
6. HEAVY RADIAL LOADS OF UP TO 1000 POUNDS SHALL BE SERVICED BY USING TWO MEDIUM LOAD STEADY ARMS ARRANGED TO SHARE LOAD EQUALLY.
7. FOR AUTO-TENSIONED CONTACT WIRE THE MINIMUM DISTANCE FROM CONTACT WIRE TO HEEL PIVOT SHALL BE 36".



STEADY ARM CLEARANCE FROM UPLIFTED PANTOGRAPH
NTS



TRACK WITH UP TO 6% SUPERELEVATION
NTS

DATE	APPR.	REVISIONS
ISSUED:		REFERENCE

RECOMMENDED: *Michael H. Hall*
DEPUTY CHIEF ENGINEER

APPROVED: *Robert E. [Signature]*
CHIEF TRANSPORTATION ENGINEER

D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

OVERHEAD CONTACT SYSTEM
TECHNICAL SHEETS
STEADY ARM CLEARANCES AND DIMENSIONS

PROJECT ENG. _____
DESIGNED BY _____
CHECKED BY _____
DRAWN BY _____
PROJECT MGR. _____

DIVISION CHIEF _____
DATE _____
FILE _____
DWG. NO. OCT-10

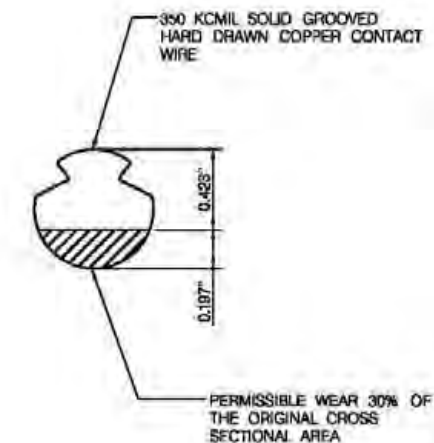
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NOTES:

1. ICE (O) OPERATING CONDITION IS WITH 1/4" RADIAL ICE ON THE CONTACT WIRE.
2. ICE (NO) NON OPERATING CONDITION IS WITH 1/2" RADIAL ICE ON THE CONTACT WIRE.
3. SYSTEM WEIGHTS SHOWN ARE FOR DESIGN PURPOSES AND CONSIST OF CONDUCTOR WEIGHTS PER FOOT, WHICH WERE TAKEN FROM MANUFACTURERS INFORMATION TABLES.

SINGLE WIRE AUTO-TENSIONED (SWAT)		
CONDUCTOR PARTICULARS (UNWORN CONDITION)	UNITS	CONDUCTOR
		CONTACT
CONDUCTOR TYPE	-	350 KCMIL SOLID GROOVED
MATERIAL	-	HARD DRAWN COPPER
DIAMETER	IN.	0.620
CROSS SECTIONAL AREA	Sq. In.	0.2758
WEIGHT OF CONDUCTOR	LB/FT	1.063
WEIGHT OF SYSTEM	LB/FT	1.063
RADIAL THICKNESS OF ICE (O)	IN.	0.25
WEIGHT OF ICE (O)	LB/FT	0.270
WEIGHT OF SYSTEM WITH ICE (O)	LB/FT	1.333
RADIAL THICKNESS OF ICE (NO)	IN.	0.50
WEIGHT OF ICE (NO)	LB/FT	0.696
WEIGHT OF SYSTEM WITH ICE (NO)	LB/FT	1.759
CONDUCTOR BREAKING LOAD	LB	11810
MAXIMUM SPAN	FT	120
CONDUCTOR TENSIONS AT:		
80 DEG F NO WIND	LB	3000
125 DEG F NO WIND	LB	3000
-5 DEG F WIND & ICE (O)	LB	4028
-5 DEG F W/55 MPH WIND (NO)	LB	3985
CONDUCTOR SAG ON MAXIMUM SPAN AT:		
80 DEG F NO WIND	FT	.638
125 DEG F NO WIND	FT	.638
-5 DEG F 40 MPH WIND ICE (O)	FT	.506
-5 DEG F 55 MPH WIND	FT	.513
CONDUCTOR HEIGHT AT 80 DEG F	FT	19.0 (NORMAL)
LOWER LIMIT OF AUTO TENSIONING	DEG F	20
UPPER LIMIT OF AUTO TENSIONING	DEG F	125
MODULUS OF ELASTICITY	PSI	16x10 ⁶
COEFFICIENT OF THERMAL EXPANSION	/DEG F	8.4x10 ⁻⁶
MINIMUM FACTOR OF SAFETY	-	2.93

SINGLE WIRE FIXED-TENSIONED (SWFT)		
CONDUCTOR PARTICULARS (UNWORN CONDITION)	UNITS	CONDUCTOR
		CONTACT
CONDUCTOR TYPE	-	350 KCMIL SOLID GROOVED
MATERIAL	-	HARD DRAWN COPPER
DIAMETER	IN.	0.620
CROSS SECTIONAL AREA	Sq. In.	0.2758
WEIGHT OF CONDUCTOR	LB/FT	1.063
WEIGHT OF SYSTEM	LB/FT	1.063
RADIAL THICKNESS OF ICE (O)	IN.	0.25
WEIGHT OF ICE (O)	LB/FT	0.270
WEIGHT OF SYSTEM WITH ICE (O)	LB/FT	1.333
RADIAL THICKNESS OF ICE (NO)	IN.	0.50
WEIGHT OF ICE (NO)	LB/FT	0.696
WEIGHT OF SYSTEM WITH ICE (NO)	LB/FT	1.759
CONDUCTOR BREAKING LOAD	LB	11810
MAXIMUM SPAN	FT	100
CONDUCTOR TENSIONS AT:		
80 DEG F NO WIND	LB	2000
125 DEG F NO WIND	LB	844
-5 DEG F WIND & ICE (O)	LB	4477
-5 DEG F W/55 MPH WIND (NO)	LB	4441
CONDUCTOR SAG ON MAXIMUM SPAN AT:		
80 DEG F NO WIND	FT	.864
125 DEG F NO WIND	FT	1.676
-5 DEG F 40 MPH WIND ICE (O)	FT	.372
-5 DEG F 55 MPH WIND	FT	.320
CONDUCTOR HEIGHT AT 80 DEG F	FT	19.0 (NORMAL)
MODULUS OF ELASTICITY	PSI	16x10 ⁶
COEFFICIENT OF THERMAL EXPANSION	/DEG F	8.4x10 ⁻⁶
MINIMUM FACTOR OF SAFETY	-	2.84



SINGLE WIRE AUTO-TENSIONED (SWAT)		
CONDUCTOR PARTICULARS (WORN CONDITION)	UNITS	CONDUCTOR
		CONTACT
PERMISSIBLE WEAR	% OF AREA	30.00
WEIGHT OF CONTACT WIRE	LB/FT	0.7441
WEIGHT OF CONTACT WIRE WITH ICE (O)	LB/FT	0.977
WEIGHT OF CONTACT WIRE WITH ICE (NO)	LB/FT	1.366
CONDUCTOR TENSION AT:		
0°F WIND & ICE (NO)	LB	3919
CONDUCTOR BREAKING LOAD	LB	8267
MINIMUM SAFETY FACTOR	-	2.05

SINGLE WIRE FIXED-TENSIONED (SWFT)		
CONDUCTOR PARTICULARS (WORN CONDITION)	UNITS	CONDUCTOR
		CONTACT
PERMISSIBLE WEAR	% OF AREA	30.00
WEIGHT OF CONTACT WIRE	LB/FT	0.7441
WEIGHT OF CONTACT WIRE WITH ICE (O)	LB/FT	0.977
WEIGHT OF CONTACT WIRE WITH ICE (NO)	LB/FT	1.366
CONDUCTOR TENSION AT:		
0°F WIND & ICE (NO)	LB	4462
CONDUCTOR BREAKING LOAD	LB	8267
MINIMUM SAFETY FACTOR	-	1.80

D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

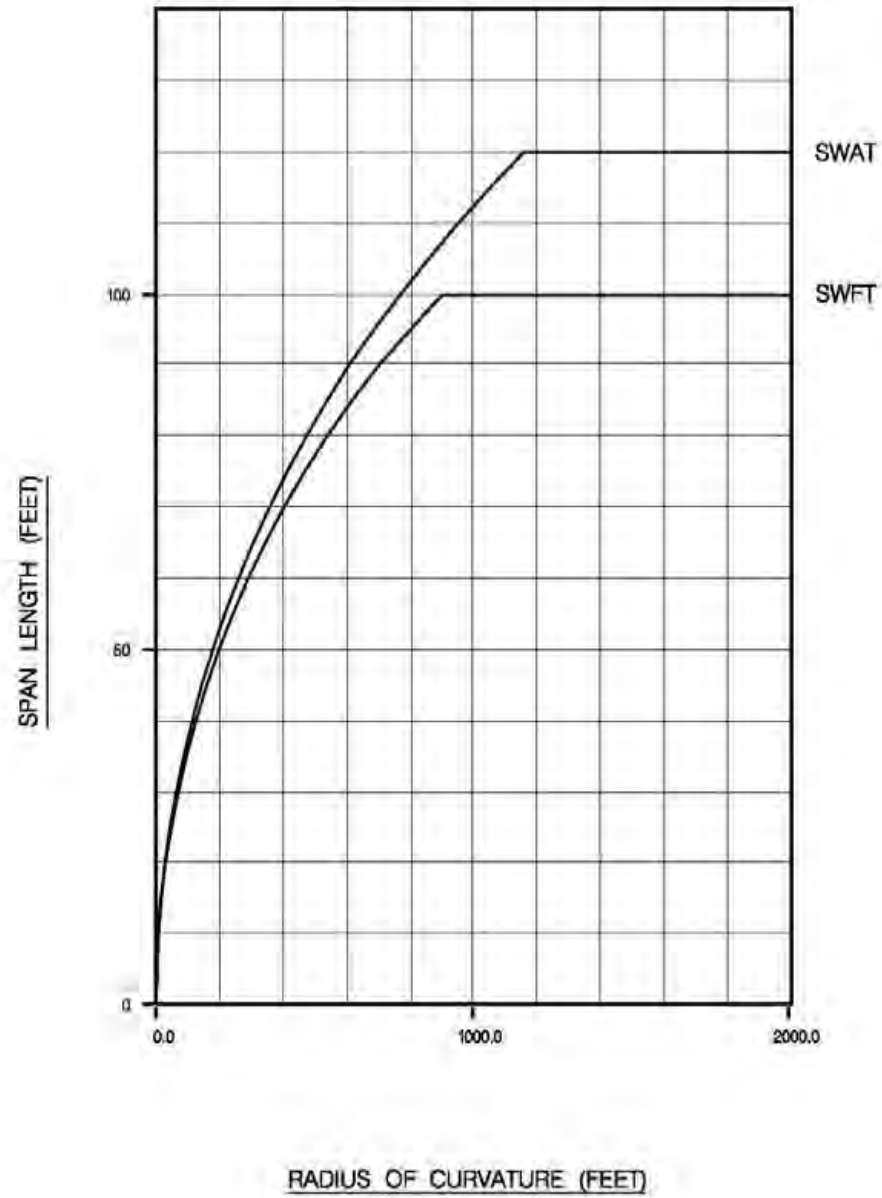
OVERHEAD CONTACT SYSTEM
TECHNICAL SHEET
CONDUCTOR PARTICULARS

RECOMMENDED: *Mohammad Khalil*
DEPUTY CHIEF ENGINEER

APPROVED: *D. J. The*
CHIEF TRANSPORTATION ENGINEER

DATE	APPR.	ISSUED:	REFERENCE

PROJECT ENG.	
DESIGNED BY	
CHECKED BY	
DRAWN BY	
PROJECT MGR.	CT
DIVISION CHIEF	
DATE	
FILE	
DWG. NO.	OCT-11



STRUCTURE SPACING SWAT

SPAN LENGTH (FEET)	STATIC OFFSET (INCHES)	STATIC OFFSET (FEET)	BLOW-OFF (FEET)	MINIMUM RADIUS (FEET)
30	10.42	.868	0.015	63.1
35	10.35	.862	0.020	86.1
40	10.27	.856	0.027	112.8
45	10.19	.849	0.034	143.4
50	10.09	.841	0.042	177.8
55	9.99	.832	0.050	216.2
60	9.87	.823	0.060	259.7
65	9.75	.812	0.070	305.5
70	9.61	.801	0.082	356.6
75	9.47	.789	0.094	412.3
80	9.31	.776	0.107	472.6
85	9.15	.762	0.120	537.9
90	8.97	.748	0.135	608.4
95	8.79	.732	0.150	684.2
100	8.59	.716	0.167	765.8
105	8.39	.699	0.184	853.0
110	8.17	.681	0.202	946.7
115	7.95	.662	0.220	1047.0
120	7.71	.643	0.240	1154.4

NOTES:

1. THE CONDITIONS FOR THE STRUCTURE SPACING CHART & THE TABLES ARE 80 DEGREES F WITH A WIND SPEED OF 40 MPH.
2. THE SPANS SHOWN ARE THE ABSOLUTE MAXIMUM FOR THE RESPECTIVE CURVES. FOR DESIGN CONSIDERATIONS THE MAXIMUM SPAN IS REDUCED BY 5 FEET TO CATER FOR SITE ADJUSTMENTS IF OBSTRUCTIONS ARE ENCOUNTERED, DURING CONSTRUCTION.
3. MAXIMUM STRUCTURE SPACINGS FOR SPANS WHOLLY OVER CONSTANT RADIUS TRACK CURVE, ARE TO BE DETERMINED FROM THE GRAPHS AND RELATED NOTES. FOR ALL OTHER HORIZONTAL ALIGNMENT COMBINATIONS, SPACING MUST SATISFY MAXIMUM STATIC MIDSPAN OFFSET CRITERIA APPLIED TO STAGGERED CONTACT WIRE.
4. THE MAXIMUM STATIC MIDSPAN OFFSET IS THE VALUE THE CONTACT WIRE CAN BE FROM THE CENTER LINE OF A STATIC PANTOGRAPH UNDER STILL AIR CONDITIONS MEASURED AT MIDSPAN.
5. WHERE AS-BUILT STATIC MIDSPAN OFFSET EXCEEDS THE MAXIMUM VALUE LISTED IN THE TABLE, FURTHER CONSTRUCTION MAY ONLY CONTINUE AFTER SITE SPECIFIC APPROVAL BY THE DISTRICT.
6. INSTALLED CONTACT WIRE SPANS MAY BE ACCEPTED WITH 1 INCH OF ADDITIONAL MIDSPAN OFFSET CONSTRUCTION TOLERANCE ABOVE THE MAXIMUM VALUES LISTED.
7. MAXIMUM CONTACT WIRE STAGGER = 9"
8. FOR GENERAL NOTES, SEE DWG OCT-01.

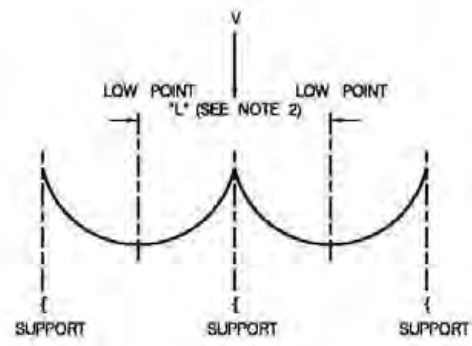
STRUCTURE SPACING SWFT

SPAN LENGTH (FEET)	STATIC OFFSET (INCHES)	STATIC OFFSET (FEET)	BLOW-OFF (FEET)	MINIMUM RADIUS (FEET)
30	8.32	.693	0.023	69.9
35	8.22	.685	0.031	95.6
40	8.11	.676	0.040	125.6
45	7.98	.665	0.051	160.0
50	7.84	.653	0.063	199.0
55	7.68	.640	0.076	242.9
60	7.51	.626	0.090	291.7
65	7.32	.610	0.106	345.9
70	7.12	.593	0.123	405.6
75	6.90	.575	0.141	471.3
80	6.67	.556	0.160	543.3
85	6.42	.535	0.181	622.0
90	6.16	.513	0.203	708.0
95	5.88	.490	0.226	801.8
100	5.59	.466	0.250	904.1

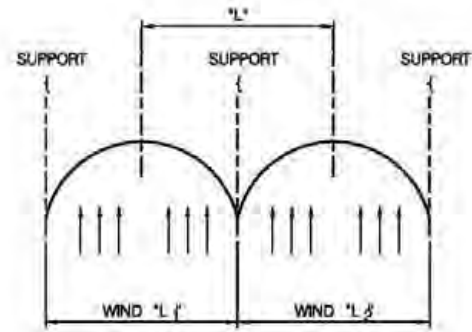
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D.C. DEPARTMENT OF TRANSPORTATION

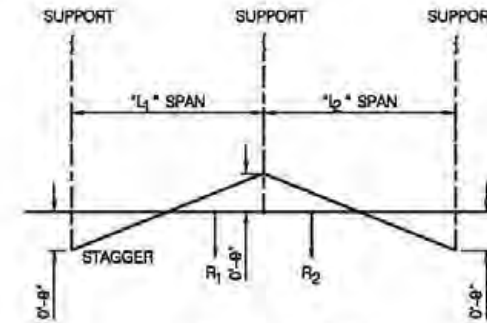
RECOMMENDED: <i>Mohammed Elshah</i> DEPUTY CHIEF ENGINEER		STREETCAR STANDARD DRAWINGS	PROJECT ENG. _____
APPROVED: <i>R. H. The</i> CHIEF TRANSPORTATION ENGINEER			DESIGNED BY _____
DATE _____	APPR. _____	OVERHEAD CONTACT SYSTEM TECHNICAL SHEET AUTO & FIXED-TENSIONED SINGLE CONTACT WIRE SPAN LENGTH CHART	CHECKED BY _____
REVISED _____	REFERENCE _____		DRAWN BY _____
ISSUED _____			PROJECT MGR. <i>CT</i>
			DIVISION CHIEF _____
			DATE _____
			FILE _____
			DWG. NO. OCT-12



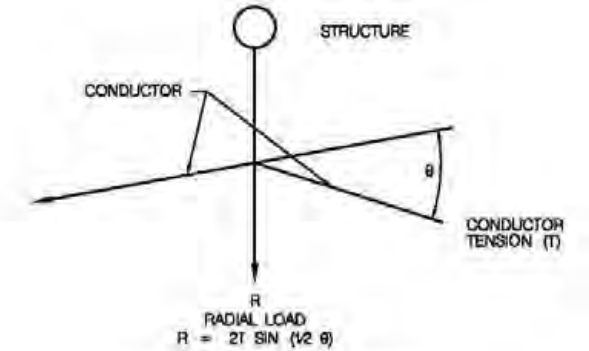
V = VERTICAL LOAD



$$L = \frac{L_1 + L_2}{2}$$



RADIAL LOAD (R) AT SUPPORT
 $R = R_1 + R_2$
 RADIAL LOAD IS BASED ON 8" STAGGER AT SUPPORTS



TO DETERMINE RADIAL LOAD, MEASURE ANGLE θ AND USE TABLE TO DETERMINE LOAD FOR CONDITION REQUIRED.
 $R = 2T \sin (1/2 \theta)$

VERTICAL LOADING

SPAN (FEET)	CONDITION AND LOAD VALUE (V) (LB)		
	BARE	ICE (NO)	ICE (O)
20	21.3	35.2	26.7
25	26.6	44.0	33.3
30	31.9	52.8	40.0
35	37.2	61.6	46.7
40	42.5	70.4	53.3
45	47.8	79.2	60.0
50	53.2	88.0	66.7
55	58.5	96.7	73.3
60	63.8	105.5	80.0
65	69.1	114.3	86.6
70	74.4	123.1	93.3
75	79.7	131.9	100.0
80	85.0	140.7	106.6
85	90.4	149.5	113.3
90	95.7	158.3	120.0
95	101.0	167.1	126.6
100	106.3	175.9	133.3
105	111.6	184.7	140.0
110	116.9	193.5	146.6
115	122.2	202.3	153.3
120	127.6	211.1	160.0

WIND LOADING

SPAN (FEET)	CONDITION AND FORCE (WIND LOADING) (LB)			
	BARE WIRE 70 MPH WIND	BARE WIRE 55 MPH WIND	1/2" ICE CW (NO) 40 MPH WIND	1/4" ICE CW (O) 40 MPH WIND
	CW	CW	CW	CW
20	13.0	8.0	11.1	7.6
25	16.2	10.0	13.8	9.6
30	19.4	12.0	16.6	11.5
35	22.7	14.0	19.4	13.4
40	25.9	16.0	22.1	15.3
45	29.2	18.0	24.9	17.2
50	32.4	20.0	27.7	19.1
55	35.7	22.0	30.4	21.0
60	38.9	24.0	33.2	22.9
65	42.1	26.0	35.9	24.8
70	45.4	28.0	38.7	26.8
75	48.8	30.0	41.5	28.7
80	51.9	32.0	44.2	30.6
85	55.1	34.0	47.0	32.5
90	58.3	36.0	49.8	34.4
95	61.6	38.0	52.5	36.3
100	64.8	40.0	55.3	38.2
105	68.1	42.0	58.1	40.1
110	71.3	44.0	60.8	42.0
115	74.5	46.0	63.6	44.0
120	77.8	48.0	66.4	45.9

RADIAL LOAD TANGENT TRACK

SPAN (FEET)	CONDITION AND RADIAL LOAD (LB) (R1 AND R2)		
	60°F NO WIND, NO ICE	-5°F, 40 MPH WIND 1/2" ICE	-5°F, 40 MPH WIND 1/4" ICE CW
	CW	CW	CW
20	448.7	617.0	602.5
25	358.4	494.0	482.5
30	269.6	412.0	402.3
35	256.3	353.2	344.9
40	224.6	309.2	301.9
45	199.9	274.8	268.4
50	179.9	247.4	241.6
55	163.6	224.9	219.6
60	150.0	206.2	201.3
65	138.4	190.3	185.9
70	128.6	176.7	172.6
75	120.0	165.0	161.1
80	112.5	154.7	151.0
85	105.9	145.6	142.1
90	100.0	137.5	134.2
95	94.7	130.2	127.2
100	90.0	123.7	120.8
105	85.7	117.8	115.1
110	81.8	112.5	109.8
115	78.3	107.6	105.1
120	75.0	103.1	100.7

RADIAL LOAD BY ANGLE

ANGLE (DEGREES) θ	CONDITION AND RADIAL LOAD (LB) "R"		
	60°F NO WIND, NO ICE	-5°F, 40 MPH WIND 1/2" ICE	-5°F, 40 MPH WIND 1/4" ICE CW
	CW	CW	CW
0.5	26.2	36.0	36.2
1.0	52.4	72.0	70.3
1.5	78.5	108.0	105.4
2.0	104.7	144.0	140.6
2.5	130.9	180.0	175.7
3.0	157.1	216.0	210.9
4.0	209.4	287.9	281.2
5.0	261.7	369.9	361.4
6.0	314.0	431.6	421.6
7.0	366.3	503.7	491.6
8.0	418.5	575.6	562.0
9.0	470.8	647.3	632.1
10.0	522.9	719.0	702.1
11.0	575.1	790.7	772.1
12.0	627.2	862.4	842.1
13.0	679.2	933.9	912.0
14.0	731.2	1005.4	981.8
15.0	783.2	1076.8	1051.5

NOTES:

1. L = SUM OF THE DISTANCE TO THE LOW POINT OF THE CONTACT WIRE ON BOTH SIDES OF THE SUPPORT.

2. ICE (NON OPERATING CONDITION) IS 1/2" RADIAL ICE ON CONTACT WIRE. ICE (OPERATING CONDITION) IS 1/4" RADIAL ICE ON CONTACT WIRE.

D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

OVERHEAD CONTACT SYSTEM
 TECHNICAL SHEET
 AUTO-TENSIONED SINGLE CONTACT WIRE
 RADIAL AND WIND LOADS

DATE	APPR.
ISSUED:	REVISED
	REFERENCE

RECOMMENDED: *Michael K. ...*
 DEPUTY CHIEF ENGINEER

APPROVED: *R. ...*
 CHIEF TRANSPORTATION ENGINEER

PROJECT ENG.	
DESIGNED BY	
CHECKED BY	
DRAWN BY	
PROJECT MGR.	CV
DIVISION CHIEF	
DATE	
FILE	
DWG. NO.	OCT-14

CONTACT WIRE SAGS SWAT

ACTUAL SPAN (FEET)	EQUIVALENT SPAN = 100 FEET					
	TEMPERATURE - DEGREES F					
	-5	0	5	10	15	20 TO 125
20	0.16	0.17	0.18	0.19	0.20	0.21
25	0.25	0.26	0.28	0.29	0.31	0.33
30	0.36	0.38	0.40	0.42	0.45	0.48
35	0.49	0.52	0.55	0.58	0.61	0.65
40	0.64	0.68	0.71	0.75	0.80	0.85
45	0.81	0.86	0.90	0.95	1.01	1.08
50	1.00	1.06	1.11	1.18	1.25	1.33
55	1.21	1.28	1.35	1.43	1.51	1.61
60	1.44	1.52	1.60	1.70	1.80	1.91
65	1.70	1.79	1.88	1.99	2.11	2.25
70	1.97	2.07	2.18	2.31	2.45	2.60
75	2.26	2.38	2.51	2.65	2.81	2.99
80	2.57	2.70	2.85	3.02	3.20	3.40
85	2.90	3.05	3.22	3.41	3.61	3.84
90	3.25	3.42	3.61	3.82	4.05	4.31
95	3.62	3.81	4.02	4.25	4.51	4.80
100	4.01	4.22	4.46	4.71	5.00	5.32
105	4.42	4.66	4.91	5.20	5.51	5.86
110	4.86	5.11	5.39	5.70	6.05	6.43
115	5.31	5.59	5.89	6.23	6.61	7.03
120	5.78	6.08	6.42	6.79	7.20	7.65

CONTACT WIRE SAGS SWFT

ACTUAL SPAN (FEET)	EQUIVALENT SPAN = 100 FEET											
	TEMPERATURE - DEGREES F											
	-5	0	15	30	45	60	75	90	105	120	125	
20	0.14	0.15	0.20	0.21	0.25	0.32	0.40	0.51	0.61	0.72	0.76	
25	0.22	0.24	0.31	0.33	0.40	0.50	0.63	0.79	0.96	1.13	1.18	
30	0.32	0.34	0.45	0.47	0.57	0.72	0.91	1.14	1.38	1.63	1.70	
35	0.44	0.46	0.61	0.64	0.78	0.98	1.24	1.55	1.88	2.21	2.31	
40	0.58	0.60	0.80	0.84	1.02	1.28	1.62	2.02	2.46	2.89	3.02	
45	0.73	0.76	1.01	1.06	1.29	1.61	2.04	2.56	3.11	3.66	3.83	
50	0.90	0.94	1.25	1.31	1.59	1.99	2.52	3.16	3.84	4.51	4.72	
55	1.09	1.14	1.51	1.58	1.93	2.41	3.05	3.83	4.65	5.46	5.71	
60	1.30	1.36	1.80	1.88	2.29	2.87	3.64	4.56	5.53	6.50	6.80	
65	1.52	1.59	2.11	2.21	2.69	3.37	4.27	5.35	6.49	7.63	7.98	
70	1.76	1.85	2.45	2.56	3.12	3.91	4.95	6.20	7.53	8.85	9.26	
75	2.02	2.12	2.81	2.94	3.58	4.48	5.68	7.12	8.64	10.16	10.63	
80	2.30	2.41	3.20	3.34	4.08	5.10	6.46	8.10	9.83	11.56	12.09	
85	2.60	2.72	3.61	3.77	4.60	5.78	7.30	9.14	11.10	13.05	13.65	
90	2.91	3.05	4.05	4.23	5.16	6.46	8.18	10.25	12.44	14.63	15.30	
95	3.25	3.40	4.51	4.71	5.75	7.20	9.11	11.42	13.8	16.30	17.05	
100	3.60	3.77	5.00	5.22	6.37	7.97	10.10	12.65	15.36	18.05	18.89	

NOTES:

1. THE EQUIVALENT SPAN FOR THE SINGLE CONTACT WIRE SYSTEM IS DETERMINED BY THE FOLLOWING FORMULA:

$$\sqrt{\frac{L_1^3 + L_2^3 + L_3^3 + \dots + L_N^3}{L_1 + L_2 + L_3 + \dots + L_N}}$$

WHERE $L_1, L_2, L_3, \dots, L_N$ ARE THE LENGTHS OF THE INDIVIDUAL SPANS IN EACH FULL TENSION LENGTH (ANCHOR TO ANCHOR).

2. FOR INTERMEDIATE TEMPERATURES IN THE ERECTION TENSION TABLES, BETWEEN THOSE LISTED, THE TENSION VALUE SHALL BE INTERPOLATED ON A STRAIGHT LINE BASIS.

3. TO DETERMINE SAG OF CONTACT WIRE AT A SPECIFIC TEMPERATURE INITIALLY ESTABLISH THE EQUIVALENT SPAN FOR THE TENSION LENGTH AS DESCRIBED ABOVE. FROM EQUIVALENT SPAN TABLE READ WIRE SAG USING THE ACTUAL SPAN AND TEMPERATURE.

ERECTION TENSIONS SWAT

L =	Equivalent Span (ft)	Temperature							
		40	50	60	70	80	90	100	
tn = New Temperature	0	5463	5448	5431	5410	5387	5361	5331	
	10	5050	5037	5021	5002	4980	4956	4929	
	20	4638	4626	4611	4594	4575	4554	4529	
	30	4226	4216	4203	4189	4173	4155	4135	
	40	3815	3808	3799	3788	3775	3762	3747	
	50	3407	3402	3397	3390	3384	3375	3367	
	60	3000	3000	3000	3000	3000	3000	3000	
	70	2598	2604	2612	2621	2629	2639	2650	
	80	2202	2219	2237	2257	2279	2301	2323	
	90	1820	1850	1883	1919	1956	1992	2030	
	100	1460	1511	1563	1617	1670	1722	1772	
	110	1144	1218	1292	1362	1429	1493	1555	
120	893	988	1075	1157	1235	1308	1376		

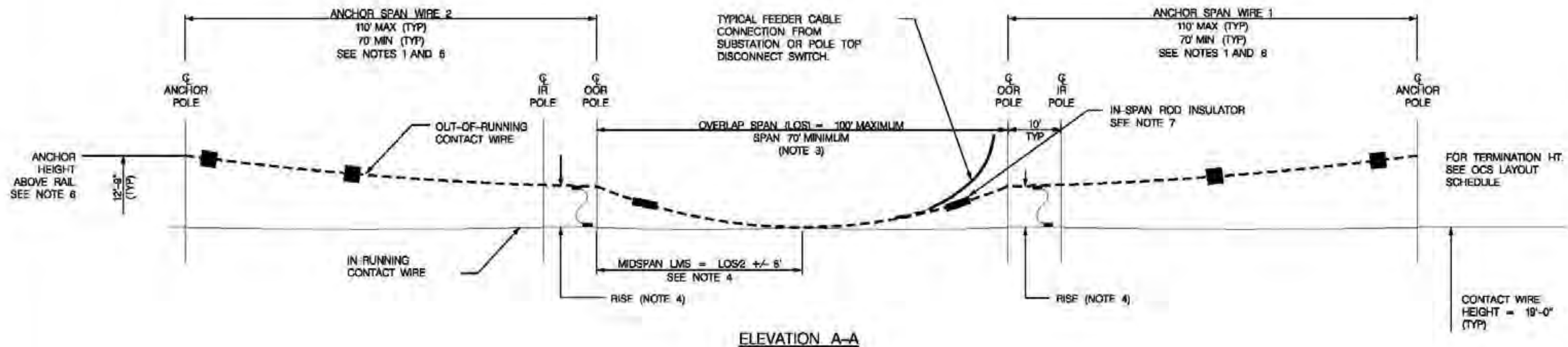
ERECTION TENSIONS SWFT

L =	Equivalent Span (ft)	Temperature							
		40	50	60	70	80	90	100	
tn = New Temperature	0	4423	4386	4342	4290	4230	4165	4094	
	10	4012	3977	3935	3887	3832	3771	3705	
	20	3601	3570	3532	3488	3440	3386	3327	
	30	3194	3166	3134	3096	3055	3009	2962	
	40	2789	2767	2742	2713	2682	2649	2613	
	50	2390	2377	2361	2346	2328	2309	2291	
	60	2000	2000	2000	1999	2000	2000	2000	
	70	1627	1647	1667	1688	1709	1729	1746	
	80	1288	1332	1377	1421	1461	1499	1535	
	90	1003	1075	1142	1204	1260	1312	1360	
	100	790	880	962	1036	1103	1164	1219	
	110	644	741	829	907	979	1045	1106	
120	545	642	729	810	883	951	1014		

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1/20/2017

DATE	APPR.	RECOMMENDED: <i>Muhammad Khalid</i> DEPUTY CHIEF ENGINEER
ISSUED:	REVISED	APPROVED: <i>R. J. E.</i> CHIEF TRANSPORTATION ENGINEER
		REFERENCE

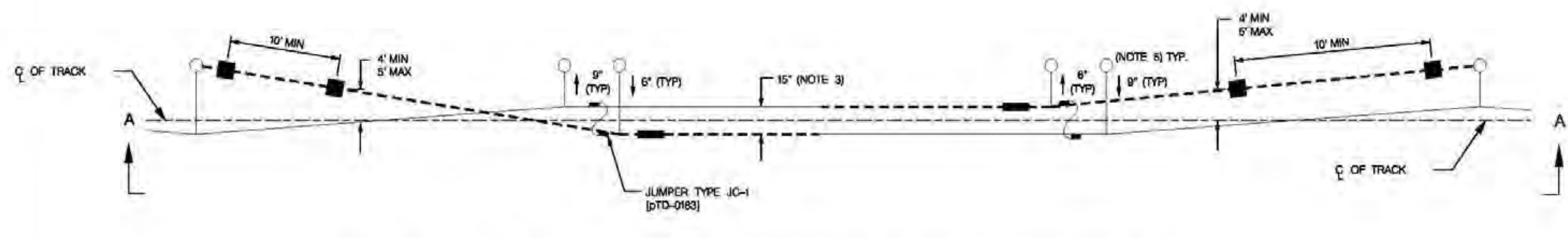
D.C. DEPARTMENT OF TRANSPORTATION	
STREETCAR STANDARD DRAWINGS	
OVERHEAD CONTACT SYSTEM TECHNICAL SHEET SWAT & SWFT ERECTION TENSIONS	
PROJECT NO.	DATE
DRAWN BY	SCALE
CHECKED BY	DATE
ISSUED BY	DATE
PROJECT NO.	DWG NO.



ELEVATION A-A

NOTES:

1. DIMENSIONS SHOWN SUITABLE FOR 350 KCMIL CONTACT WIRE AT 3000 LB TENSION.
2. IN AREAS WHERE CENTER POLES ARE USED, THE OVERLAPS SHALL BE STAGGERED ONE SPAN ALONG THE TRACK TO REDUCE POLE LOADING AND PROVIDE ONE BALANCE WEIGHT ANCHOR PER POLE.
3. WHEN TRACK CURVATURE REQUIRES SPANS SHORTER THAN 70', USE TWO SPANS TO DEVELOP INSULATED OVERLAP WITH INSULATED KNUCKLE AND REGISTRATION IN THE MIDDLE AND THE OVERLAPPING CONTACT WIRES 12 INCHES (MINIMUM) APART.
4. RISE SHALL BE MINIMUM 8", MAXIMUM 14". RISE SHALL BE FIELD ADJUSTED TO CAUSE THE MID SPAN WIRE HEIGHT TO BE EQUAL AND TO BE THE AVERAGE OF THE ADJACENT TWO INRUNNING CONTACT WIRE HEIGHTS.
5. STAGGER VALUES ARE TYPICAL. SITE SPECIFIC VALUES SHALL BE IN ACCORDANCE WITH MAXIMUM STAGGER CRITERIA. FOR ACTUAL OVERLAP ARRANGEMENT AND STAGGER SEE OCS LAYOUT SCHEDULES.
6. TYPICAL ANCHOR SPAN SHOWN ARE SUITABLE FOR A VERTICAL DISTANCE BETWEEN INRUNNING CONTACT WIRE HEIGHT AND ANCHOR HEIGHT OF 2'-6".
7. WHERE VERTICAL CLEARANCE BETWEEN THE UNDERSIDE OF THE INSULATOR AND INRUNNING WIRE HEIGHT IS LESS THAN 6", A SECTION INSULATOR SHALL BE INSTALLED.



INSULATED OVERLAP ARRANGEMENT FOR SINGLE CONTACT WIRE TO SINGLE CONTACT WIRE (1)
TANGENT TRACK

D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

OVERHEAD CONTACT SYSTEM
GENERAL ARRANGEMENT
INSULATED OVERLAP SWAT
ON CANTILEVER SUPPORT STRUCTURES

DATE	APPR.	ISSUED:	REFERENCE

RECOMMENDED: *Mohammad Kishik*
DEPUTY CHIEF ENGINEER

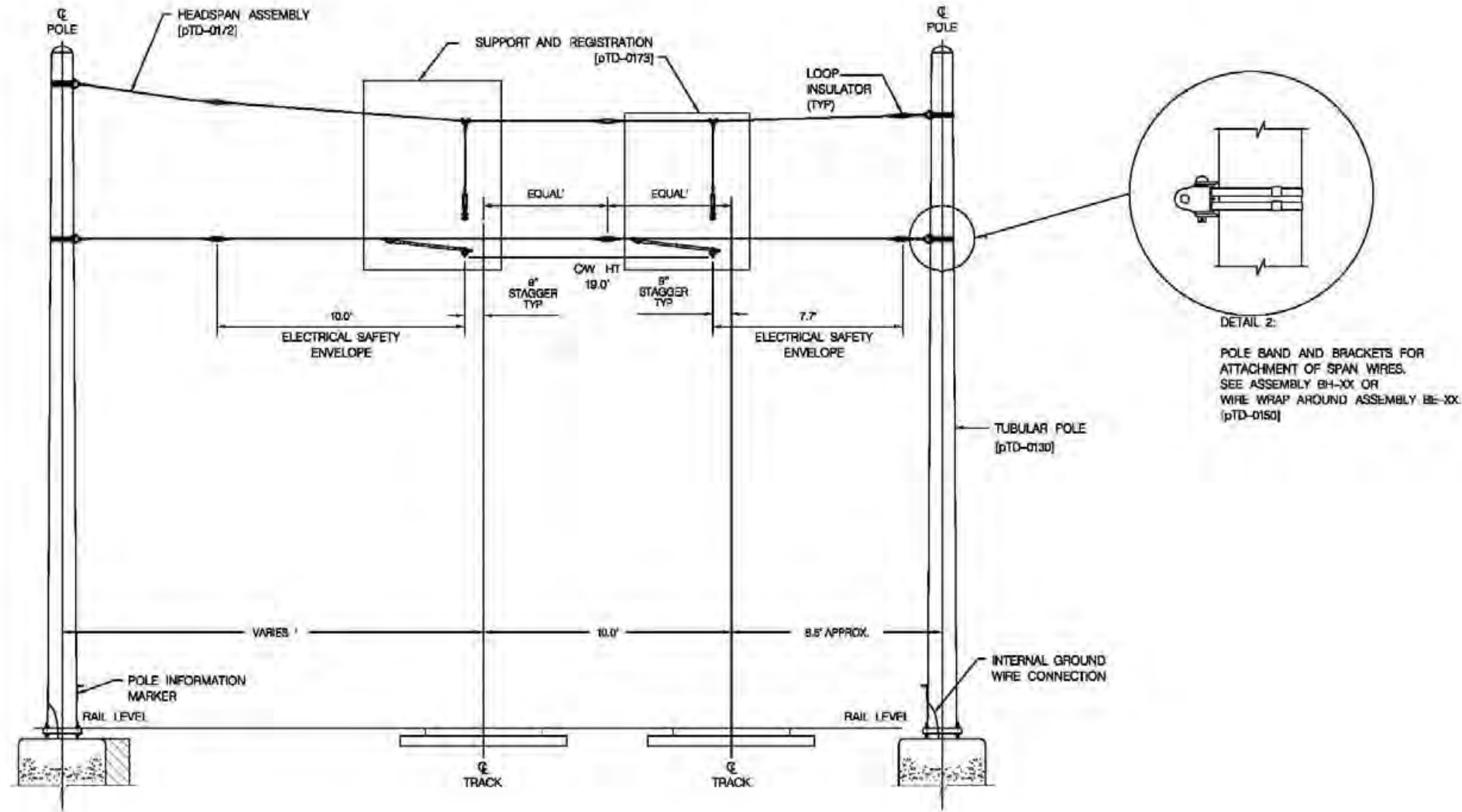
APPROVED: *[Signature]*
CHIEF TRANSPORTATION ENGINEER

PROJECT ENG.	
DESIGNED BY	
CHECKED BY	
DRAWN BY	
PROJECT MGR.	
DIVISION CHIEF	
DATE	
FILE	
DWG. NO.	OCD-01

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NOTES:

1. THE STEADY SPAN WIRE SHALL BE TENSIONED TO ELIMINATE SAG DUE TO EQUIPMENT WEIGHT. NOMINAL PRE-TENSION IS 700 LB BEFORE INSTALLATION OF OCS.
2. SPAN WIRES SHALL BE ATTACHED TO THE POLE USING APPROVED BANDED OR WRAP AROUND BRACKETS. SEE DETAIL 2.



DETAIL 2:
POLE BAND AND BRACKETS FOR ATTACHMENT OF SPAN WIRES. SEE ASSEMBLY BH-XX OR WIRE WRAP AROUND ASSEMBLY WB-XX. (pTD-0150)

TYPICAL HEADSPAN STRUCTURE 1

D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

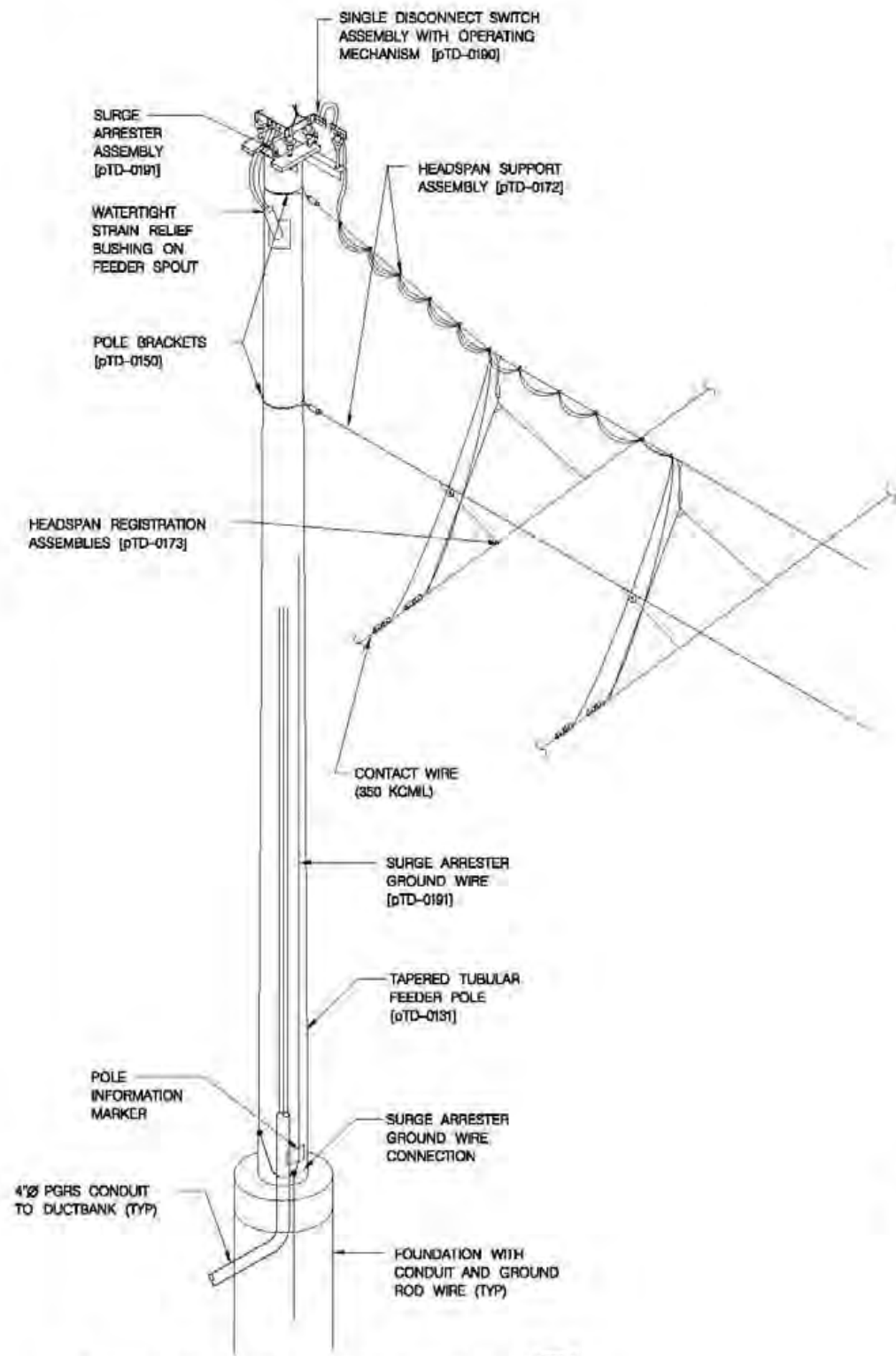
OVERHEAD CONTACT SYSTEM
TYPICAL HEADSPAN STRUCTURE
AUTO-TENSIONED SINGLE CONTACT WIRE

RECOMMENDED: *Muhammad Khid*
DEPUTY CHIEF ENGINEER

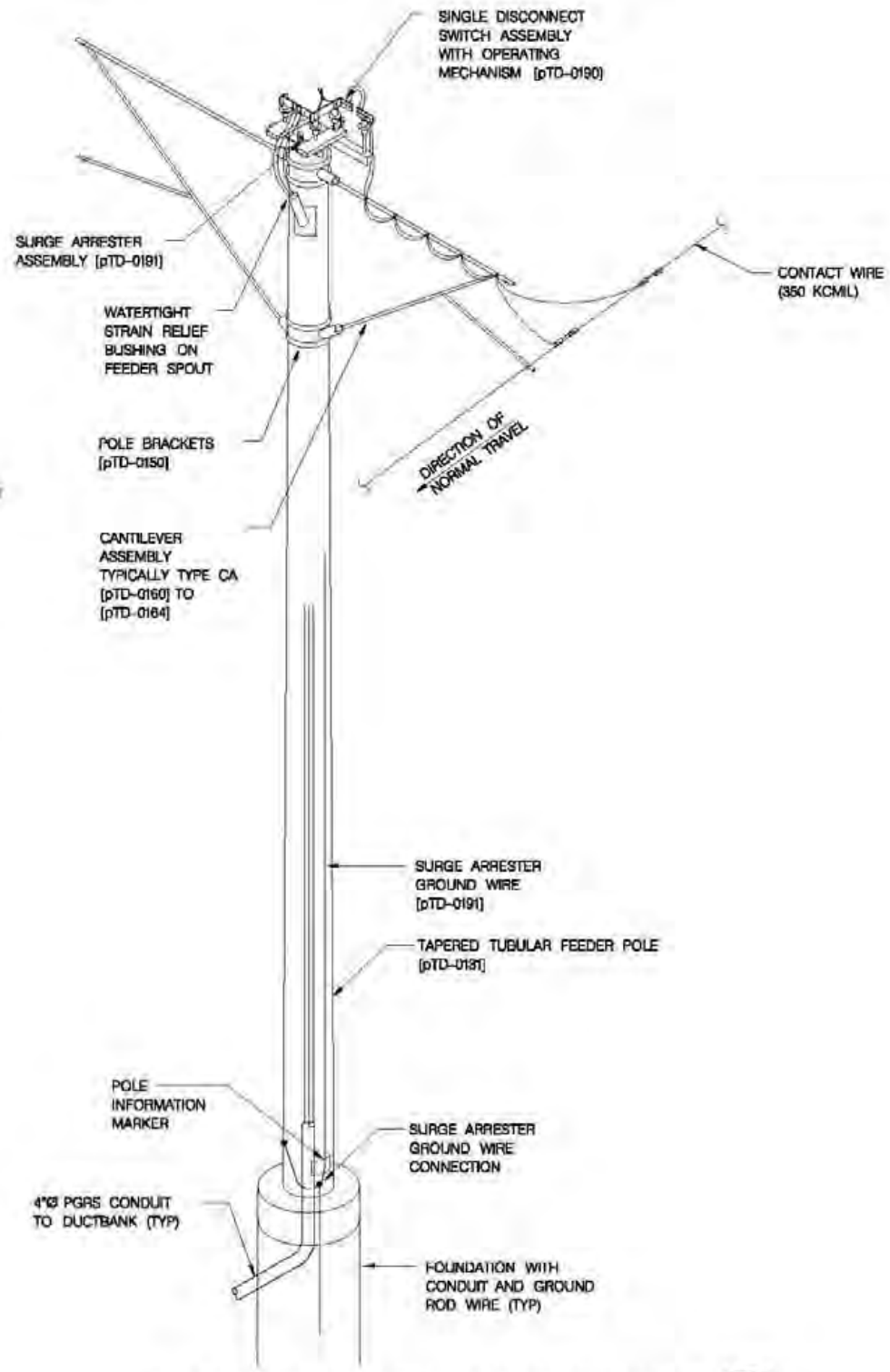
APPROVED: *Rathee*
CHIEF TRANSPORTATION ENGINEER

DATE	APPR.	ISSUED:	REFERENCE

PROJECT ENG.	
DESIGNED BY	
CHECKED BY	
DRAWN BY	
PROJECT MGR.	
DIVISION CHIEF	
DATE	
FILE	
DWG. NO.	OCD-03



TWIN DISCONNECT ON HEADSPAN POLE (1)



SINGLE DISCONNECT ON CENTER OR SIDE POLE (2)

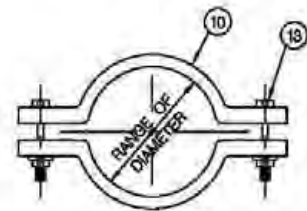
NOTES:

1. TYPICAL ASSEMBLY DRAWINGS ARE NOTED THUS: [pTD-0040].
2. MOUNTING HEIGHT AND POSITION OF OPERATING HANDLE TO BE DETERMINED BY CONTRACTOR AND APPROVED BY THE DISTRICT.
3. ALL OPERATING HANDLES SHALL BE INSTALLED IN THE ALONG TRACK DIRECTION AND CLEAR VEHICLE CLEARANCE ENVELOPE.
4. ALL OPERATING HANDLES SHALL BE PROVIDED WITH A DISTRICT APPROVED PADLOCK AND KEY.
5. EACH INCOMING FEEDER CIRCUIT IS TO BE PROTECTED BY A SURGE ARRESTER ASSEMBLY CONNECTED TO THE SUPPLY SIDE OF EACH DISCONNECT SWITCH.
6. WHERE SWITCH MECHANISMS OR OTHER EQUIPMENT OBSTRUCT NORMAL PLACEMENT OF POLE I.D. LABELS FACING ON COMING TRAINS, THE LABELS ARE TO BE POSITIONED FACING THE TRACK.

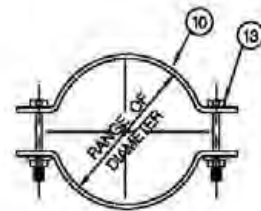
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 1/20/2012

D.C. DEPARTMENT OF TRANSPORTATION	
STREETCAR STANDARD DRAWINGS	PROJECT ENG: _____ DESIGNED BY: _____ CHECKED BY: _____ DRAWN BY: _____ PROJECT MGR.: CY
OVERHEAD CONTACT SYSTEM TYPICAL FEEDER STRUCTURES WITH DISCONNECT SWITCH	DIVISION CHIEF: _____ DATE: _____ FILE: _____ DWG. NO. OGD-04

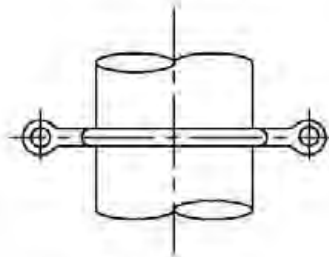
RECOMMENDED:	<i>Michael K. K.</i> DEPUTY CHIEF ENGINEER
APPROVED:	<i>R. J. M.</i> CHIEF TRANSPORTATION ENGINEER
DATE	APPR.
ISSUED:	REVISED
	REFERENCE



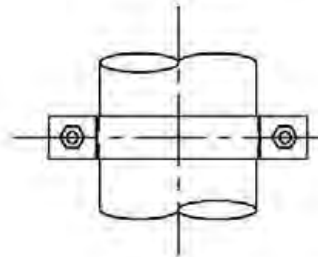
PLAN
ROUND BAR OPTION



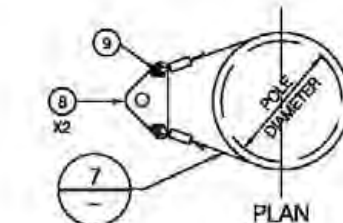
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PLATE OPTION



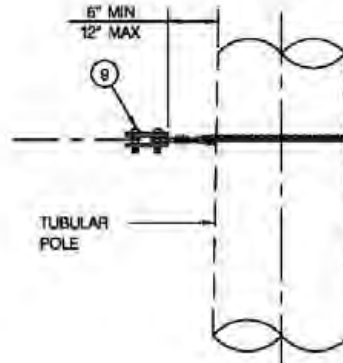
ELEVATION
ROUND BAR OPTION



ELEVATION
PLATE OPTION

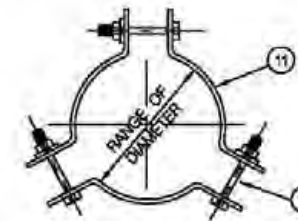


PLAN

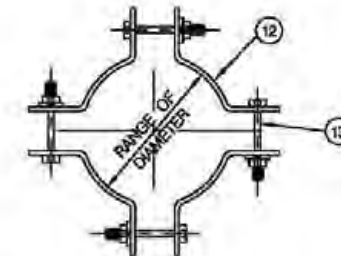


ELEVATION

STEEL GUY STRAND
FOR CROSS-SPANS AND TERMINATIONS
ASSEMBLY BE-XX



THREE PIECE POLE
BRACKETS FOR GUY WIRES
ASSEMBLY BC-XX



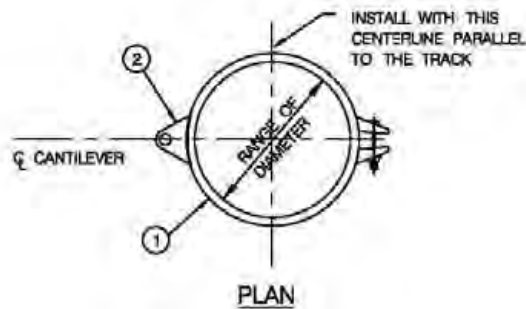
PLAN

FOUR PIECE POLE
BRACKETS FOR GUY ATTACHMENT
ASSEMBLY BD-XX

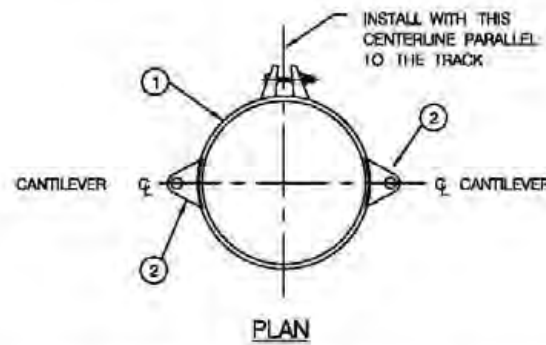
NOTES:

1. ALL DIMENSIONS AND BOLT SIZES SHALL BE DETERMINED BY CONTRACTOR BASED ON FURNISHED CATENARY COMPONENTS PRIOR TO FABRICATION.
2. CONTRACTOR TO DETERMINE POLE DIAMETER AT ATTACHMENT HEIGHT PRIOR TO FABRICATION OF BRACKET ASSEMBLIES.
3. IN ASSEMBLY REFERENCE, 'XX' INDICATES POLE DIAMETER TO THE NEAREST INCH.
4. BOLT THREAD PROJECTION THROUGH NUTS SHALL NOT EXCEED 2 INCHES IN LENGTH.
5. SWIVEL SHALL BE DESIGNED BY THE CONTRACTOR TO SUIT MATING CANTILEVER ASSEMBLY COMPONENTS.
6. THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.

TWO PIECE POLE BRACKET
ASSEMBLY BA-XX

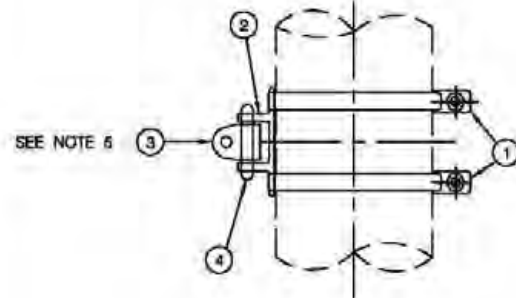


PLAN



PLAN

HINGE BRACKET FOR BACK-TO-BACK CANTILEVER
ASSEMBLY BB-XX



ELEVATION

HINGE BRACKET FOR A SINGLE CANTILEVER
ASSEMBLY BH-XX



TYPICAL POLE SLING SUB-ASSEMBLY

QUANTITIES EACH TYPE						DESCRIPTION	ITEM NO.	PART NO./REMARKS
BH-XX	BE-XX	BD-XX	BC-XX	BB-XX	BA-XX			
-	-	4	3	-	2	BOLT, GALVANIZED	13	W/NUT & WASHER
-	-	4	-	-	-	QUARTER BRACKET	12	
-	-	-	3	-	-	THIRD BRACKET	11	
-	-	-	-	-	2	HALF BRACKET	10	
-	3	-	-	-	-	PIN WITH SLIT PIN	9	
-	2	-	-	-	-	PLATE, 3 PIN	8	
-	2	-	-	-	-	THIMBLE	7	STAINLESS STEEL
-	2	-	-	-	-	COMPRESSION SLEEVE	6	
-	AS REQD	-	-	-	-	WIRE ROPE	5	STAINLESS STEEL
1	-	-	-	2	-	HINGE PIN	4	
1	-	-	-	2	-	SWIVEL	3	
1	-	-	-	2	-	POLE CLEVIS	2	
2	-	-	-	2	-	POLE CLAMP ASSY	1	
ASSEMBLY TYPE						DESCRIPTION	ITEM NO.	PART NO./REMARKS

BILL OF MATERIALS

D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

OVERHEAD CONTACT SYSTEM
BRACKET ASSEMBLIES FOR TUBULAR POLES
TYPES BA, BB, BC, BD, BE AND BH

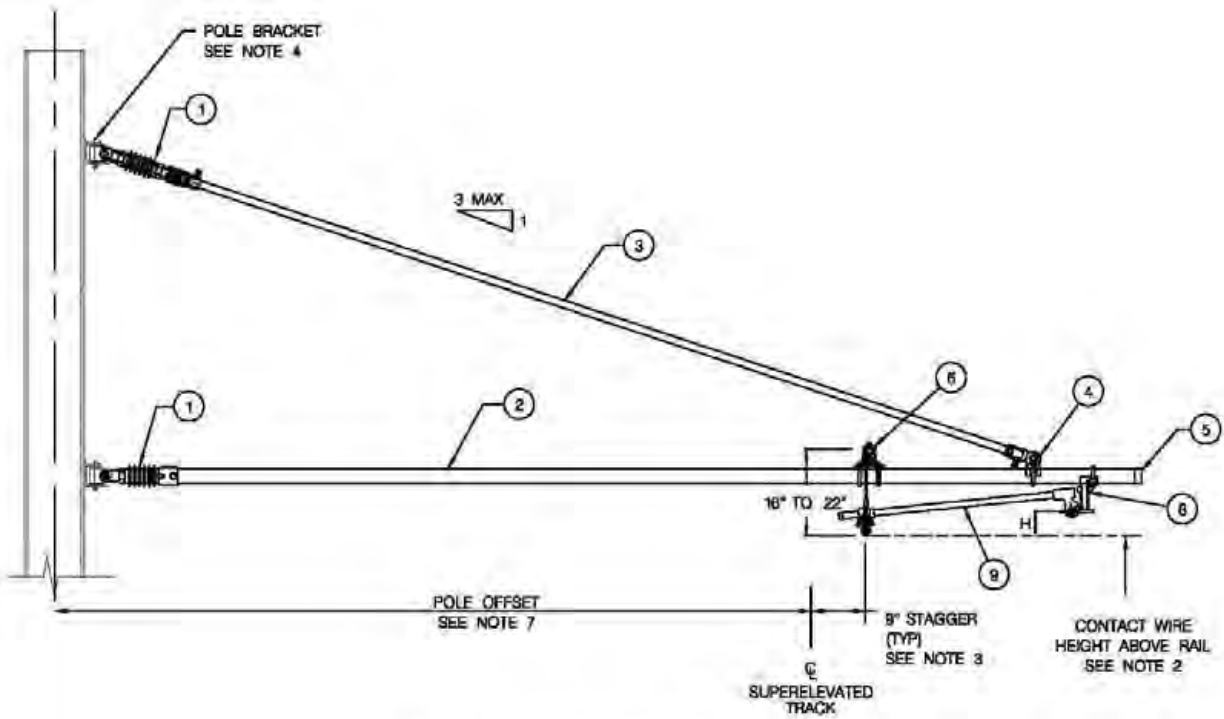
DATE	APPR.	REVISION	REFERENCE
ISSUED:			

RECOMMENDED: *Muhammad Khalid*
DEPUTY CHIEF ENGINEER

APPROVED: *[Signature]*
CHIEF TRANSPORTATION ENGINEER

PROJECT ENG
DESIGNED BY
CHECKED BY
DRAWN BY
PROJECT MGR. CY

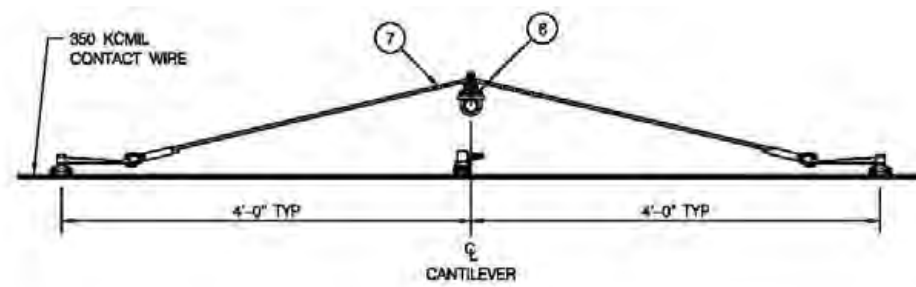
DIVISION CHIEF
DATE
FILE
DWG. NO. OGD-67



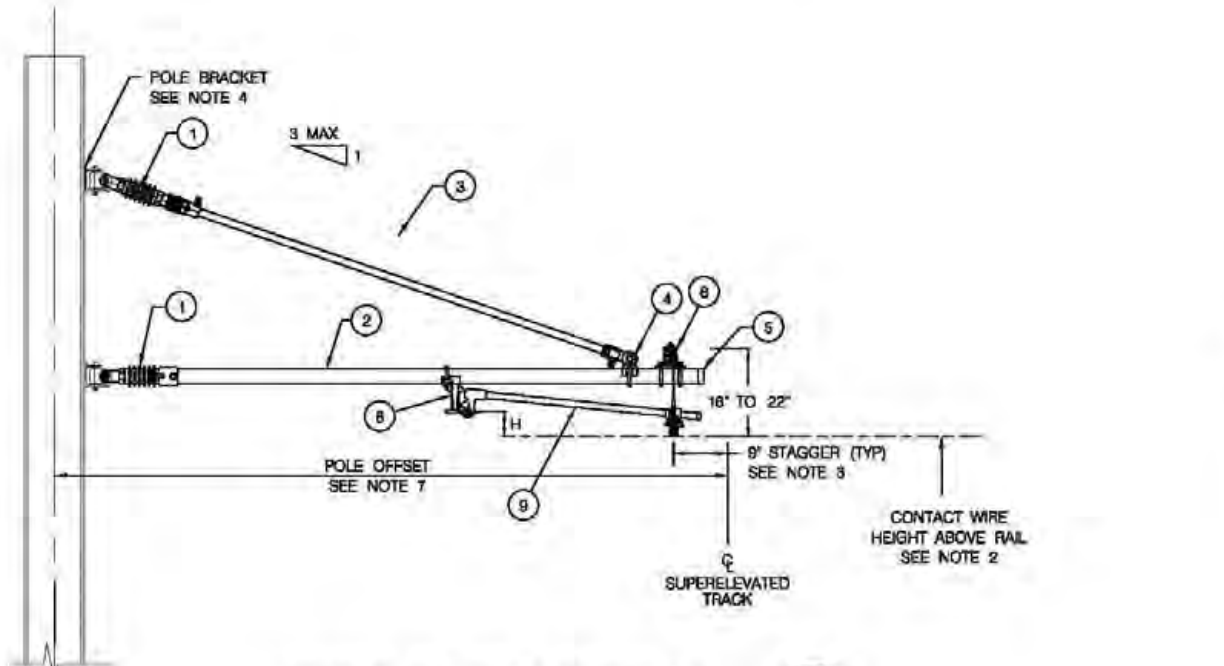
CA-01LM CANTILEVER LIGHT LOAD
RADIAL LOAD < 500 LB



- NOTES:
1. POLE BRACKET ASSEMBLY CALLED OFF SEPARATELY.
 2. CONTRACTOR SHALL DETERMINE COMPONENT DETAILS AND LOADING LIMITS.
 3. CONTRACTOR SHALL FIELD VERIFY POLE OFFSET DIMENSIONS PRIOR TO FABRICATION OF CANTILEVER.
 4. THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.



SECTION A
SCALE: NTS



CA-02LM CANTILEVER LIGHT LOAD
RADIAL LOAD < 500 LB



QUANTITIES EACH TYPE				
1	1	STEADY ARM ASSEMBLY	9	
1	1	DROP BRACKET	8	
1	1	SUPPORT BRIDGE SUB ASSEMBLY	7	
1	1	SINGLE CW SUSPENSION	6	
1	1	SYNTHETIC CAP FOR 2\"/>		

ASSEMBLY TYPE	DESCRIPTION	ITEM NO.	PART NO./REMARKS
CA-02L	CA-01L	1	
BILL OF MATERIALS			

D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

OVERHEAD CONTACT SYSTEM
SINGLE CONTACT WIRE LIGHT/MEDIUM LOAD
PUSH-OFF AND PULL-OFF CANTILEVER ASSEMBLIES
CA-01LM & CA-02LM

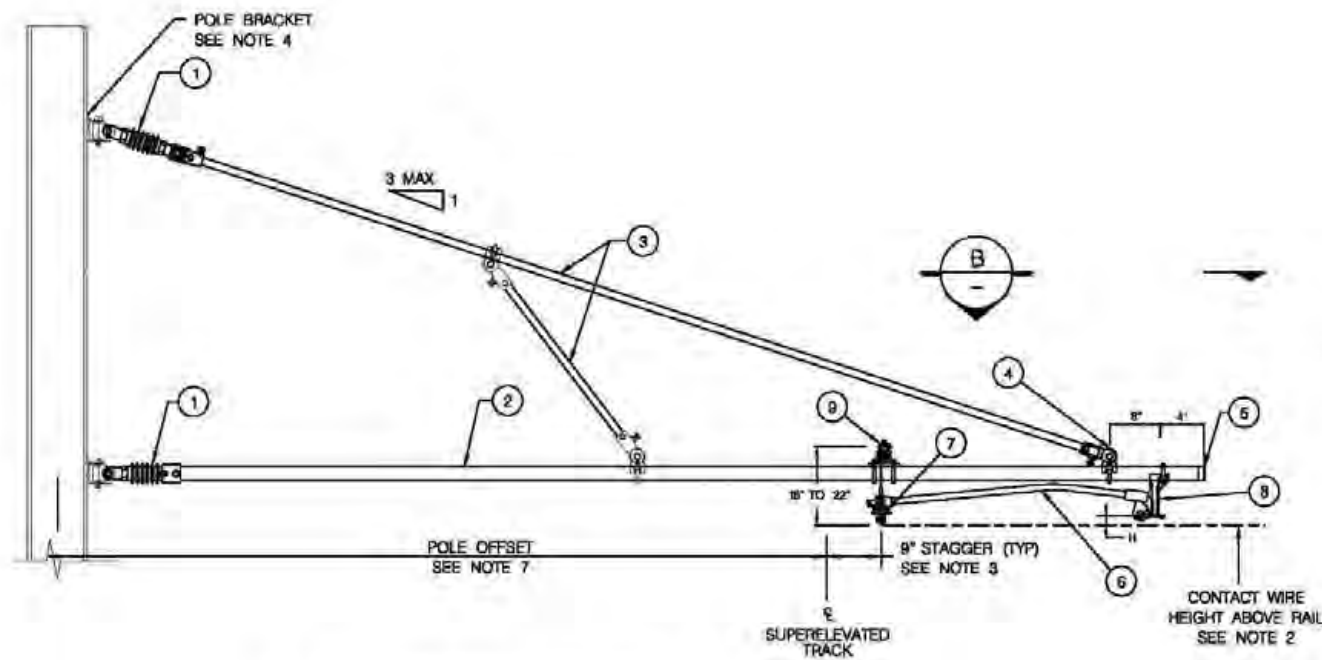
RECOMMENDED: *Mohamed K. Habib*
DEPUTY CHIEF ENGINEER

APPROVED: *[Signature]*
CHIEF TRANSPORTATION ENGINEER

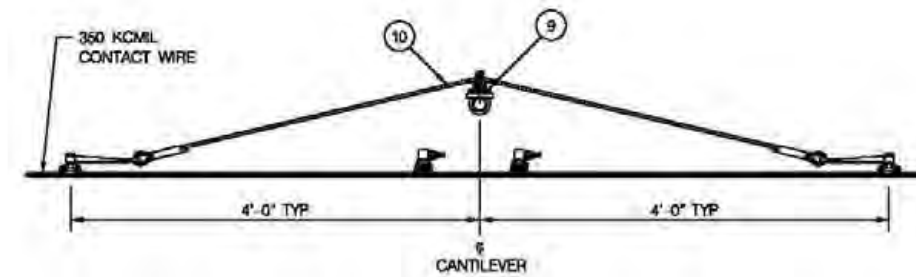
DATE	APPR.	
ISSUED:	REVISED	REFERENCE

PROJECT ENG.	
DESIGNED BY	
CHECKED BY	
DRAWN BY	
PROJECT MGR.	CT
DIVISION CHIEF	
DATE	
FILE	
DWG. NO.	OCD-08

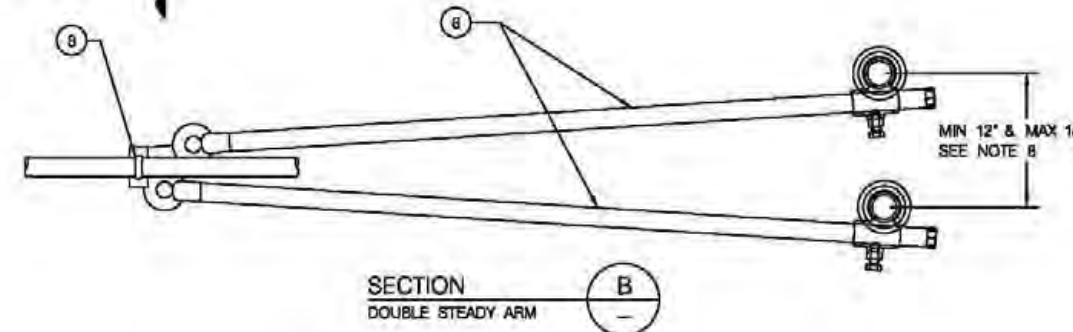
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1/20/2012



CA-01H CANTILEVER HEAVY LOAD
MAX RADIAL LOAD FROM 500 TO 1000 LBS

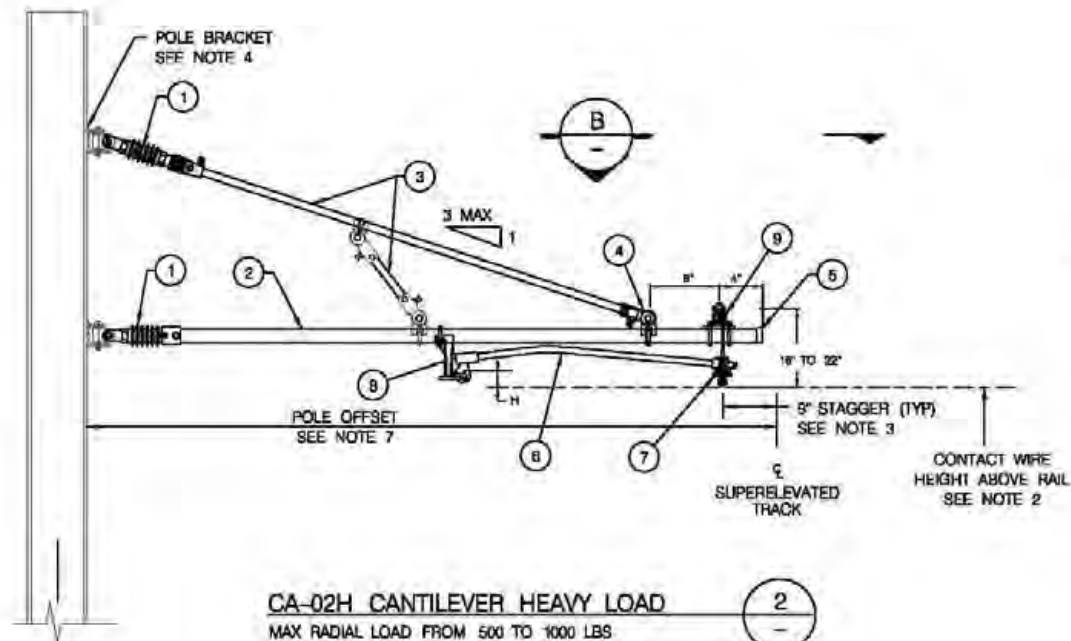


SECTION A
SCALE: NTS



SECTION B
DOUBLE STEADY ARM

- NOTES:
1. FOR STEADY ARM SHAPE, ALIGNMENT AND CLEARANCE CRITERIA SEE DRAWINGS pTD-0051.
 2. POLE BRACKET ASSEMBLY CALLED OFF SEPARATELY.
 3. CONTRACTOR SHALL DETERMINE COMPONENT DETAILS AND LOADING LIMITS.
 4. CONTRACTOR SHALL FIELD VERIFY POLE OFFSET DIMENSION PRIOR TO FABRICATION OF CANTILEVER.
 5. THE CONTRACT SHALL ENSURE THAT EACH STEADY ARM EQUALLY SHARES THE CW RADIAL LOAD.
 6. THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.



CA-02H CANTILEVER HEAVY LOAD
MAX RADIAL LOAD FROM 500 TO 1000 LBS

QUANTITIES EACH TYPE				
1	1	SUPPORT BRIDLE SUB ASSEMBLY	10	
1	1	SINGLE CONTACT WIRE SUSPENSION	9	
1	1	DROP BRACKET	8	
2	2	CW SWIVEL CLAMP & INSULATOR	7	
2	2	STEADY ARM	6	
1	1	SYNTHETIC CAP FOR 2" PIPE	5	
3	3	EYE CLAMP	4	
2	2	PIPE 1" SCHEDULE 40 GALV. WEND FITTING	3	
1	1	PIPE 2" SCHEDULE 80 GALV.	2	
2	2	CANTILEVER INSULATOR	1	
CA-02H	CA-01H			
ASSEMBLY TYPE		DESCRIPTION	ITEM NO.	PART NO./REMARKS
BILL OF MATERIALS				

D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

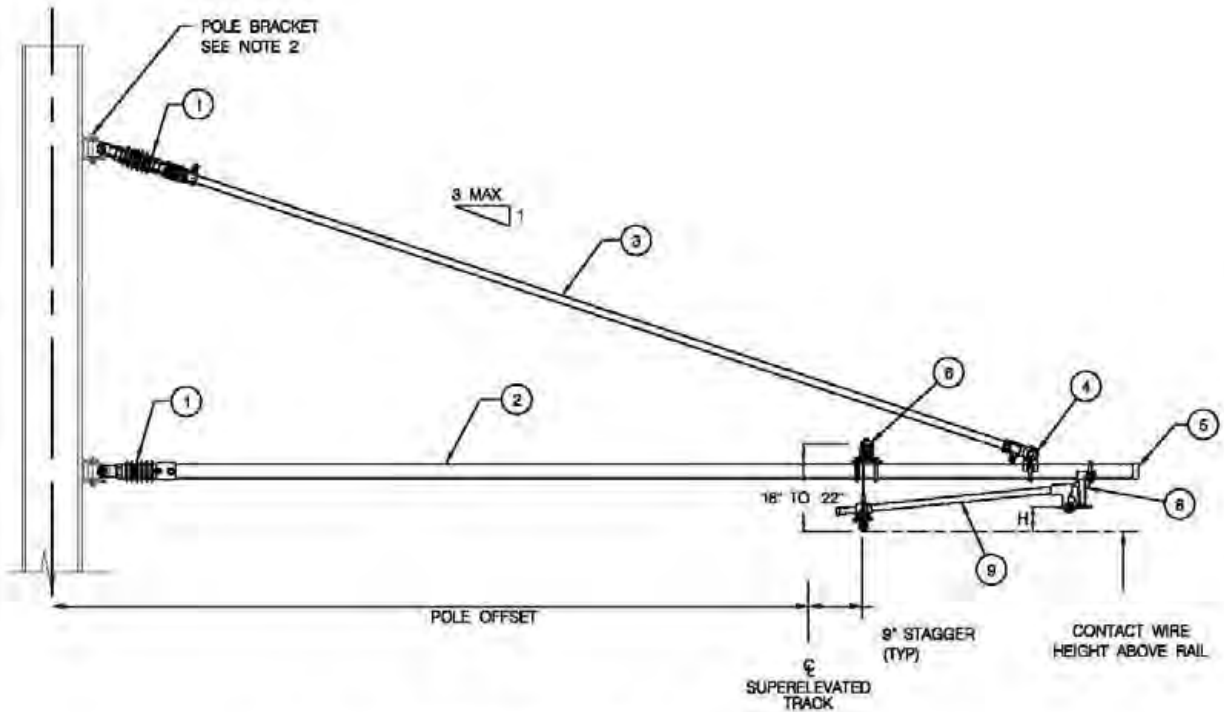
OVERHEAD CONTACT SYSTEM
SINGLE CONTACT WIRE HEAVY LOAD
PUSH-OFF AND PULL-OFF CANTILEVER ASSEMBLES
CA-01H & CA-02H

RECOMMENDED: *Mohamed Khadd*
DEPUTY CHIEF ENGINEER

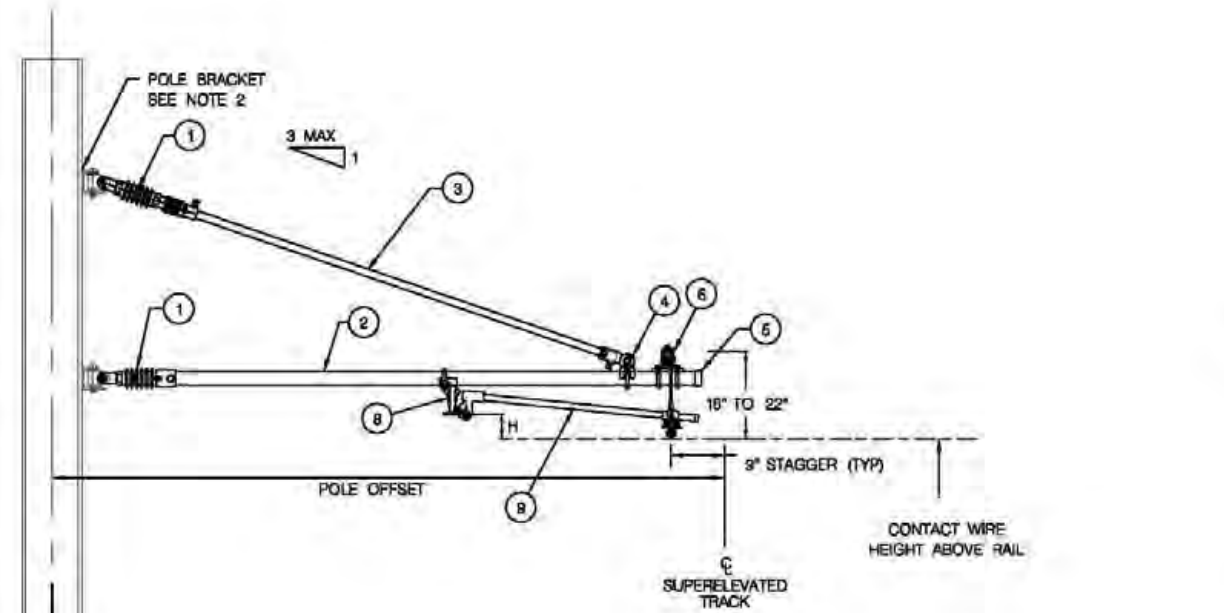
APPROVED: *[Signature]*
CHIEF TRANSPORTATION ENGINEER

DATE	APPR.	
ISSUED:	REVISED	REFERENCE

PROJECT ENG.	
DESIGNED BY	
CHECKED BY	
DRAWN BY	
PROJECT MGR.	CY
DIVISION CHIEF	
DATE	
FILE	
DWG. NO.	OCD-09



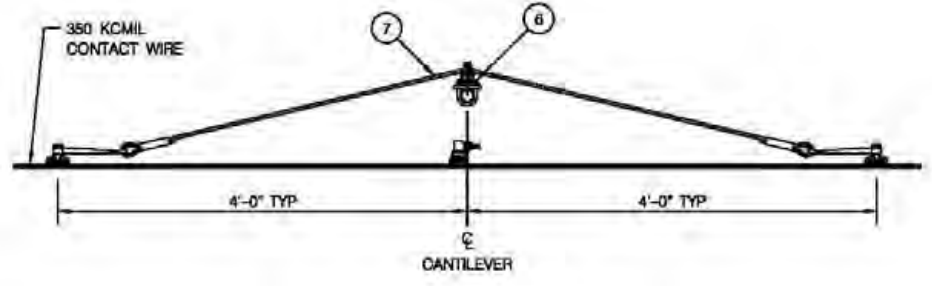
CA-01LM CANTILEVER LIGHT LOAD
RADIAL LOAD < 500 LB



CA-02LM CANTILEVER LIGHT LOAD
RADIAL LOAD < 500 LB

NOTES:

- SUPPORT BRIDLE SUB-ASSEMBLY SHALL BE FIELD ADJUSTED TO ACHIEVE SPECIFIED CONTACT WIRE HEIGHT.
- FOR CONTACT WIRE HEIGHT OVER EACH TRACK, SEE OCS LAYOUT PLAN.
- FOR REQUIRED STAGGER VALUES AND DIRECTION, SEE OCS LAYOUT PLAN.
- POLE BRACKET ASSEMBLY CALLED OFF SEPARATELY.
- CONTRACTOR SHALL DETERMINE COMPONENT DETAILS AND LOADING LIMITS.
- OCS DETAILS AT EACH LOCATION ARE SHOWN IN THE WIRING LAYOUT PLANS.
- CONTRACTOR SHALL FIELD VERIFY POLE OFFSET DIMENSIONS PRIOR TO FABRICATION OF CANTILEVER.
- THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.



SECTION A-A
SCALE: NTS

QUANTITIES EACH TYPE			
1	1	STEADY ARM ASSEMBLY	9
1	1	DROP BRACKET	8
1	1	SUPPORT BRIDLE SUB ASSEMBLY	7
1	1	SINGLE CW SUSPENSION	6
1	1	SYNTHETIC CAP FOR 2\" PIPE	5
1	1	EYE CLAMP	4
1	1	PIPE 1\" SCHEDULE 40 GALV. W/END FITTING	3
1	1	PIPE 2\" SCHEDULE 80 GALV.	2
2	2	CANTILEVER INSULATOR	1
CA-02L	CA-01L		
ASSEMBLY TYPE		DESCRIPTION	ITEM NO.
BILL OF MATERIALS			
		DESCRIPTION	PART NO./REMARKS

D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

OVERHEAD CONTACT SYSTEM
SINGLE CONTACT WIRE LIGHT/MEDIUM LOAD
PUSH-OFF AND PULL-OFF CANTILEVER ASSEMBLIES
CA-01LM & CA-02LM

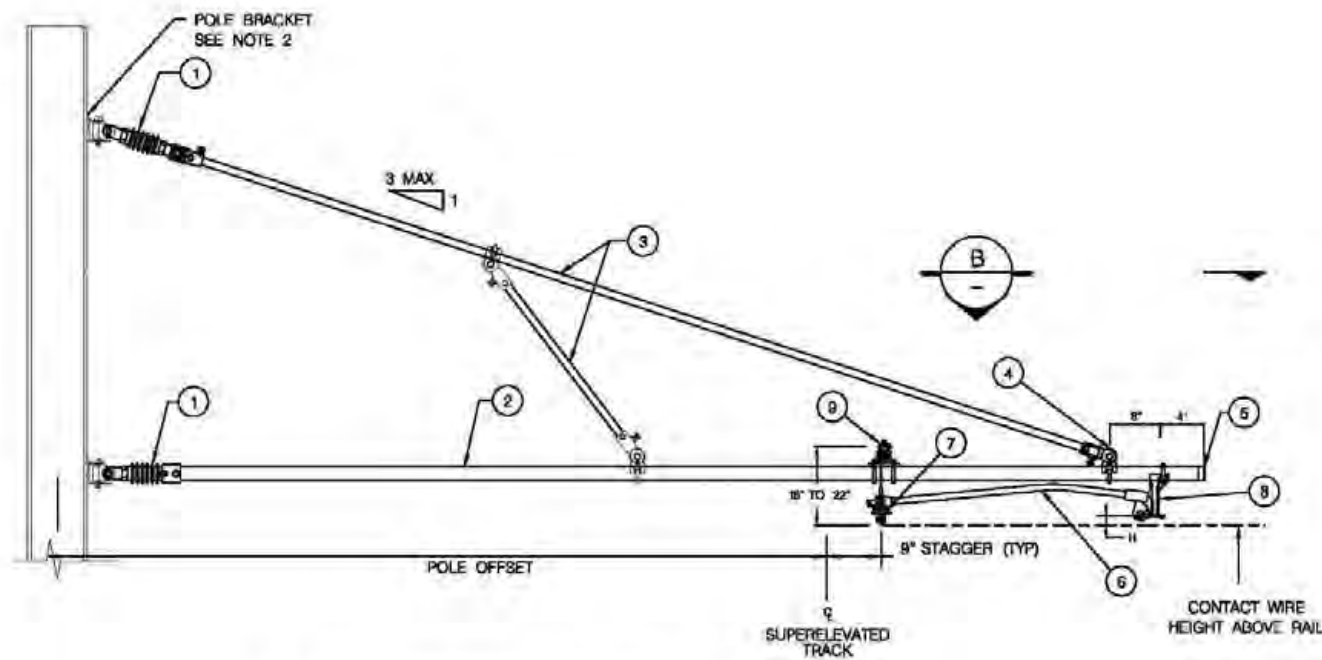
RECOMMENDED: *Muhammad Khalid*
DEPUTY CHIEF ENGINEER

APPROVED: *R. J. The*
CHIEF TRANSPORTATION ENGINEER

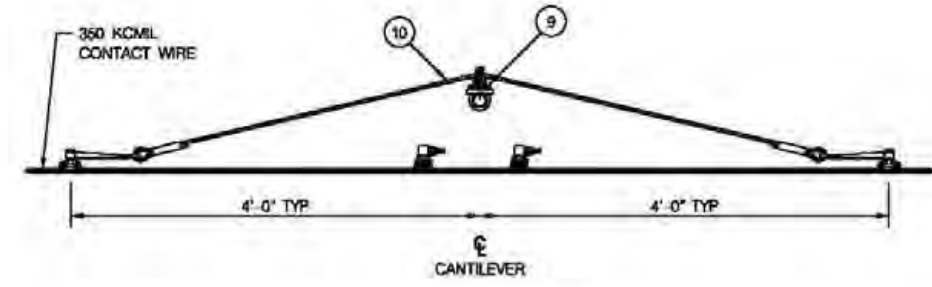
DATE	APPR.	
ISSUED:	REVISED	REFERENCE

PROJECT ENG.	
DESIGNED BY	
CHECKED BY	
DRAWN BY	
PROJECT MGR.	CT
DIVISION CHIEF	
DATE	
FILE	
DWG. NO.	CGD-10

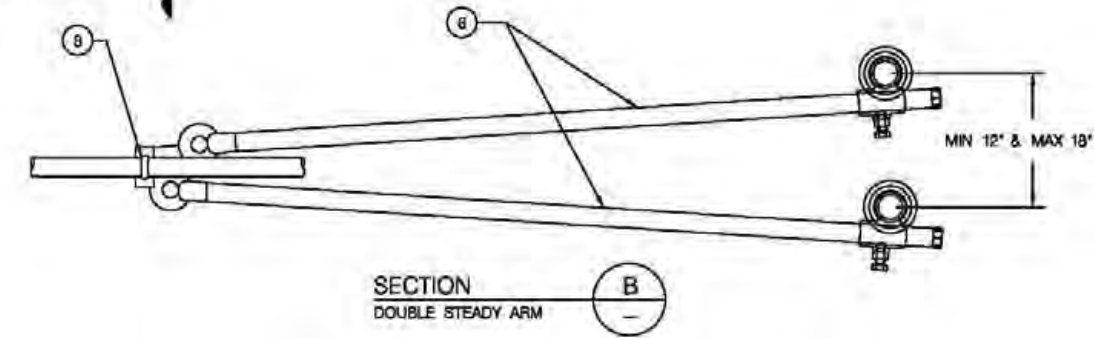
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CA-01H CANTILEVER HEAVY LOAD
MAX RADIAL LOAD FROM 500 TO 1000 LBS

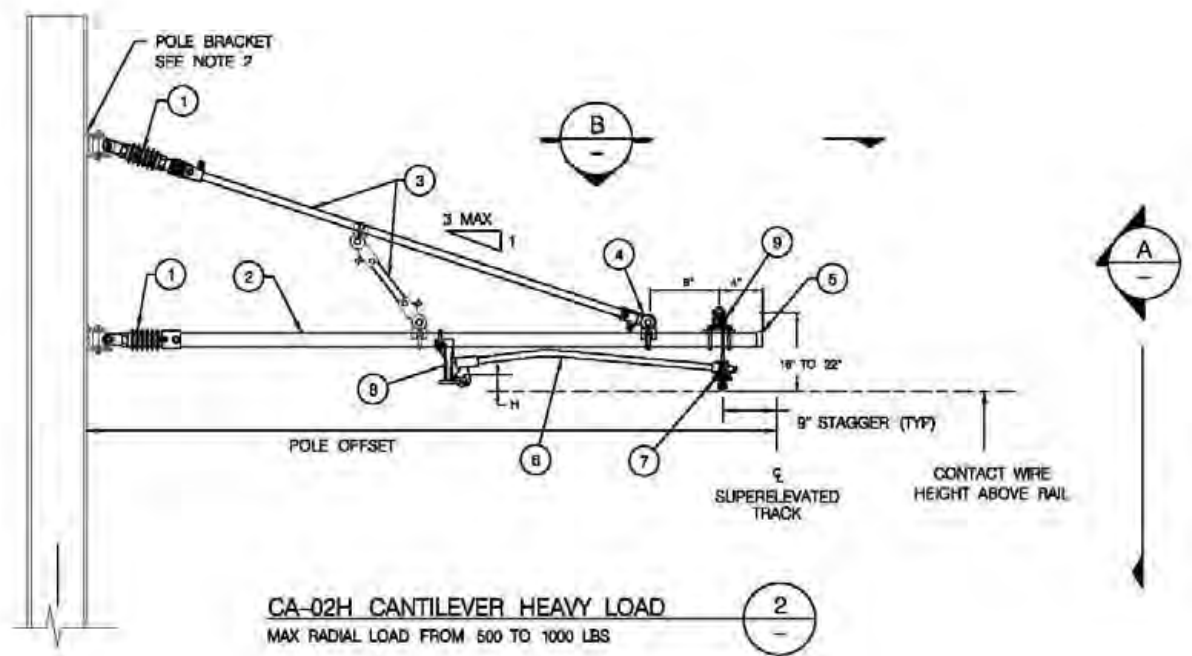


SECTION A
SCALE: NTS



SECTION B
DOUBLE STEADY ARM

- NOTES:**
1. FOR STEADY ARM SHAPE, ALIGNMENT AND CLEARANCE CRITERIA SEE DRAWINGS pTD-0051.
 2. POLE BRACKET ASSEMBLY CALLED OFF SEPARATELY.
 3. CONTRACTOR SHALL DETERMINE COMPONENT DETAILS AND LOADING LIMITS.
 4. CONTRACTOR SHALL FIELD VERIFY POLE OFFSET DIMENSION PRIOR TO FABRICATION OF CANTILEVER.
 5. THE CONTRACT SHALL ENSURE THAT EACH STEADY ARM EQUALLY SHARES THE CW RADIAL LOAD.
 6. THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.



CA-02H CANTILEVER HEAVY LOAD
MAX RADIAL LOAD FROM 500 TO 1000 LBS

QUANTITIES EACH TYPE				
1	1	SUPPORT BRIDLE SUB ASSEMBLY	10	
1	1	SINGLE CONTACT WIRE SUSPENSION	9	
1	1	DROP BRACKET	8	
2	2	CW SWIVEL CLAMP & INSULATOR	7	
2	2	STEADY ARM	6	
1	1	SYNTHETIC CAP FOR 2" PIPE	5	
3	3	EYE CLAMP	4	
2	2	PIPE 1" SCHEDULE 40 GALV. WEND FITTING	3	
1	1	PIPE 2" SCHEDULE 80 GALV.	2	
2	2	CANTILEVER INSULATOR	1	
CA-02H	CA-01H		ITEM NO.	PART NO./REMARKS
ASSEMBLY TYPE		DESCRIPTION		
BILL OF MATERIALS				

D.C. DEPARTMENT OF TRANSPORTATION

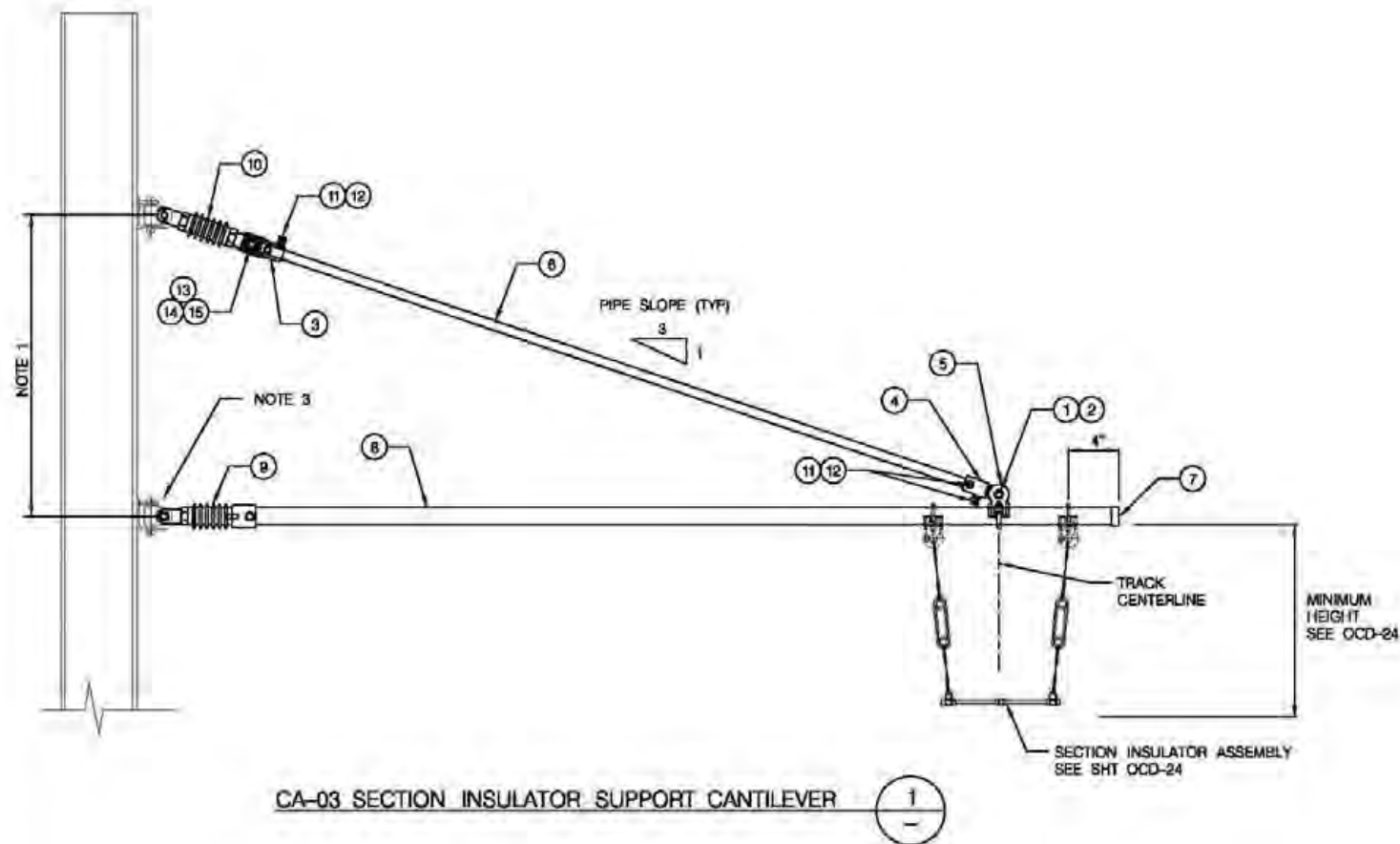
STREETCAR STANDARD DRAWINGS

DATE	APPR.	RECOMMENDED:	<i>Mohammad Akhbar</i> DEPUTY CHIEF ENGINEER
ISSUED:	REVISED	APPROVED:	<i>Rita He</i> CHIEF TRANSPORTATION ENGINEER
		REFERENCE	

OVERHEAD CONTACT SYSTEM
SINGLE CONTACT WIRE HEAVY LOAD
PUSH-OFF AND PULL-OFF CANTILEVER ASSEMBLIES
CA-01H & CA-02H

PROJECT ENG.	
DESIGNED BY	
CHECKED BY	
DRAWN BY	
PROJECT MGR.	CY
DIVISION CHIEF	
DATE	
FILE	
DWG. NO.	CGD-11

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1/20/2012



NOTES:

1. CANTILEVER BRACKET SEPARATION SHALL BE DETERMINED USING THE TYPICAL 1:3 PIPE SLOPE AS A BASIS. IN SOME LOCATIONS A LARGER SLOPE MAY BE USED TO AVOID CONFLICTS WITH OTHER HARDWARE MOUNTED ON THE POLE.
2. CANTILEVER SWIVEL & CLEVIS IS ALLOCATED WITH THE BRACKET ASSEMBLIES.
3. THE BILL OF MATERIAL DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOW. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
4. THE CONTRACTOR SHALL DETERMINE THE LOADING LIMITS.

CA-03 SECTION INSULATOR SUPPORT CANTILEVER

QUANTITIES EACH TYPE	DESCRIPTION	ITEM NO.	PART NO./REMARKS
2	3/4" WASHER-HDG - SMALL PATTERN	15	
1	3/4" HEX NUT HDG	14	
1	3/4" X 2-1/2" HEX BOLT, HDG	13	
4	1/2" X 1-1/4" SS SET SCREW (CUP POINT)	12	
4	1/2" HEX NUT SS	11	
1	TROLLEY SUPPORT TUBE INSULATION FOR 1" PIPE	10	
1	REGISTRATION INSULATION FOR 2" PIPE	9	
AS REQ'D	PIPE 2" SCHEDULE 80 ASTM A 106 B GALVANIZED	8	
1	SYNTHETIC CAP FOR TUBE 2" PVC SOFT BLACK	7	
AS REQ'D	PIPE 1" SCHEDULE 40 ASTM A 106 B GALVANIZED	6	
1	EYE CLAMP FOR 2" PIPE WITH U BOLT, NUTS & WASHERS	5	
1	CLEVIS END FITTING 3/2 (1")	4	
1	SPADE END FITTING 3/2 (1")	3	
1	SPLIT PIN 5X28 CU	2	
1	PIN WITH ROUND HEAD 13X52 (DIN 43161)	1	
CA-03			
ASSEMBLY TYPE	DESCRIPTION	ITEM NO.	PART NO./REMARKS
	BILL OF MATERIALS		

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D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

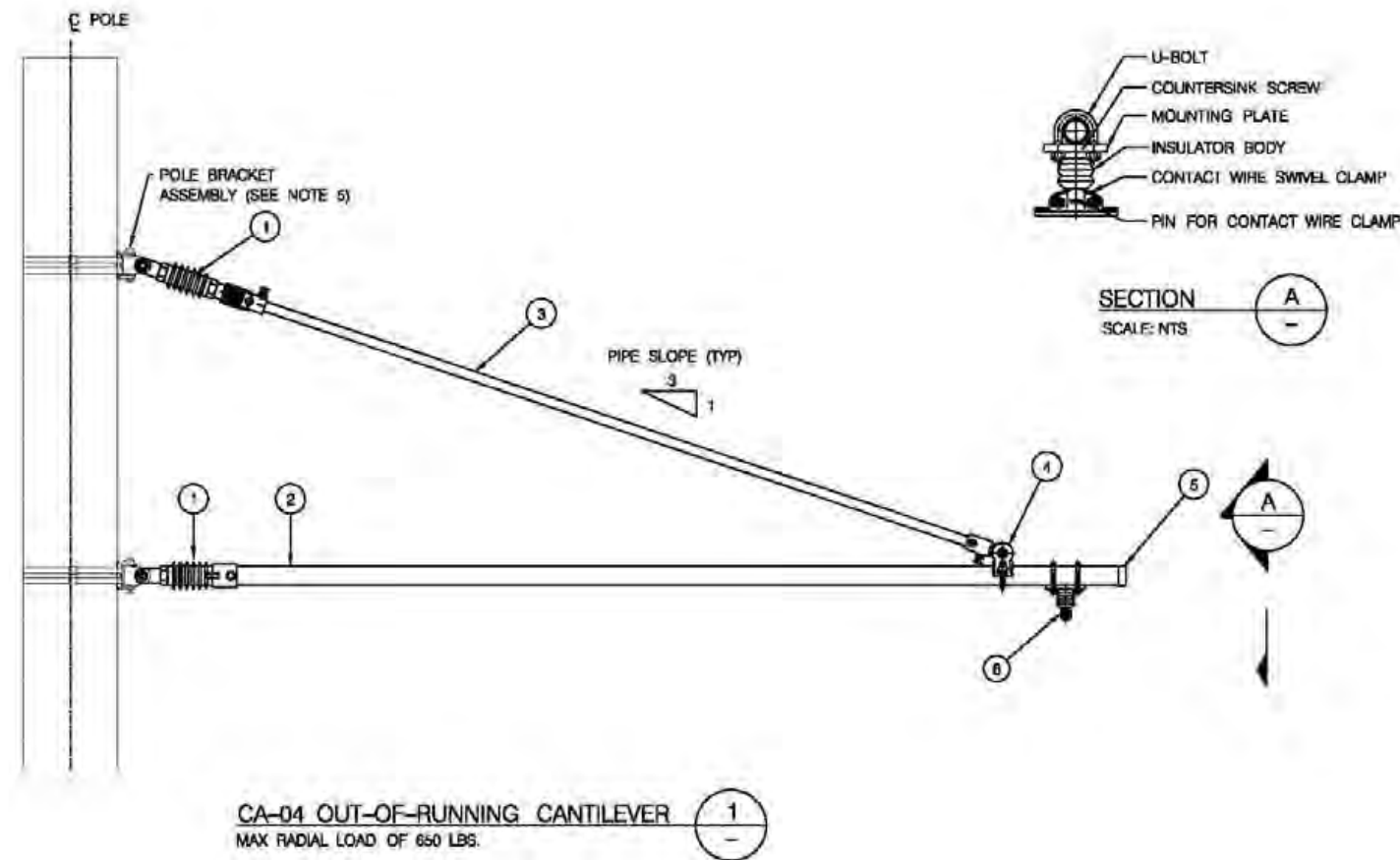
OVERHEAD CONTACT SYSTEM
SINGLE CONTACT WIRE SECTION INSULATOR
SUPPORT CANTILEVER ASSEMBLY - CA-03

DATE	APPR.	ISSUED	REFERENCE

RECOMMENDED: *Muhammad Khan*
DEPUTY CHIEF ENGINEER

APPROVED: *R. J. [Signature]*
CHIEF TRANSPORTATION ENGINEER

PROJECT ENG.	
DESIGNED BY	
CHECKED BY	
DRAWN BY	
PROJECT MGR.	
DIVISION CHIEF	
DATE	
FILE	
DWG. NO.	OCD-24



NOTES:

1. THE CANTILEVER REACH IS EQUAL TO THE DISTANCE BETWEEN THE FACE OF THE POLE AND THE ELEVATED CENTERLINE OF THE TRACK AT CONTACT WIRE HEIGHT LEVEL PLUS THE STAGGER IF AWAY FROM POLE, MINUS THE STAGGER IF TOWARD THE POLE.
2. MAINTAIN MINIMUM 4" CLEARANCE FROM CANTILEVER PIPE TO DYNAMIC PANTOGRAPH CLEARANCE ENVELOPE.
3. POLE BRACKET ASSEMBLIES CALLED OFF SEPARATELY FOR EACH TYPE OF POLE.
4. CONTRACTOR TO FIELD VERIFY POLE OFFSET DIMENSION PRIOR TO FABRICATION OF CANTILEVER PIPES.
5. MAINTAIN MINIMUM 1" CLEARANCE FROM SPAN WIRE BRACKET TO DYNAMIC PANTOGRAPH CLEARANCE ENVELOPE.
6. THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
7. WHERE THE WORKING LOAD CAPABILITIES OF THE CONTRACTORS ASSEMBLIES EXCEED THOSE SHOWN IN THE LOADING TABLE, THE CONTRACTOR SHALL UPDATE THE TABLE.

QUANTITIES EACH TYPE			
1	SINGLE CONTACT WIRE SUSPENSION	6	
1	SYNTHETIC CAP FOR 2" PIPE	5	
1	EYE CLAMP	4	
1	PIPE 1" SCHEDULE 40 GALV. W/END FITTING	3	
1	PIPE 2" SCHEDULE 80 GALV.	2	
2	CANTILEVER INSULATOR	1	
CA-04		ITEM NO.	PART NO./REMARKS
ASSEMBLY TYPE	DESCRIPTION		
BILL OF MATERIALS			

D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

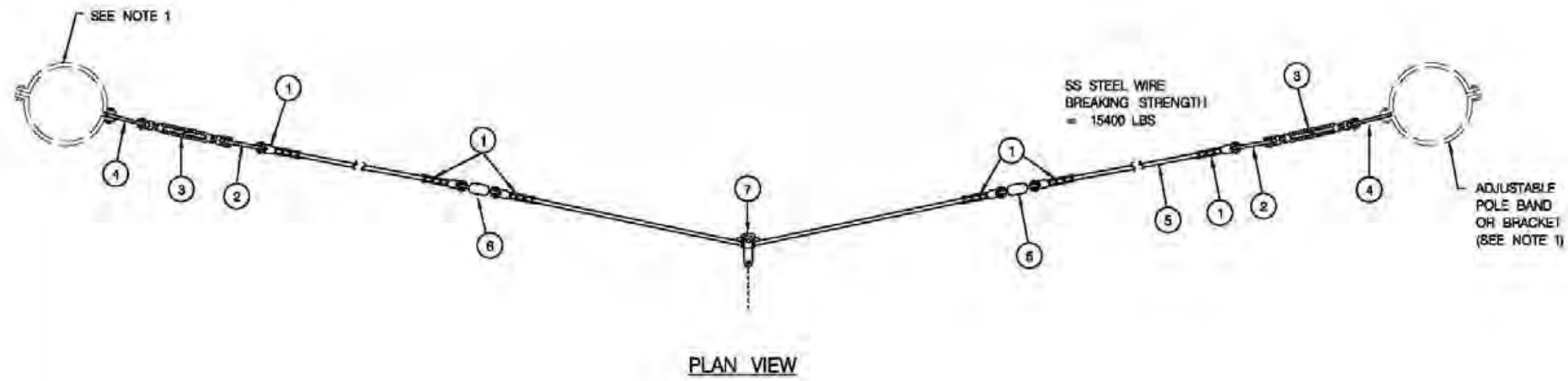
OVERHEAD CONTACT SYSTEM
SINGLE CONTACT WIRE OUT-OF-RUNNING
CANTILEVER ASSEMBLY - CA-04

RECOMMENDED: *Muhammad Khaid*
DEPUTY CHIEF ENGINEER

APPROVED: *[Signature]*
CHIEF TRANSPORTATION ENGINEER

DATE	APPR.	
ISSUED:	REVISED	REFERENCE

PROJECT ENG.	
DESIGNED BY	
CHECKED BY	
DRAWN BY	
PROJECT MGR.	CY
DIVISION CHIEF	
DATE	
FILE	
DWG. NO.	CCD-15

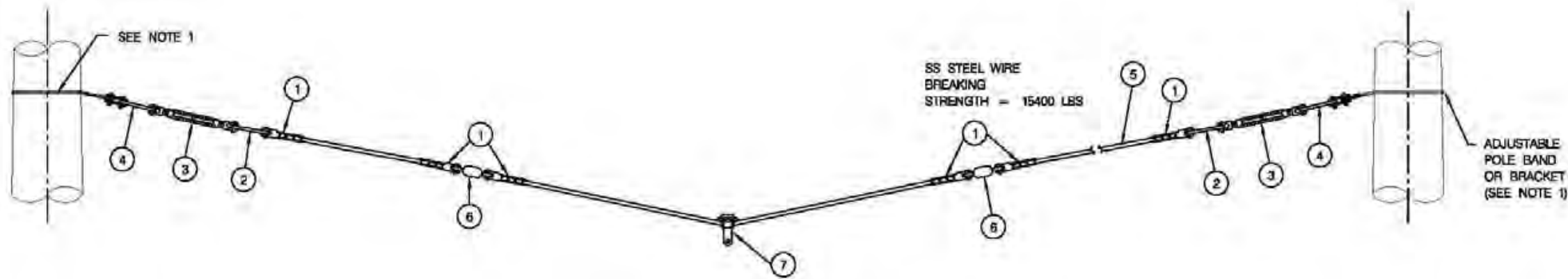


PLAN VIEW

ALONG TRACK BRIDLE WIRE - BD01, BD02 (1)
 BD01 - ONE WIRE CLAMP FOR SINGLE PULL-OFF (AS SHOWN)
 BD02 - TWO WIRE CLAMPS FOR TWO PULL-OFFS

NOTES:

1. POLE BANDS AND POLE BRACKETS SHALL BE CALLED OFF SEPARATELY.
2. CONTRACTOR SHALL PROVIDE WORKING LOAD CAPACITIES FOR THESE ASSEMBLIES.
3. THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.



ELEVATION

BRIDLE WIRE SUPPORT - BD03 (2)
 FOR SUPPORTING SINGLE CONTACT SYSTEM SECTION INSULATOR, IN SPAN INSULATION, TO BE DETERMINED TO SUIT ADJACENT WIRING AND FITTINGS

QUANTITIES EACH TYPE			DESCRIPTION	ITEM NO.	PART NO./REMARKS
1	2	1			
1	2	1	WIRE CLAMP OR BULL RING	7	
2	2	2	INSULATOR	6	
AS REQ'D	AS REQ'D	AS REQ'D	SS STEEL WIRE	5	
2	2	2	LINK	4	
2	2	2	TURNBUCKLE	3	
2	2	2	LINK	2	
6	8	6	STRAIN CLAMP	1	
BD03	BD02	BD01			
ASSEMBLY TYPE			DESCRIPTION	ITEM NO.	PART NO./REMARKS
BILL OF MATERIALS					

D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

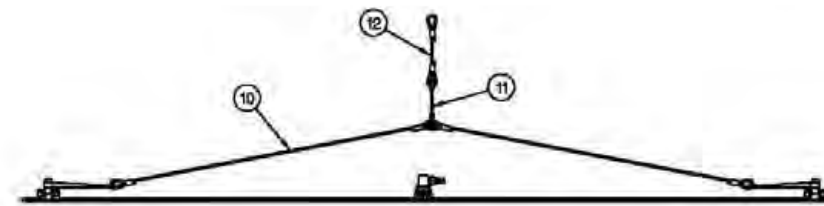
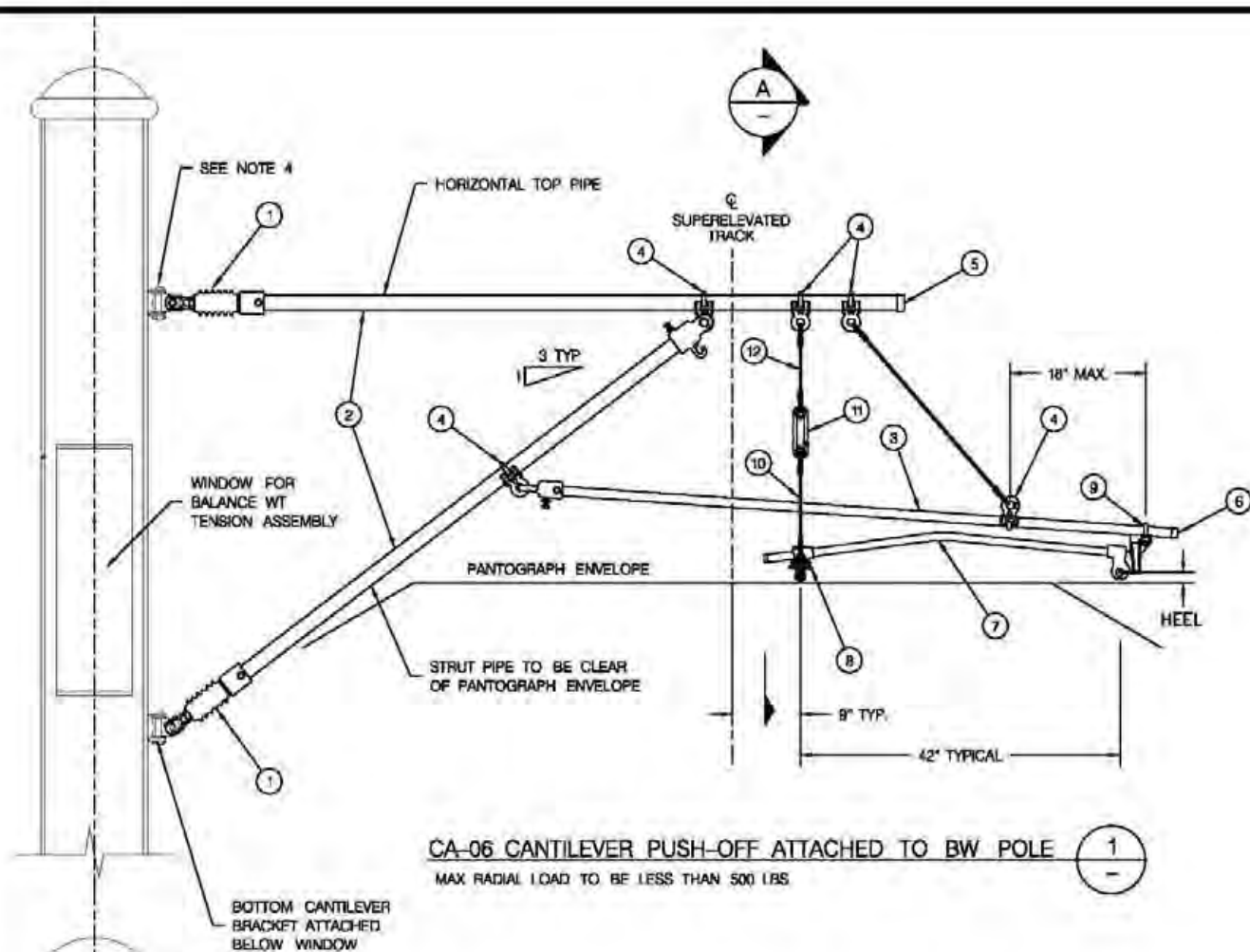
OVERHEAD CONTACT SYSTEM
 BRIDLE WIRE ASSEMBLIES
 TYPES BD-1, BD-2 AND BD-3

RECOMMENDED: *Mohamed Elabd*
 DEPUTY CHIEF ENGINEER

APPROVED: *[Signature]*
 CHIEF TRANSPORTATION ENGINEER

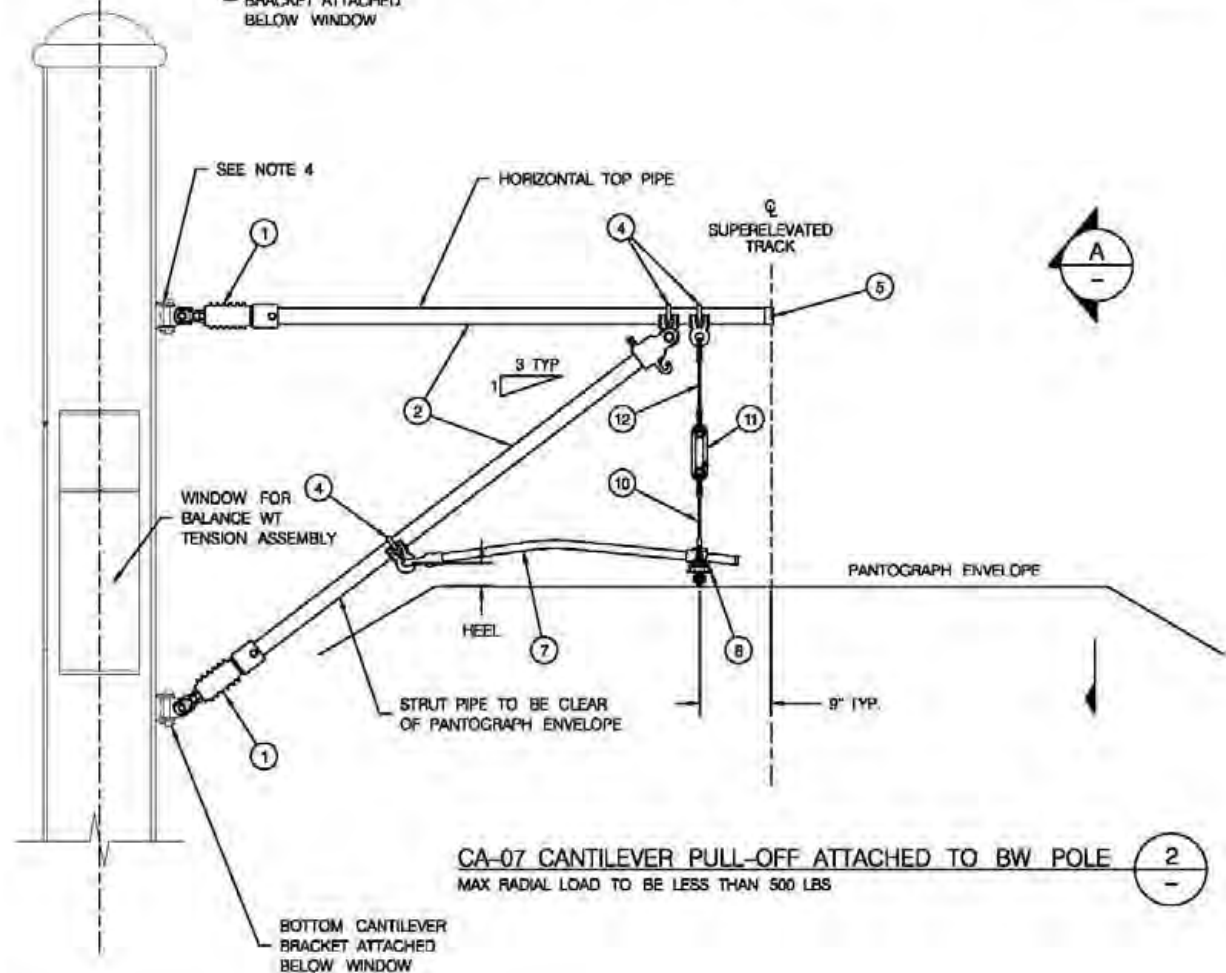
DATE	APPR.	REFERENCE
ISSUED:		

PROJECT ENG.	
DESIGNED BY	
CHECKED BY	
DRAWN BY	
PROJECT MGR.	
DIVISION CHIEF	
DATE	
FILE	
DWG. NO.	OGD-14



SECTION A
SCALE: NTS

- NOTES:
1. FOR STEADY ARM SHAPE, ALIGNMENT AND CLEARANCE CRITERIA SEE DRAWINGS OCT-10.
 2. POLE BRACKET ASSEMBLY CALLED OFF SEPARATELY.
 3. CONTRACTOR SHALL DETERMINE COMPONENT DETAILS AND LOADING LIMITS.
 4. CONTRACTOR SHALL FIELD VERIFY POLE OFFSET DIMENSION PRIOR TO FABRICATION OF CANTILEVER.
 5. THE CONTRACT SHALL ENSURE THAT EACH STEADY ARM EQUALLY SHARES THE CW RADIAL LOAD.
 6. THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.



QUANTITIES EACH TYPE				
-	2	HANGER ASSEMBLY	13	
-	2	LOOP INSULATOR	12	
1	1	SUPPORT BRIDLE SUB ASSEMBLY	11	
-	1	DROP BRACKET	10	
1	1	CW SWIVEL CLAMP & INSULATOR	9	
1	1	STEADY ARM	8	
-	1	SYNTHETIC CAP FOR 1-1/4" PIPE	7	
1	1	SYNTHETIC CAP FOR 2" PIPE	6	
3	5	EYE CLAMP	5	
-	1	PIPE 1-1/4" SCHEDULE 40 GALV. W/END FITTING	4	
2	2	PIPE 2" SCHEDULE 80 GALV.	3	
2	2	CANTILEVER INSULATOR	2	
CA-07	CA-06		1	
ASSEMBLY TYPE		DESCRIPTION	ITEM NO.	PART NO./REMARKS

BILL OF MATERIALS

D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

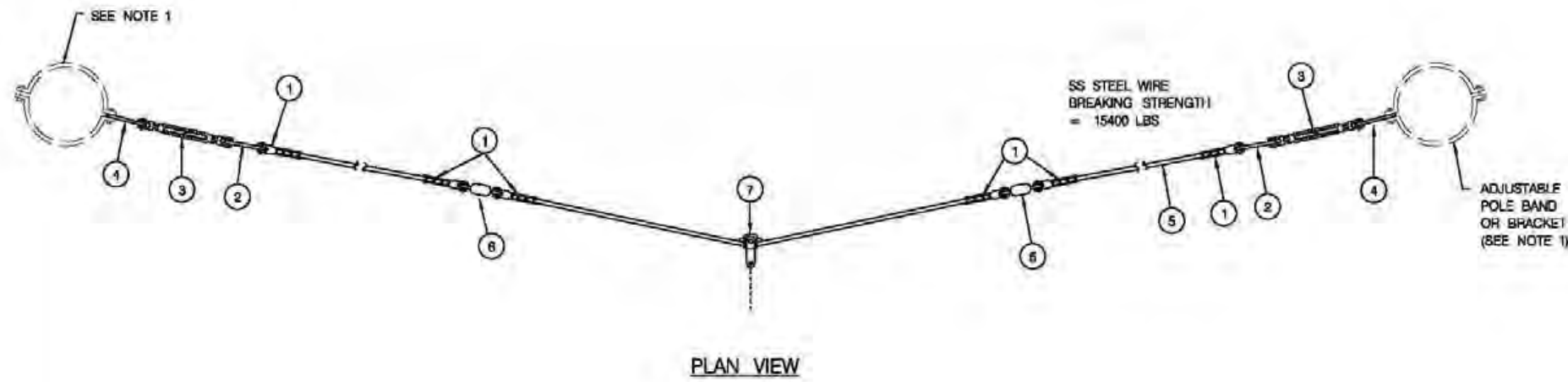
OVERHEAD CONTACT SYSTEM
SINGLE CONTACT WIRE PUSH & PULL CANTILEVER
ATTACHED TO BALANCE WEIGHT POLE
CA-06 & CA-07

RECOMMENDED: *Muhammad Khalid*
DEPUTY CHIEF ENGINEER

APPROVED: *R. P. The*
CHIEF TRANSPORTATION ENGINEER

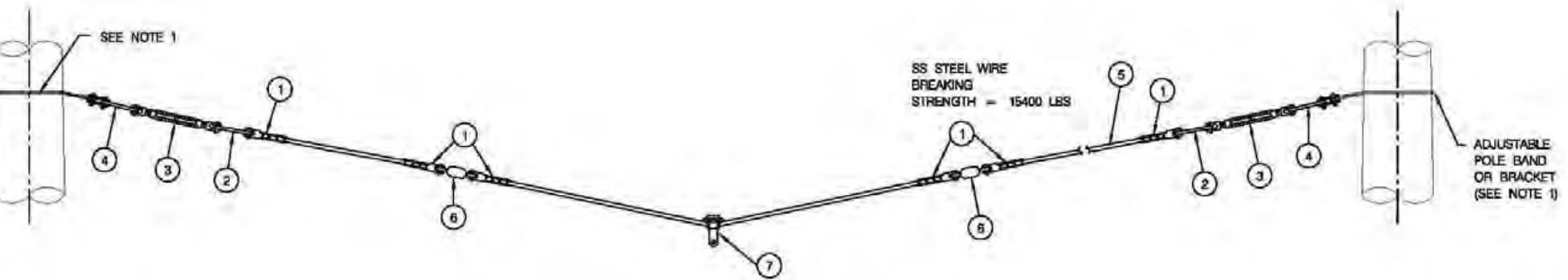
DATE	APPR.	
ISSUED:	REVISED	REFERENCE

PROJECT ENG.	
DESIGNED BY	
CHECKED BY	
DRAWN BY	
PROJECT MGR.	CY
DIVISION CHIEF	
DATE	
FILE	
DWG. NO.	OGD-15



PLAN VIEW

ALONG TRACK BRIDLE WIRE - BD01, BD02 (1)
 BD01 - ONE WIRE CLAMP FOR SINGLE PULL-OFF (AS SHOWN)
 BD02 - TWO WIRE CLAMPS FOR TWO PULL-OFFS



ELEVATION

BRIDLE WIRE SUPPORT - BD03 (2)
 FOR SUPPORTING SINGLE CONTACT SYSTEM SECTION INSULATOR,
 IN SPAN INSULATION TO BE DETERMINED TO SUIT ADJACENT
 WIRING AND FITTINGS

NOTES:

1. POLE BANDS AND POLE BRACKETS SHALL BE CALLED OFF SEPARATELY.
2. CONTRACTOR SHALL PROVIDE WORKING LOAD CAPACITIES FOR THESE ASSEMBLIES.
3. THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.

QUANTITIES EACH TYPE			DESCRIPTION	ITEM NO.	PART NO./REMARKS
1	2	1			
1	2	1	WIRE CLAMP OR BULL RING	7	
2	2	2	INSULATOR	6	
AS REQ'D	AS REQ'D	AS REQ'D	SS STEEL WIRE	5	
2	2	2	LINK	4	
2	2	2	TURNBUCKLE	3	
2	2	2	LINK	2	
6	8	6	STRAIN CLAMP	1	
BD03	BD02	BD01			
ASSEMBLY TYPE			DESCRIPTION	ITEM NO.	PART NO./REMARKS
BILL OF MATERIALS					

D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

OVERHEAD CONTACT SYSTEM
 BRIDLE WIRE ASSEMBLIES
 TYPES BD-1, BD-2 AND BD-3

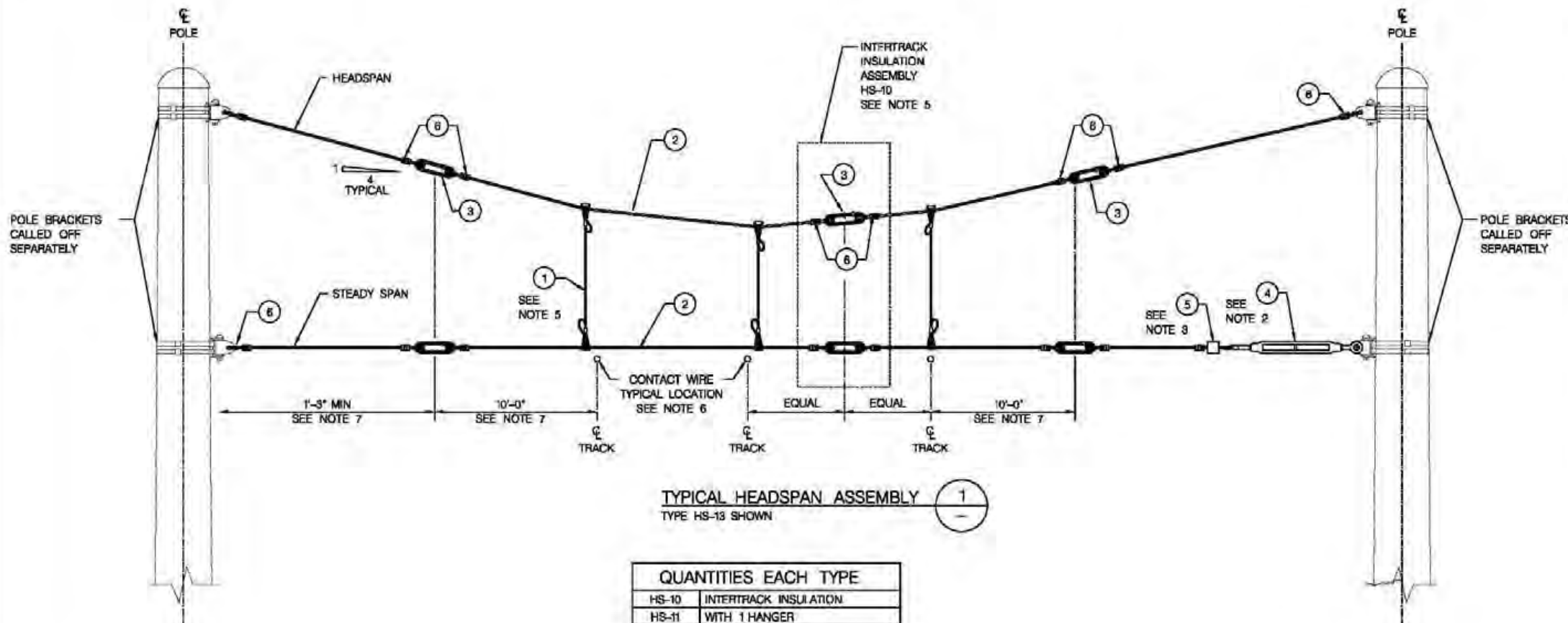
RECOMMENDED: *Muhammad Khalid*
 DEPUTY CHIEF ENGINEER

APPROVED: *[Signature]*
 CHIEF TRANSPORTATION ENGINEER

DATE	APPR.	
ISSUED:	REVISED	REFERENCE

PROJECT ENG.	
DESIGNED BY	
CHECKED BY	
DRAWN BY	
PROJECT MGR.	CY
DIVISION CHIEF	
DATE	
FILE	
DWG. NO.	OCD-18

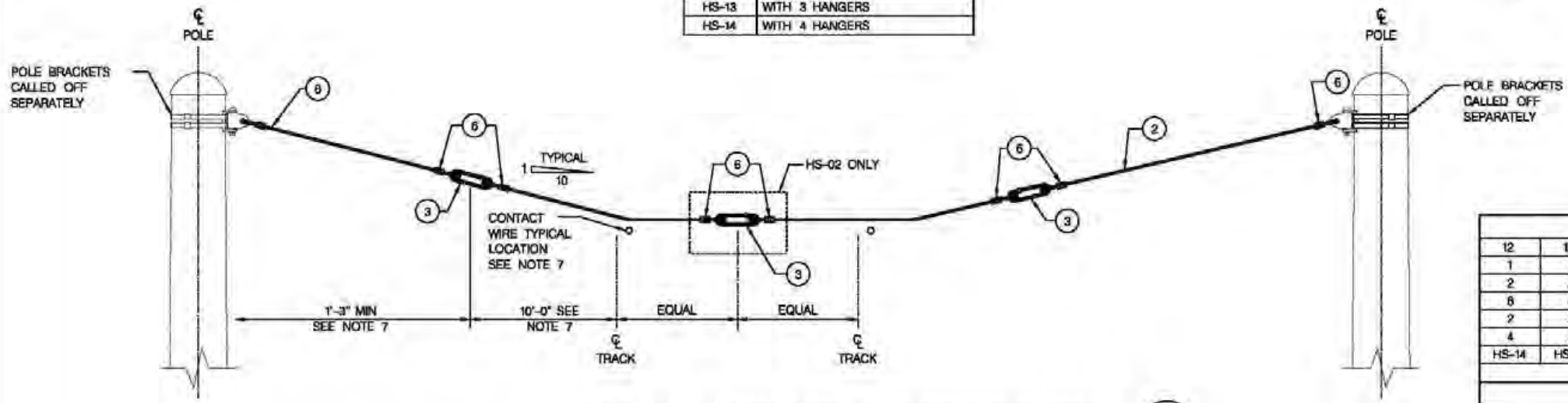
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TYPICAL HEADSPAN ASSEMBLY 1
TYPE HS-13 SHOWN

QUANTITIES EACH TYPE	
HS-10	INTERTRACK INSULATION
HS-11	WITH 1 HANGER
HS-12	WITH 2 HANGERS
HS-13	WITH 3 HANGERS
HS-14	WITH 4 HANGERS

- NOTES:**
1. THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
 2. LOCATE TURNBUCKLE ON THE SLACKER SIDE OF THE SPAN WIRES THIS IS TYPICALLY INSIDE OF CURVES.
 3. A CROSS SPAN WIRE VIBRATION DAMPER IS REQUIRED ONLY IF ONE OR BOTH ENDS OF THE CROSS SPAN WIRE ARE ATTACHED TO A BUILDING, A MULTIPLE POLE HEADSPAN STRUCTURE, CONCRETE POLE, OR OTHER RIGID SUPPORT. THE SPRING IS TO BE LOCATED ADJACENT TO THE TURNBUCKLE.
 4. TYPICALLY LOCATE A SPAN WIRE HANGER ABOVE OR NEAR EACH ATTACHED CONTACT WIRE SUPPORT.
 5. INTERTRACK INSULATION ASSEMBLIES (HS-10) ARE REQUIRED TO BE INSTALLED BETWEEN TRACKS WHERE CONTACT WIRES ARE FED ELECTRICALLY THROUGH DIFFERENT SWITCHES, OR HAVE UNINSULATED WIRE SUPPORT ASSEMBLIES. SEE SECTIONALIZING DIAGRAMS AND OCS LAYOUT PLAN.
 6. THE CONTACT WIRE SHALL BE ATTACHED TO THESE SPAN WIRES USING INSULATED CONTACT WIRE SUPPORT AND REGISTRATION ASSEMBLIES. SEE DRAWING OGD-19.
 7. SECOND LEVEL INSULATION TO BE LOCATED 10 FT FROM TRACK CENTERLINE EXCEPT IN CASES WHEN THE POLE FACE IS LESS THAN 11'-3" FROM TRACK CENTERLINE, A MINIMUM OF 1'-3" FROM FACE OF POLE IS REQUIRED.



TYPICAL SINGLE CONTACT SPAN WIRE SUPPORT ASSEMBLIES 2
ASSEMBLY TYPE HS-01 FOR ONE OR TWO TRACKS
ASSEMBLY TYPE HS-02 FOR TWO TRACK WITH INTERTRACK INSULATION

QUANTITIES EACH TYPE							DESCRIPTION	ITEM NO	PART NO/ REMARKS
12	12	12	12	4	8	6			
12	12	12	12	4	8	6	COMPRESSION CONNECTOR	6	
1	1	1	1	-	-	-	VIBRATION DAMPER	5	SEE NOTE 4
2	2	2	2	-	1	1	TURNBUCKLE	4	SEE NOTE 3
8	8	8	8	2	3	2	INSULATOR, STRAIN TYPE	3	
2	2	2	2	-	1	1	SS STEEL WIRE, 7x19 g ¹ TYP	2	LENGTH AS REQ'D
4	3	2	1	-	-	-	HANGER ASSEMBLY	1	
HS-14	HS-13	HS-12	HS-11	HS-10	HS-02	HS-01	ASSEMBLY TYPE		
							BILL OF MATERIALS		

D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

OVERHEAD CONTACT SYSTEM
HEADSPAN AND CROSS SPAN SUPPORT
ASSEMBLIES TYPES HS

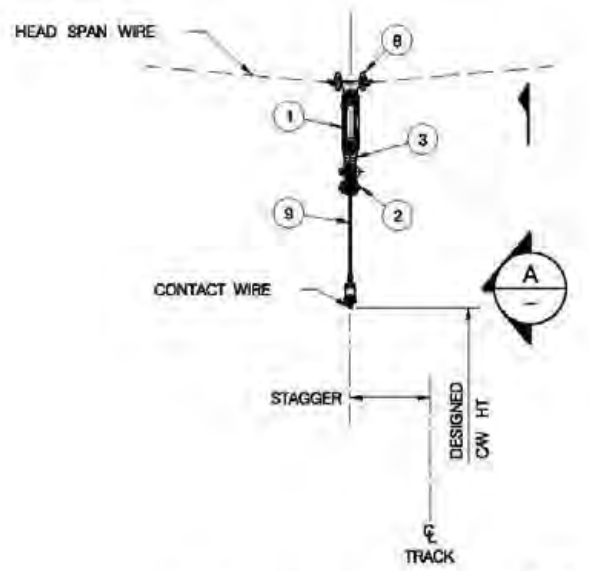
RECOMMENDED: *Mohammed Khalid*
DEPUTY CHIEF ENGINEER

APPROVED: *Robert J. ...*
CHIEF TRANSPORTATION ENGINEER

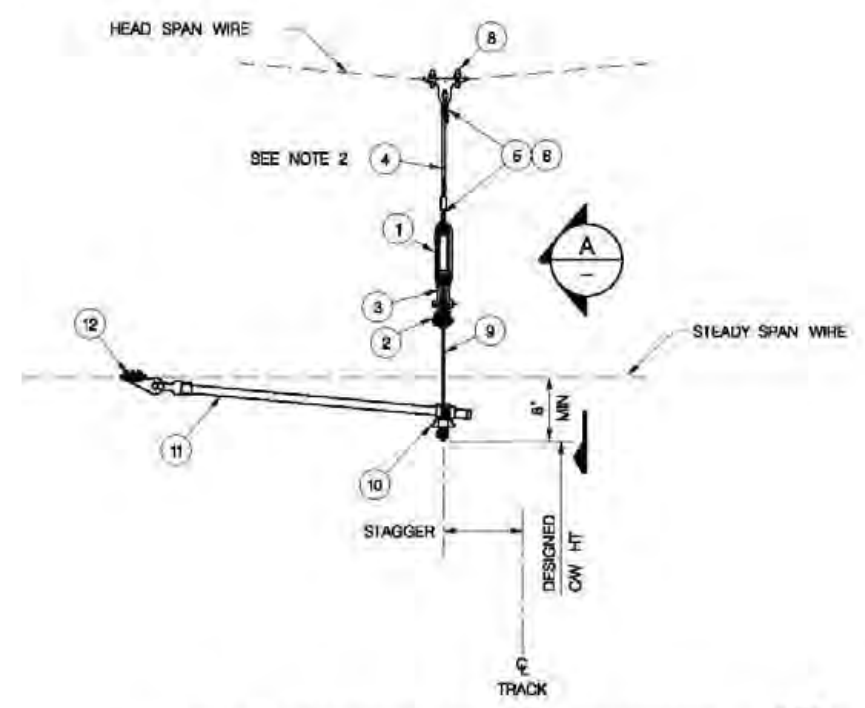
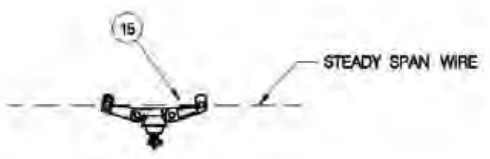
DATE	APPR	REFERENCE
ISSUED:		

PROJECT ENG	
DESIGNED BY	
CHECKED BY	
DRAWN BY	
PROJECT MGR.	CY
DIVISION CHIEF	
DATE	
FILE	
DWG. NO.	OGD-19

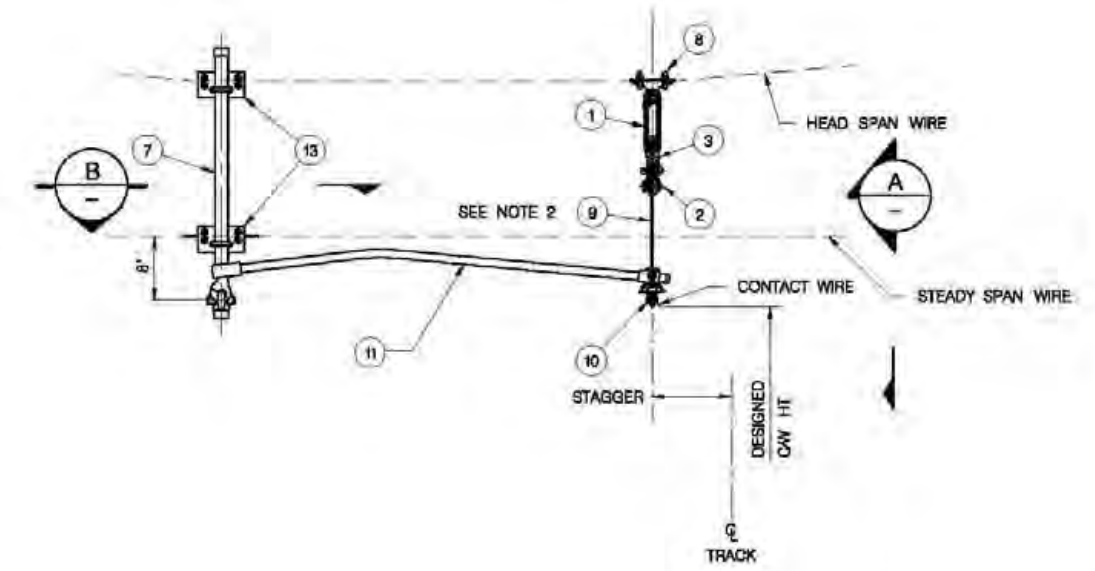
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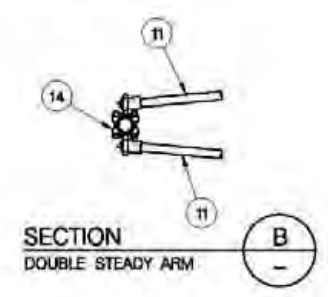
LIGHT LOAD CW SUPPORT (1)
ASSEMBLY HR-1L
UP TO 200 LB RADIAL LOAD



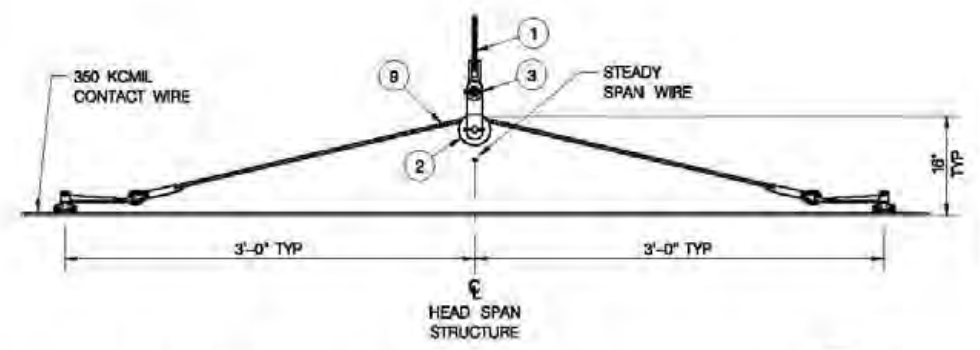
MEDIUM LOAD CW SUPPORT & REGISTRATION (3)
ASSEMBLY HR-1M
UP TO 500 LB RADIAL LOAD



HEAVY LOAD SUPPORT AND REGISTRATION (4)
ASSEMBLY HR-1H
UP TO 1000 LB CW RADIAL LOAD WHEN



LIGHT LOAD CW SUPPORT & REGISTRATION (2)
ASSEMBLY HR-2L
UP TO 200 LB RADIAL LOAD



SECTION (A)
SCALE: NTS (SHOWN WITH STEADY ARM OMITTED FOR CLARITY)

QUANTITIES EACH TYPE				DESCRIPTION	ITEM NO.	PART NO. / REMARKS
HR-1H	HR-1M	HR-2L	HR-1L			
-	-	1	-	DOUBLE EYE CLAMP	15	
1	-	-	-	DOUBLE EYE CLAMP	14	
1	-	-	-	CLAMP FOR CROSS SPAN DROP TUBE	13	
-	1	-	-	CROSS SPAN EYE CLAMP	12	
2	1	-	-	STEADY ARM	11	
2	1	-	-	CW SWIVEL CLAMP & INSULATOR	10	
1	1	-	1	SUPPORT BRIDLE SUB ASSEMBLY	9	
1	1	-	1	WIRE SUSPENSION CLAMP	8	
1	-	-	-	1-1/4" PIPE SCHED 80 GALV.	7	
-	2	-	-	THIMBLE, SST	6	
-	2	-	-	COMPRESSED SLEEVE	5	
-	1	-	-	HANGER WIRE	4	LENGTH AS REQ'D
1	1	-	1	CLEVIS-CLEVIS LINK	3	
1	1	-	1	BRIDLE PULLEY	2	
1	1	-	1	INSULATOR	1	
ASSEMBLY TYPE				DESCRIPTION	ITEM NO.	PART NO. / REMARKS

RECOMMENDED: *Mohammed El-Had*
DEPUTY CHIEF ENGINEER

APPROVED: *[Signature]*
CHIEF TRANSPORTATION ENGINEER

DATE: _____ APPR: _____

REVISED: _____

ISSUED: _____

REFERENCE: _____

D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

OVERHEAD CONTACT SYSTEM
HEADSPAN REGISTRATION ASSEMBLIES
AUTO-TENSIONED SINGLE CONTACT WIRE
TYPES HR

PROJECT ENG: _____
DESIGNED BY: _____
CHECKED BY: _____
DRAWN BY: _____
PROJECT MGR: CY

DIVISION CHIEF: _____
DATE: _____
FILE: _____
DWG. NO. OCD-18

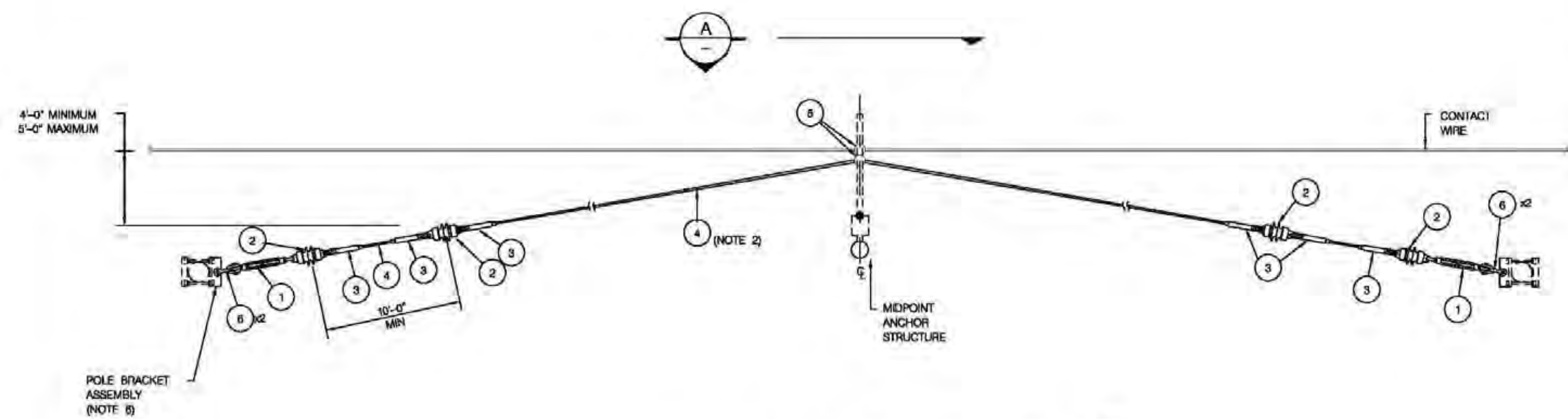
NOTES:

1. THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
2. SUPPORTING HANGERS FOR STEADY SPAN WIRE OR HEAD SPAN WIRE TO BE CALLED OUT SEPARATELY FROM HEADSPAN SUPPORT ASSEMBLIES SHOWN ON DWG OCD-18.

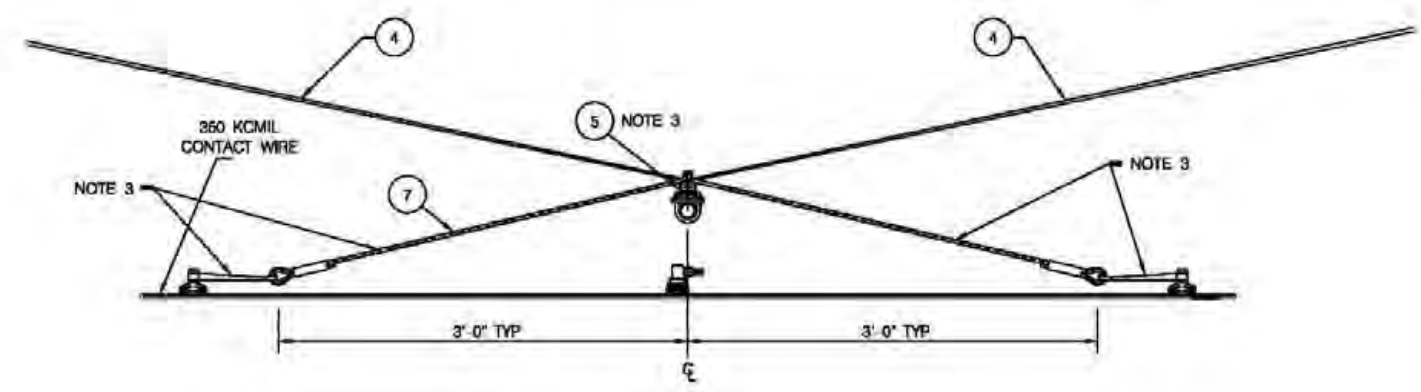
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 1/20/2012

NOTES:

1. ALL CLAMPS, WIRES AND FITTINGS SHALL HAVE SUFFICIENT STRENGTH TO RESTRAIN THE CONTACT WIRE ON ONE SIDE UNDER BROKEN CONTACT WIRE CONDITIONS.
2. MIDPOINT SPAN GUY WIRE TO BE STAINLESS STEEL STRAND OR HD COPPER STRAND CAPABLE OF HOLDING THE SINGLE CONTACT WIRE SYSTEM WHEN AT HIGHEST TENSIONS SHOWN ON OCT-11.
3. CONTACT WIRE RESTRAINT TO BE HD COPPER STRAND CAPABLE OF HOLDING CONTACT WIRE WHEN AT THE HIGHEST TENSIONS SHOWN ON OCT-11.
4. THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
5. REFER TO TYPICAL MIDPOINT ANCHOR ARRANGEMENT DRAWING OCD-06 FOR ADDITIONAL REQUIREMENTS FOR DIMENSIONS AND ERECTION TENSIONS.
6. POLE BRACKET ASSEMBLIES CALLED OFF SEPARATELY.



MIDPOINT ASSEMBLY ON CROSS SPAN/CANTILEVER
ASSEMBLY MP-01



SECTION A
SCALE: NTS

QUANTITIES EACH TYPE			
1	SUPPORT BRIDLE	7	
4	SHACKLE	8	
2	SUSPENSION INSULATED CLAMP	5	(NOTE 1 & 3)
AS REQ'D	SPAN GUY WIRE	4	(NOTE 2)
6	WIRE DEADEND	3	
4	STRAIN INSULATOR	2	
2	TURNBUCKLE	1	
MP-01			
ASSEMBLY TYPE	DESCRIPTION	ITEM NO.	PART NO./REMARKS
BILL OF MATERIALS			

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DATE	APPR.	
ISSUED:	REVISED	REFERENCE

RECOMMENDED: *Muhammad Khalid*
DEPUTY CHIEF ENGINEER

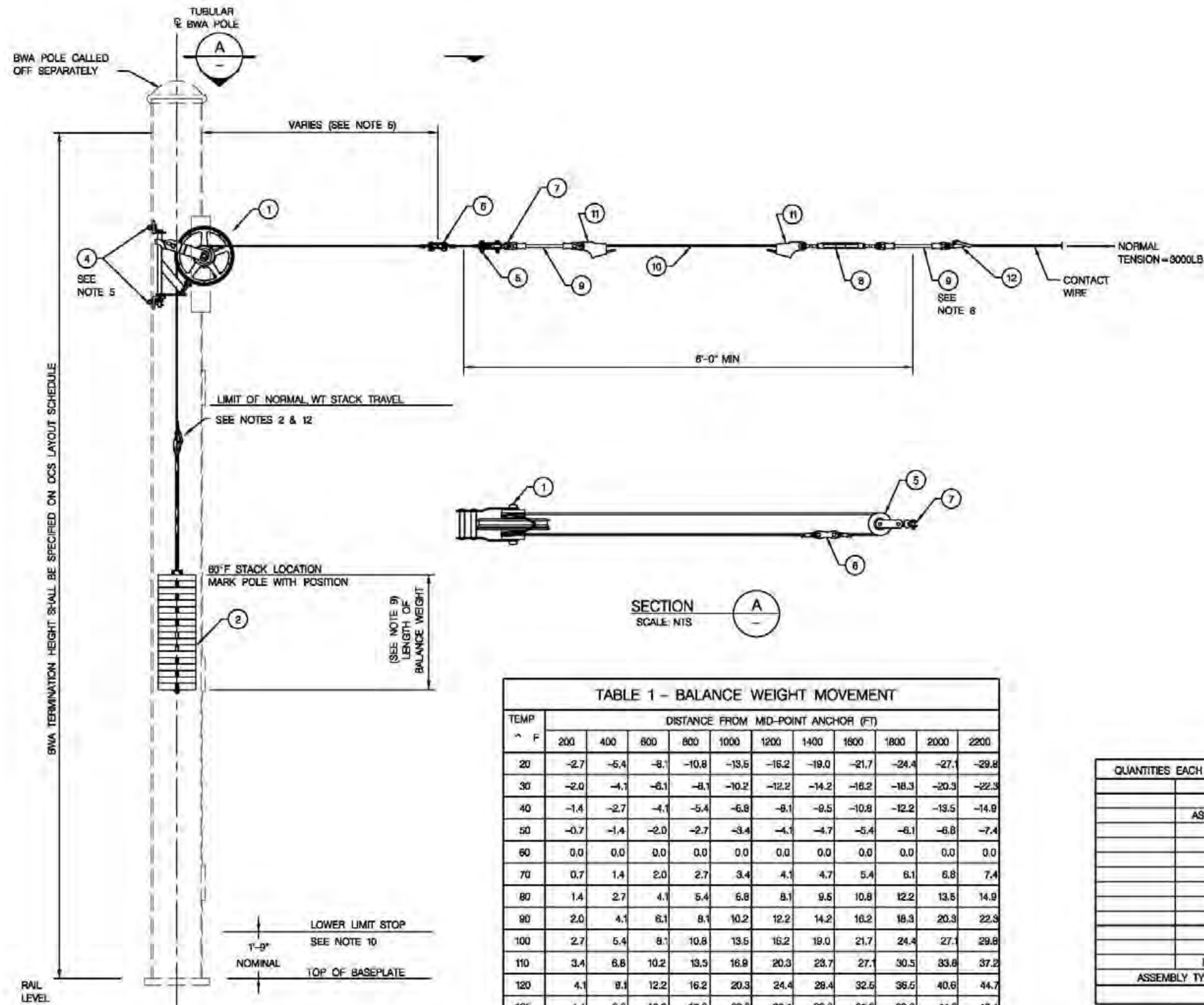
APPROVED: *[Signature]*
CHIEF TRANSPORTATION ENGINEER

D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

OVERHEAD CONTACT SYSTEM
MIDPOINT GUY ASSEMBLY
TYPE MP-1

PROJECT ENG.	PROJECT MGR.
DESIGNED BY	CY
CHECKED BY	
DRAWN BY	
DIVISION CHIEF	
DATE	
FILE	
DWG. NO.	OCD-06



NOTES:

1. THE ASSEMBLY SHALL APPLY A NORMAL TENSION OF 3000 LB CONTACT WIRE.
2. PROVIDE SUFFICIENT TAIL WIRE FOR FIELD ADJUSTMENT. THE EXCESS TAIL WIRE SHALL BE CUT OFF ONLY AFTER FINAL ADJUSTMENT.
3. TENSION ASSEMBLY SHALL HAVE A RATIO OF 1:3. TENSION ASSEMBLY SHALL BE DESIGNED SO THAT IT WILL BECOME LOCKED IN CASE OF A TENSION RELIEF.
4. AFTER FINAL ADJUSTMENT OF WIRING, TURNBUCKLES SHALL BE EXTENDED 6" MINIMUM FROM MINIMUM LENGTH.
5. MOUNTING BRACKET SHALL BE FURNISHED TO PERMIT ALONG TRACK AND ACROSS TRACK ADJUSTMENTS FOR PLUMBING OF BALANCE WEIGHT GUIDES.
6. CONTRACTOR SHALL FURNISH THIS DIMENSION, BASED ON PHYSICAL AND MECHANICAL PROPERTIES OF THE TENSIONING WHEEL, BALANCE WEIGHT ASSEMBLY AND THE ALONG TRACK MOVEMENT OF THE OCS.
7. THE INFORMATION FURNISHED IN TABLE 1 IS BASED ON A 1:3 RATIO PULLEY SYSTEM AND IS PROVIDED FOR REFERENCE ONLY. CONTRACTOR SHALL DETERMINE THE ACTUAL BALANCE WEIGHT MOVEMENT, BASED ON ACTUAL BALANCE WEIGHT ASSEMBLIES PROVIDED.
8. THE OW TAIL WIRE INSULATOR IS TO BE NO CLOSER THAN 4'-0" TO SUPERELEVATED TRACK CENTERLINE.
9. CONTRACTOR SHALL DETERMINE THE LENGTH OF THE BALANCE WEIGHT STACK, BASED ON THE REQUIRED OVERALL WEIGHT AND SIZE OF EACH BALANCE WEIGHT. MAXIMUM WIDTH OF THE WEIGHT SHALL FIT WITHIN THE STANDARD TUBULAR BWA POLE.
10. THE BALANCE WEIGHT SHALL MOVE FREELY WITHIN THE TEMPERATURE RANGE OF 5° F TO 125° F, AND WITHIN THE SPACE BETWEEN TEMPERATURE STOPS. TEMPERATURE STOP BOLTS SHALL BE INSTALLED TO PREVENT BALANCE WEIGHT MOVEMENT BEYOND THE SET TEMPERATURE RANGE.
11. THE MOUNTING ARRANGEMENT OF BALANCE WEIGHT ASSEMBLY AS SHOWN IS TYPICAL. THE CONTRACTOR SHALL DEVELOP THE DESIGN BASED ON THE EQUIPMENT ACTUALLY USED AND THE MANUFACTURER'S RECOMMENDATIONS AS APPROVED BY THE DISTRICT.
12. THE CONTRACTOR SHALL INSURE THAT NO INTERFERENCE OCCURS BETWEEN ALL POLE CLAMPS AND BRACKETS AND THE BWA-WIRE ROPE TERMINATIONS FOR THEIR TOTAL VERTICAL TRAVEL. PROVIDE A MINIMUM OF 2" OF FREE SPACE TO ALL MOVING WIRE COMPONENTS.
13. THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
14. THE CONNECTION OF THE BALANCE WEIGHT ASSEMBLY TO THE TENSIONING SHEAVE BRACKET SHALL BE DESIGNED TO ALLOW UNRESTRICTED MOVEMENT OF THE SHEAVE ASSEMBLY. THE SHEAVE ASSEMBLY SHALL BE ALIGNED TOWARDS THE REGISTRATION POINT OF THE OUT-OF-RUNNING CANTILEVER.

TABLE 1 - BALANCE WEIGHT MOVEMENT

TEMP ° F	DISTANCE FROM MID-POINT ANCHOR (FT)										
	200	400	600	800	1000	1200	1400	1600	1800	2000	2200
20	-2.7	-5.4	-8.1	-10.8	-13.5	-16.2	-19.0	-21.7	-24.4	-27.1	-29.8
30	-2.0	-4.1	-6.1	-8.1	-10.2	-12.2	-14.2	-16.2	-18.3	-20.3	-22.3
40	-1.4	-2.7	-4.1	-5.4	-6.8	-8.1	-9.5	-10.8	-12.2	-13.5	-14.9
50	-0.7	-1.4	-2.0	-2.7	-3.4	-4.1	-4.7	-5.4	-6.1	-6.8	-7.4
60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
70	0.7	1.4	2.0	2.7	3.4	4.1	4.7	5.4	6.1	6.8	7.4
80	1.4	2.7	4.1	5.4	6.8	8.1	9.5	10.8	12.2	13.5	14.9
90	2.0	4.1	6.1	8.1	10.2	12.2	14.2	16.2	18.3	20.3	22.3
100	2.7	5.4	8.1	10.8	13.5	16.2	19.0	21.7	24.4	27.1	29.8
110	3.4	6.8	10.2	13.5	16.9	20.3	23.7	27.1	30.5	33.9	37.2
120	4.1	8.1	12.2	16.2	20.3	24.4	28.4	32.5	36.5	40.6	44.7
125	4.4	8.8	13.2	17.8	22.0	26.4	30.8	35.2	39.6	44.0	48.4

DIMENSION GIVEN IN INCHES SEE NOTE 7

BALANCE WEIGHT MOVEMENT
 "-" MOVES UPWARD
 "+" MOVES DOWNWARD

QUANTITIES EACH TYPE			
1	CONTACT WIRE DEAD END CLAMPS	12	
2	WIRE END FITTING	11	
AS REQ'D	STAINLESS STEEL WIRE ROPE	10	
2	STRAIN INSULATOR	9	
1	TURNBUCKLE	8	
1	SHACKLE OR SWIVEL	7	
1	LINK PLATE DOUBLE ENDED CLEVIS	6	
1	SMALL PULLEY	5	
2	TERMINATION BRACKETS	4	
-	-	3	
1	BALANCE WEIGHT STACK	2	
1	TENSIONING WHEEL ASSEMBLY	1	
BW-01		ITEM NO.	PART NO/REMARKS
BILL OF MATERIALS			

D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

OVERHEAD CONTACT SYSTEM
BALANCE WEIGHT ANCHOR ASSEMBLY
TYPE BW-01

PROJECT ENG: _____
 DESIGNED BY: _____
 CHECKED BY: _____
 DRAWN BY: _____
 PROJECT MGR: CY

DIVISION CHIEF: _____
 DATE: _____
 FILE: _____
 DWG. NO. OGD-81

RECOMMENDED: *Muhammad Khalid*
DEPUTY CHIEF ENGINEER

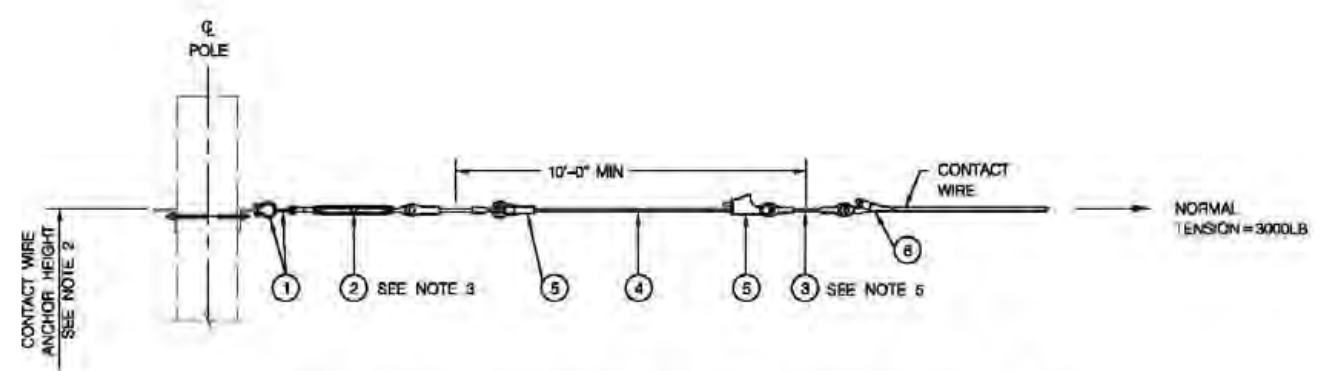
APPROVED: *[Signature]*
CHIEF TRANSPORTATION ENGINEER

DATE: _____ APPR: _____
 ISSUED: _____ REVISED: _____
 REFERENCE: _____

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NOTES:

1. THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
2. AFTER FINAL ADJUSTMENT OF WIRING, TURNBUCKLES SHALL BE EXTENDED 8" MINIMUM FROM MINIMUM LENGTH.
3. THE CW TAIL WIRE INSULATORS ARE TO BE NO CLOSER THAN 4'-0" TO SUPERELEVATED TRACK CENTERLINE.



FIXED ANCHOR ASSEMBLY FOR SINGLE CONTACT WIRE (1)
ASSEMBLY FA-1

QUANTITIES EACH TYPE				
1	CONTACT WIRE DEADEND	6		
2	WIRE END FITTING	5		
AS REQ'D	STAINLESS STEEL WIRE ROPE	4		
2	STRAIN INSULATOR	3		
1	TURNBUCKLE	2		
2	SHACKLE	1		
FA-1				
ASSEMBLY TYPE	DESCRIPTION	ITEM NO.	PART NO./REMARKS	
	BILL OF MATERIALS			

D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

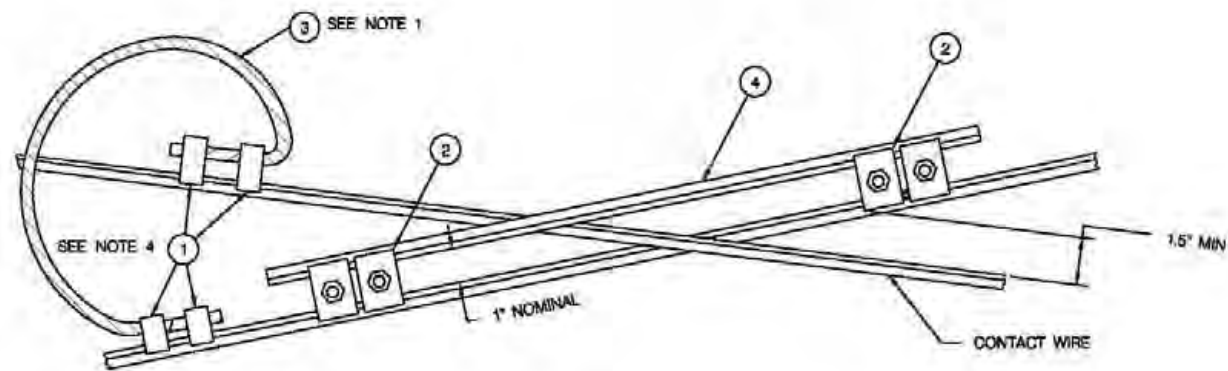
OVERHEAD CONTACT SYSTEM
FIXED TERMINATION ASSEMBLY
TYPE FA-1

DATE	APPR.	
ISSUED:	REVISED	REFERENCE

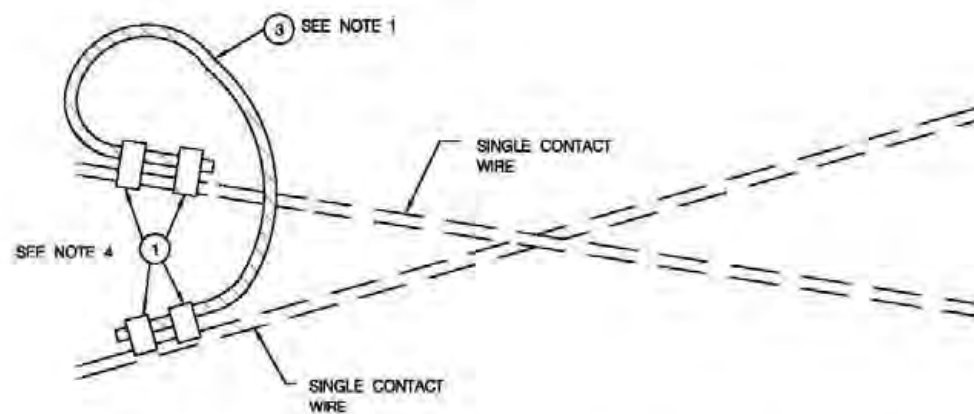
RECOMMENDED: *Muhammad R. L. H.*
DEPUTY CHIEF ENGINEER

APPROVED: *R. J. H.*
CHIEF TRANSPORTATION ENGINEER

PROJECT ENG.	
DESIGNED BY	
CHECKED BY	
DRAWN BY	
PROJECT MGR.	CY
DIVISION CHIEF	
DATE	
FILE	
DWG. NO.	OCD-82



SINGLE CONTACT SYSTEM CROSS CONTACT AND JUMPER (1)
ASSEMBLY CC-1



SINGLE CONTACT SYSTEM FULL CURRENT JUMPER (2)
ASSEMBLY JC-1 (FOR UN-INSULATED OVERLAP SPANS AND
CROSSED CONTACT ARRANGEMENTS)

NOTES:

1. WHEN INSTALLING A JUMPER BETWEEN WIRES THE CONTRACTOR SHALL DRAPE THE JUMPER WIRE SUFFICIENTLY TO PROVIDE FOR DIFFERENTIAL ALONG TRACK MOVEMENT OF THE TENSION LENGTHS. ANY BENDS IN JUMPER WIRE SHALL BE NO LESS THAN 6" RADIUS.
2. CONTACT WIRE IS 350 KCMIL HD COPPER SOLID GROOVED.
3. BEFORE ASSEMBLY, WIRES ARE TO BE WIRE BRUSH CLEANED, THEN GREASED AS INSTRUCTED BY CLAMP MANUFACTURER.
4. CUT ENDS OF JUMPER WIRE TO PROTRUDE TYPICALLY 1" BEYOND ADJACENT CLAMP. ENDS TO BE BOUND TO PREVENT FRAYING.
5. THE CONTRACTOR MAY SUBSTITUTE ONE TWO-BOLT CONTACT/JUMPER CLAMP FOR EACH PAIR OF CLAMPS SHOWN.
6. THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.

QUANTITIES EACH TYPE				
AS REQ'D	-	350 KCMIL CONTACT WIRE CUT LENGTH I	4	
AS REQ'D	AS REQ'D	JUMPER WIRE, 350 KCMIL GLASS G OR H	3	
4	-	CLAMP, PARALLEL GROOVE CLAMP	2	
4	4	CLAMP, CONTACT/JUMPER	1	
CC-1	JC-1		ITEM NO.	PART NO./REMARKS
ASSEMBLY TYPE		DESCRIPTION		
BILL OF MATERIALS				

D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

OVERHEAD CONTACT SYSTEM
JUMPER ASSEMBLY - TYPE JC
CROSS CONTACT ASSEMBLY - TYPE CC

RECOMMENDED: *Mohammed Khalid*
DEPUTY CHIEF ENGINEER

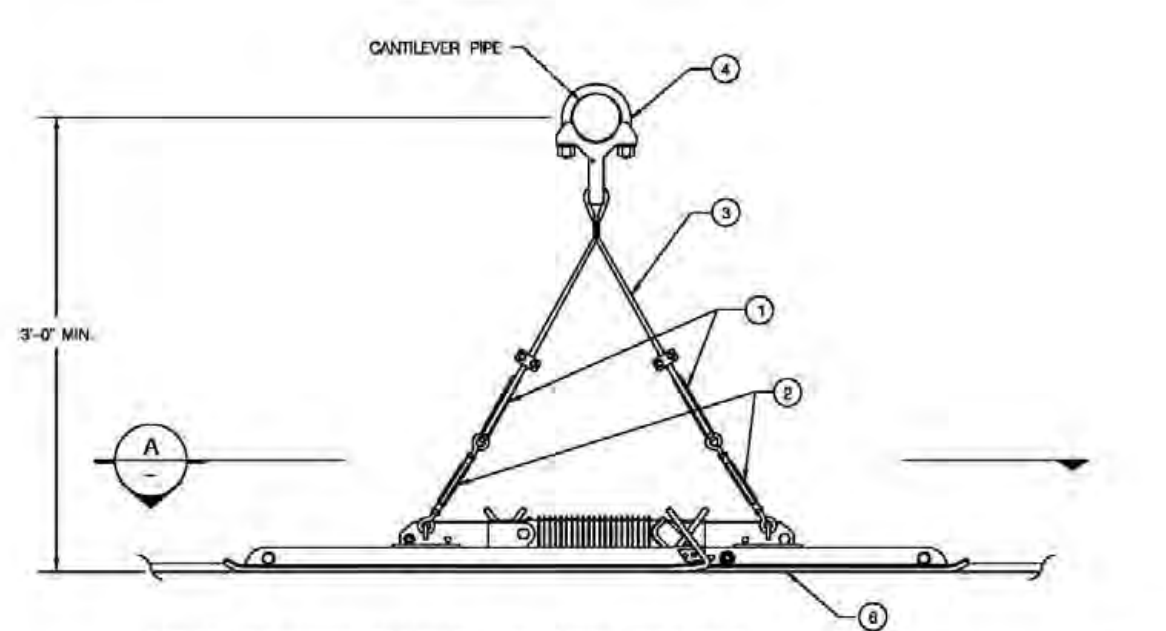
APPROVED: *R. H. [Signature]*
CHIEF TRANSPORTATION ENGINEER

DATE	APPR.	
ISSUED:	REVISED	REFERENCE

PROJECT ENG.	
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DRAWN BY	
PROJECT MGR.	CY
DIVISION CHIEF	
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DWG. NO.	OCD-25

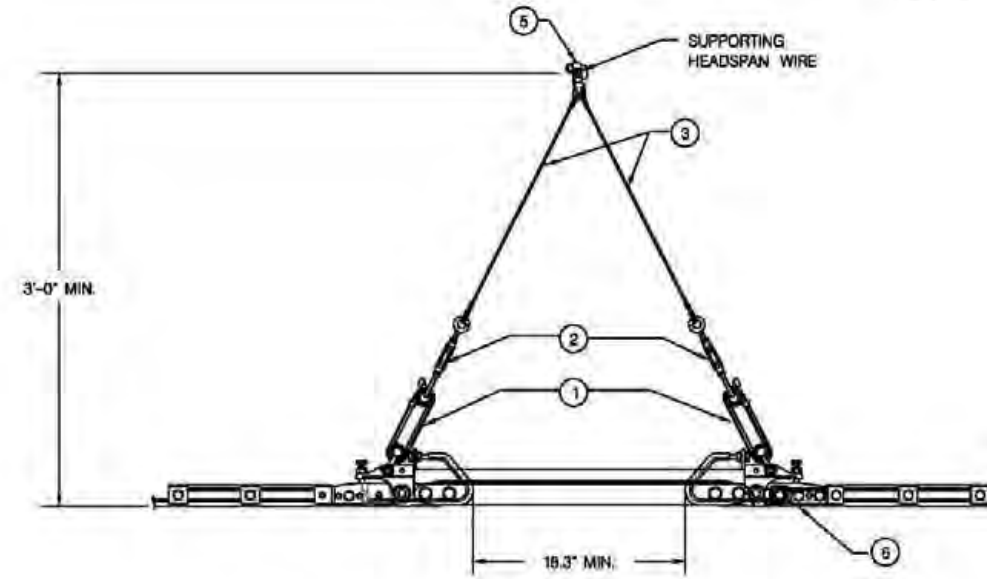
NOTES:

1. CONTRACTOR SHALL DESIGN AND INSTALL A SUPPORT SUB ASSEMBLY.
2. SECTION INSULATORS SHALL BE INSTALLED AS PER MANUFACTURERS INSTRUCTIONS.
3. THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.



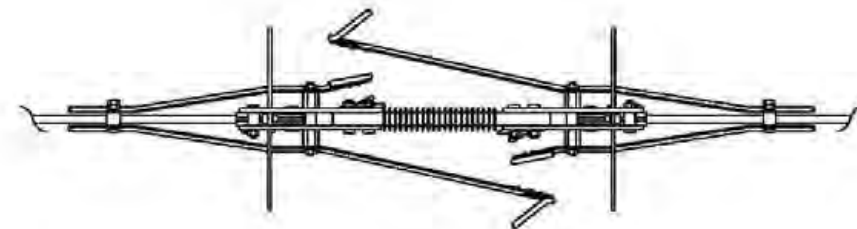
TYPICAL BRIDGING SECTION INSULATOR ASSEMBLY
FOR SINGLE CONTACT WIRE AUTO-TENSIONED SYSTEM
ASSEMBLY SI-1 (SEE NOTES 1 AND 3)

1
-



TYPICAL NON-BRIDGING SECTION INSULATOR ASSEMBLY
FOR SINGLE CONTACT FIXED TERMINATION WIRING
SCALE: NTS ASSEMBLY SI-2

2
-



VIEW
NTS

A
-

QUANTITIES EACH TYPE				
-	-	SECTION INSULATOR	8	
-	-	SPAN WIRE CLAMP	5	
-	-	PIPE CLAMP	4	
-	-	HANGER ASSEMBLIES	3	
-	-	TURNBUCKLE	2	
-	-	HANGER INSULATOR	1	
SI-2	SI-1	ITEM		PART NO./
ASSEMBLY TYPE		DESCRIPTION	NO.	REMARKS
BILL OF MATERIALS				

D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

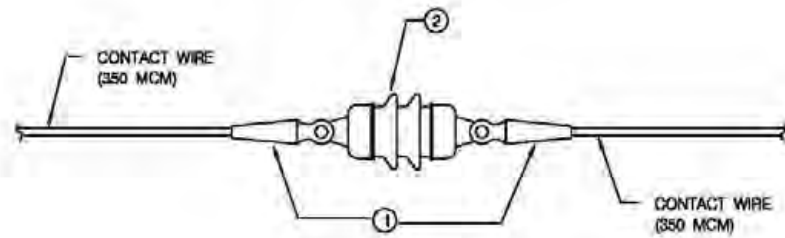
OVERHEAD CONTACT SYSTEM
SECTION INSULATOR ASSEMBLIES
TYPES SI

RECOMMENDED: *Michael R. ...*
DEPUTY CHIEF ENGINEER

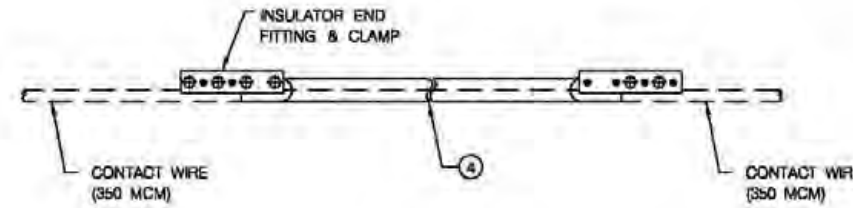
APPROVED: *Rita ...*
CHIEF TRANSPORTATION ENGINEER

DATE	APPR.	
ISSUED:	REVISED	REFERENCE

PROJECT ENG.	
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DRAWN BY	
PROJECT MGR.	CY
DIVISION CHIEF	
DATE	
FILE	
DWG. NO.	OCD-24



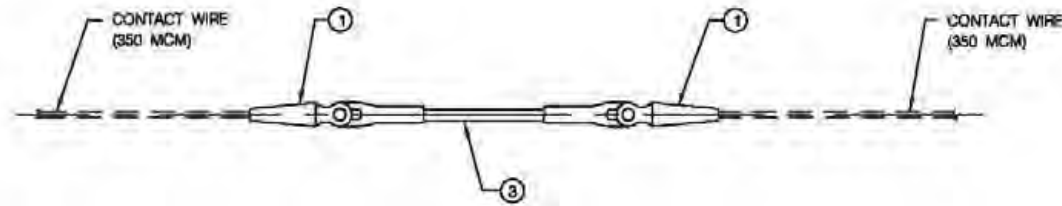
IN-SPAN INSULATION USING CERAMIC INSULATORS
ASSEMBLY IN2C (1)



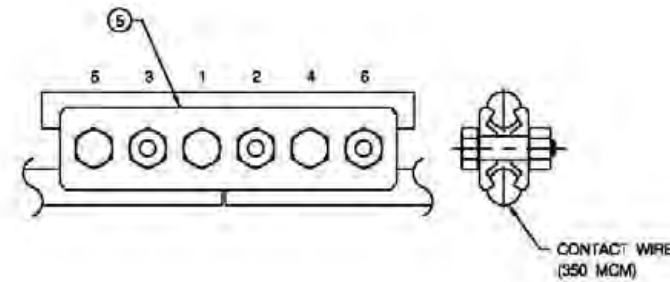
CONTACT WIRE OVERLAP IN-SPAN INSULATION
ASSEMBLY IN3 (3)

NOTES:

1. ALL INSULATORS, END CLAMPS AND SPLICES SHALL BE DESIGNED TO ACCOMMODATE THE CONTACT WIRE MAXIMUM TENSIONS TOGETHER WITH APPLICABLE SAFETY FACTORS.
2. FOR CONDUCTOR INFORMATION SEE TECHNICAL INFORMATION DRAWINGS pTD-0082.
3. A SWIVEL LINK MAY BE ADDED BETWEEN THE CONTACT WIRE CLAMPS AND THE INSULATORS TO PREVENT THE OUT OF RUNNING OCS FROM TWISTING.
4. THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.



IN-SPAN INSULATION USING GLASS FIBER INSULATION
ASSEMBLY IN2G (2)



HIGH SPEED CONTACT WIRE SPLICE
ASSEMBLY SP2 (4)

QUANTITIES EACH TYPE				DESCRIPTION	ITEM NO.	PART NO./REMARKS
1	2	3	4			
-	-	-	-	CONTACT WIRE SPLICE	5	
-	1	-	-	RUN-ABLE GLASS FIBER SECTION INSULATOR	4	
-	-	1	-	INSULATOR (GLASS FIBER TYPE)	3	
-	-	-	1	INSULATOR (CERMANIC TYPE)	2	
-	-	2	2	CONTACT WIRE END CLAMP	1	
SP2	IN3	IN2G	IN2C			
ASSEMBLY TYPE						

BILL OF MATERIALS

D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

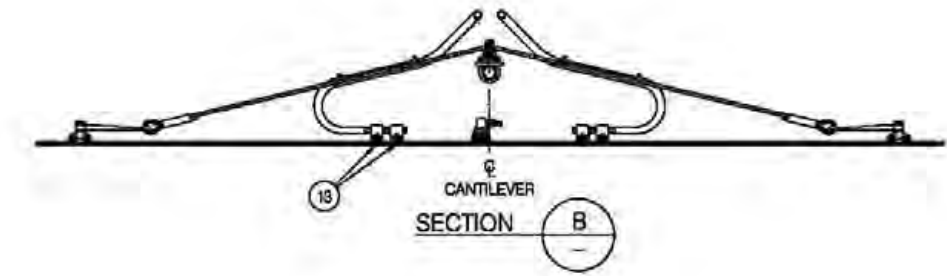
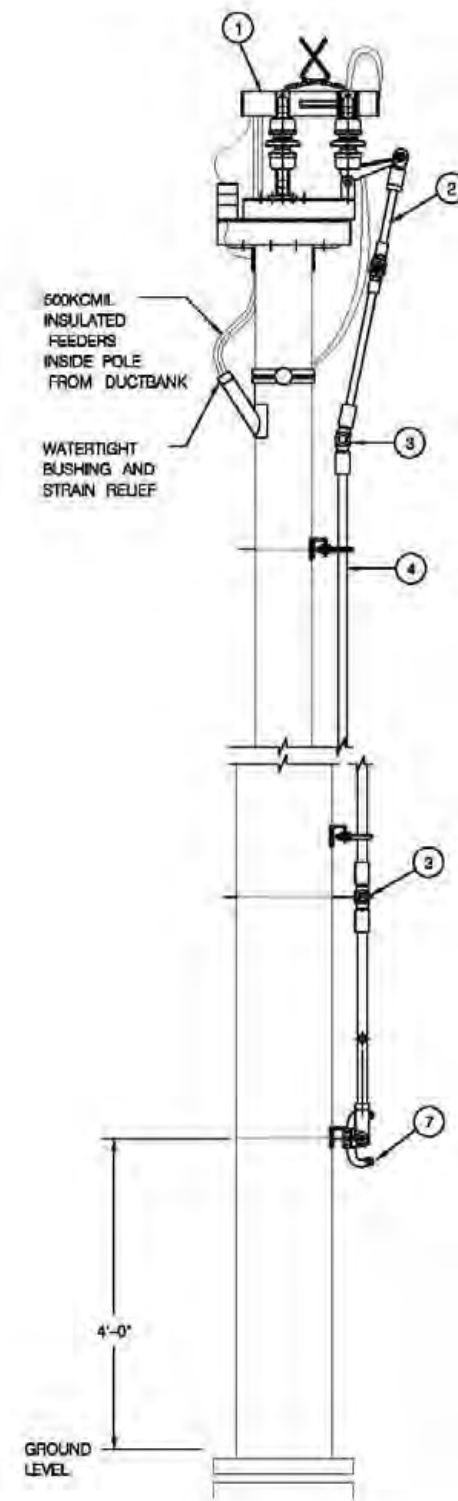
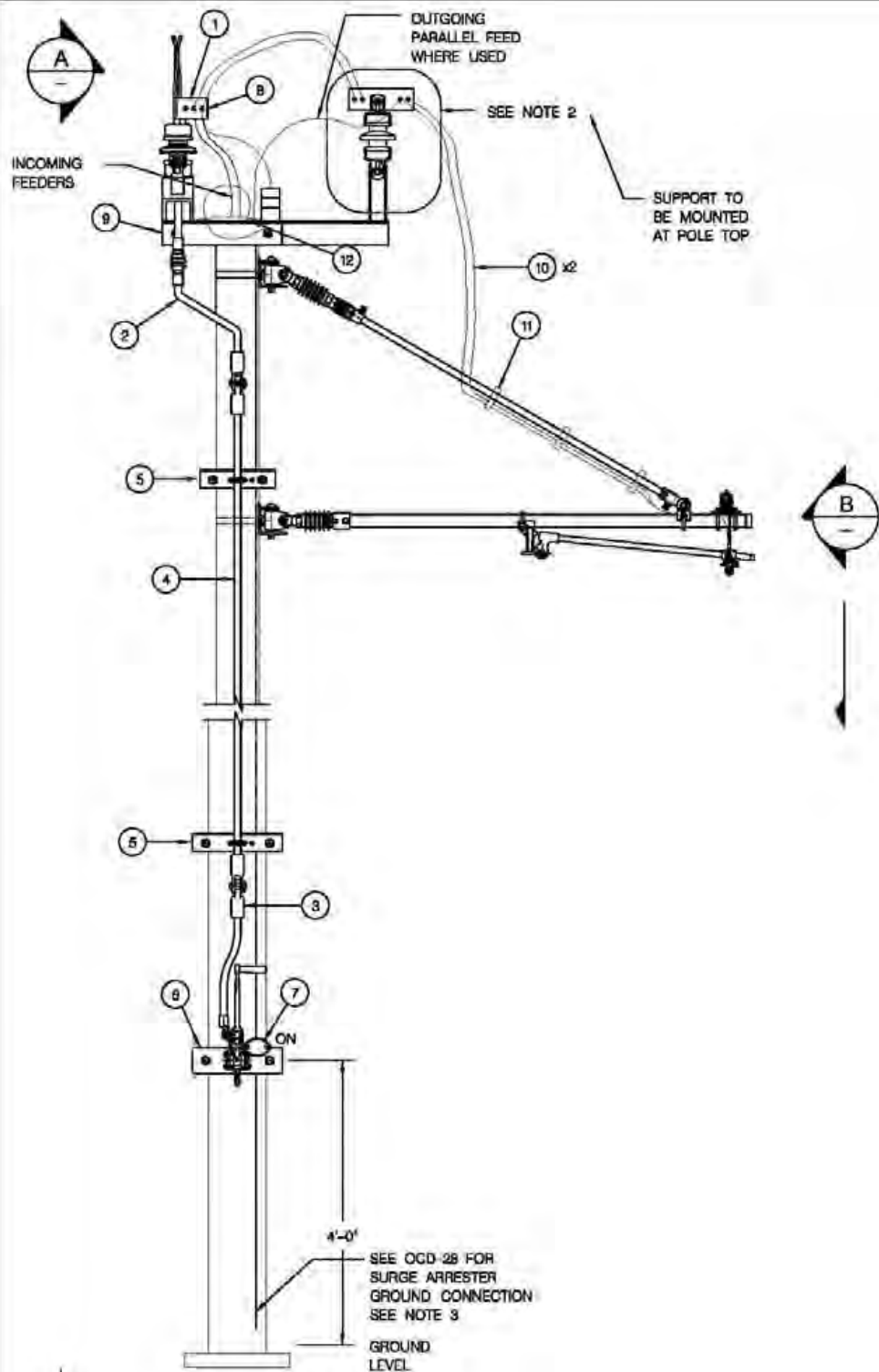
OVERHEAD CONTACT SYSTEM
CUT-IN INSULATION ASSEMBLIES & SPLICE
TYPES - IN2C, IN2G, IN3 & SP1

RECOMMENDED: *Mohammed Khalid*
DEPUTY CHIEF ENGINEER

APPROVED: *[Signature]*
CHIEF TRANSPORTATION ENGINEER

DATE	APPR.	
ISSUED:	REVISED	REFERENCE

PROJECT ENG.	
DESIGNED BY	
CHECKED BY	
DRAWN BY	
PROJECT MGR.	CT
DIVISION CHIEF	
DATE	
FILE	
DWG. NO.	OCG-85



- NOTES:**
1. THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
 2. THE CONTRACTOR SHALL INCLUDE CABLE SUPPORTS WHERE CABLE WEIGHT MAY AFFECT SWITCH OPERATION.
 3. RUN INSULATED SURGE ARRESTER GROUND WIRE INSIDE POLE, DOWN TO GROUND ROD CONNECTION AT POLE BASE. ALL GROUND CONNECTIONS SHALL BE BY EXOTHERMIC WELD. FOR BORED FOUNDATIONS, SURGE ARRESTER GROUND CABLE IS TO BE CONNECTED TO THE POLE GROUND ROD. FOR AERIAL STRUCTURE MOUNTED POLES, SURGE ARRESTER GROUNDS ARE TO BE CONNECTED TO A SEPARATE GROUND ROD SYSTEM. MAXIMUM TESTED RESISTANCE TO GROUND IS 5 OHMS.

QUANTITIES EACH TYPE			
ASSEMBLY TYPE	DESCRIPTION	ITEM NO.	PART NO./REMARKS
-	4 CONTACT WIRE CLAMP	13	
-	1 POLE TOP BUSHING AND STRAIN RELIEF ASSY	12	
-	AS REQ'D INSULATED CABLE SUPPORT	11	
-	AS REQ'D FEEDER CABLE, 500KCMIL	10	2KV INSULATED
-	1 SINGLE SWITCH SUPPORT, TUBULAR POLE	8	WITH STRAIN SUPPORT
-	6 CABLE LUGS OR CLAMPS	6	
-	1 OPERATING HANDLE ASSY	7	
-	1 SINGLE HANDLE SUPPORT	6	
-	2 SUPPORT FOR ONE OP PIPE	5	
-	1 OPERATING PIPE	4	
-	2 PIPE LINKAGE	3	
-	1 INSULATED OPERATING PIPE	2	
-	1 SINGLE SWITCH ASSY, 2000 AMP	1	
-	DS-21		

BILL OF MATERIALS

TYPICAL SINGLE DISCONNECT SWITCH FOR TUBULAR POLE
ASSEMBLY DS-21

SECTION A

D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

OVERHEAD CONTACT SYSTEM
POLE MOUNTED DISCONNECT SWITCH ASSEMBLY
TYPE DS-21 & DS-22

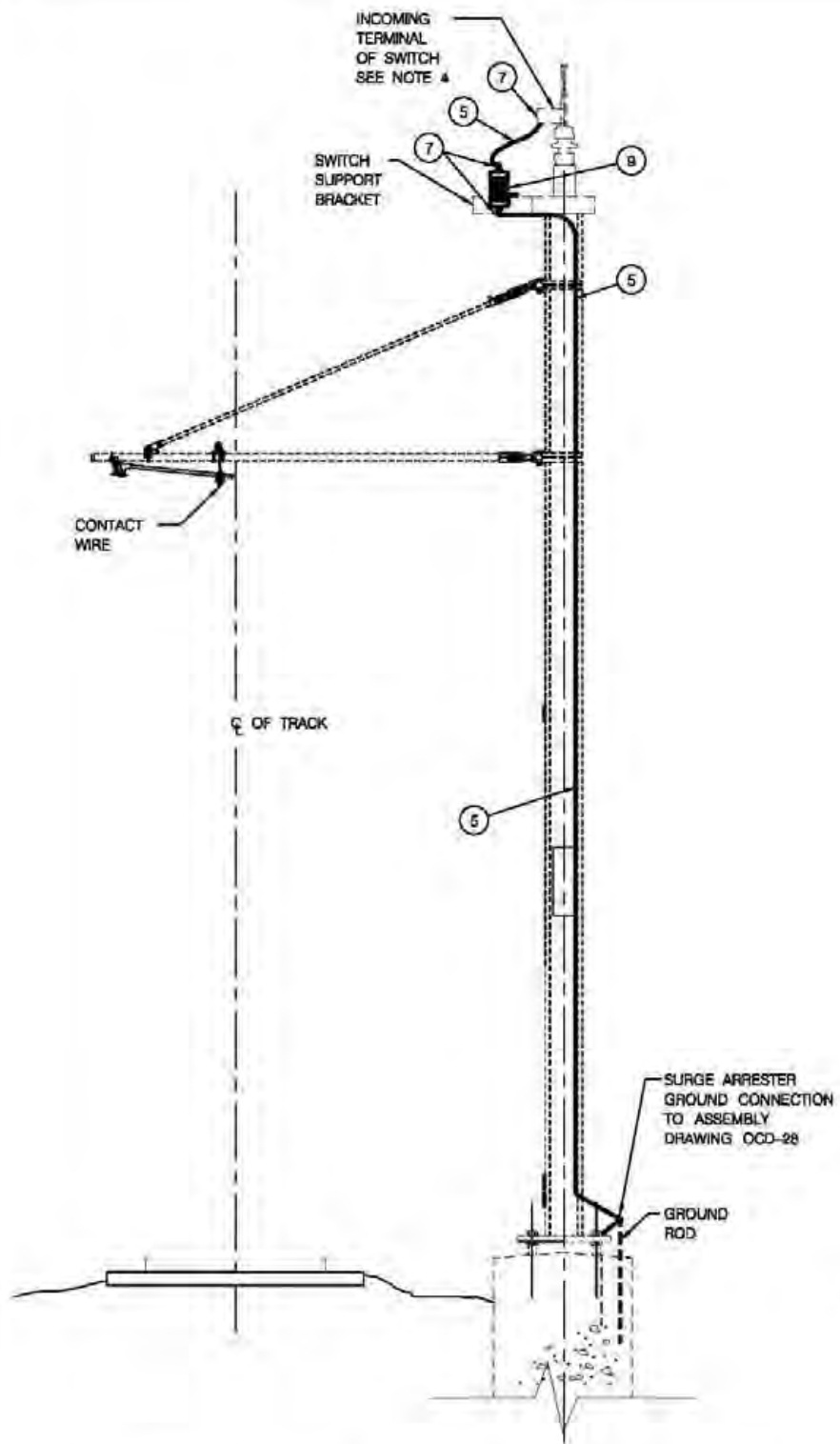
DATE	APPR.	ISSUED	REFERENCE

RECOMMENDED: *Mohamed El-Said*
DEPUTY CHIEF ENGINEER

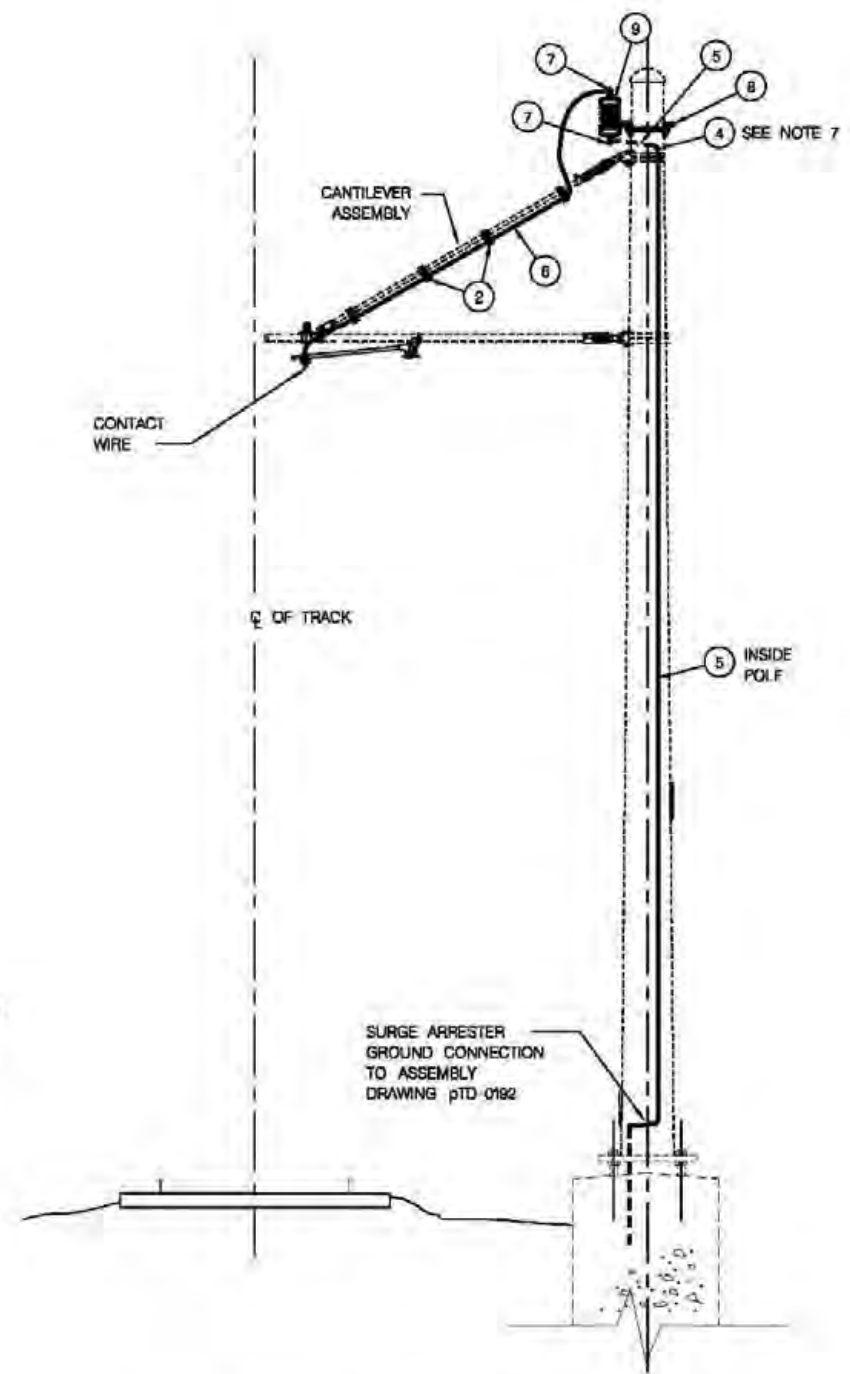
APPROVED: *RATLE*
CHIEF TRANSPORTATION ENGINEER

PROJECT ENG. _____
DESIGNED BY _____
CHECKED BY _____
DRAWN BY _____
PROJECT MGR. _____
DIVISION CHIEF _____
DATE _____
FILE _____
DWG. NO. OGD-28

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1/20/2012



SURGE ARRESTER ASSEMBLIES FOR FEEDERS (1)
ASSEMBLY SA-1 FOR TUBULAR POLE (SIMILAR)



SURGE ARRESTER ASSEMBLIES FOR CONTACT (2)
ASSEMBLY SA-2 FOR TUBULAR POLE (AS SHOWN)

- NOTES:**
1. THE SURGE ARRESTER SHALL BE MOUNTED TO PERMIT THE POSITIVE AND GROUND CABLES TO TAKE THE MOST DIRECT ROUTE TO GROUND.
 2. CABLE BENDS SHALL EXCEED 8" RADIUS.
 3. INSTALLATION AND TESTING OF GROUND RODS SHALL BE IN ACCORDANCE WITH THE SPECIFICATION REACHING A TESTED RESISTANCE OF 5 OHMS OR LESS. ADDITIONAL GROUND RODS AND CONNECTIONS TO BE INSTALLED TO REACH THIS TEST CONDITION. REFER TO OCS TESTING SPECIFICATION.
 4. THE POSITIVE CONNECTION CABLE SHALL BE CONNECTED TO THE SAME SWITCH TERMINAL AS THE INCOMING FEEDER CABLES FROM THE SUBSTATION.
 5. THE POLE FOUNDATION, WITH INTEGRAL GROUND ROD ASSEMBLY, WILL BE CALLED OFF SEPARATELY ON THE OCS FOUNDATION SCHEDULES.
 6. THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
 7. GROUND CABLE ENTRY HOLE IN TUBULAR POLE TO BE DRILLED. GROUND ROD CONNECTION TO BE MADE PRIOR TO FINAL ERECTION OF TUBULAR POLE.

QUANTITIES EACH TYPE				
1	1	CABLE LUG, 40 AWG	7	
1	1	SURGE ARRESTER SUPPORT BRKT	6	
2	3	CABLE LUG, 40 AWG	5	
AS REQ'D	AS REQ'D	CABLE, 40 AWG 2000V INSULATED	4	
AS REQ'D	AS REQ'D	WIRE, 40 AWG BARE	3	
1	2	CABLE SUPPORT AND POLE SEAL	2	
4 TYP	-	INSULATED CABLE SUPPORT	1	
SA-2	SA-1		ITEM NO.	PART NO./REMARKS
BILL OF MATERIALS				

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DATE	APPR.	
ISSUED:	REVISED	REFERENCE

RECOMMENDED: *Mick...*
DEPUTY CHIEF ENGINEER

APPROVED: *R...*
CHIEF TRANSPORTATION ENGINEER

D.C. DEPARTMENT OF TRANSPORTATION

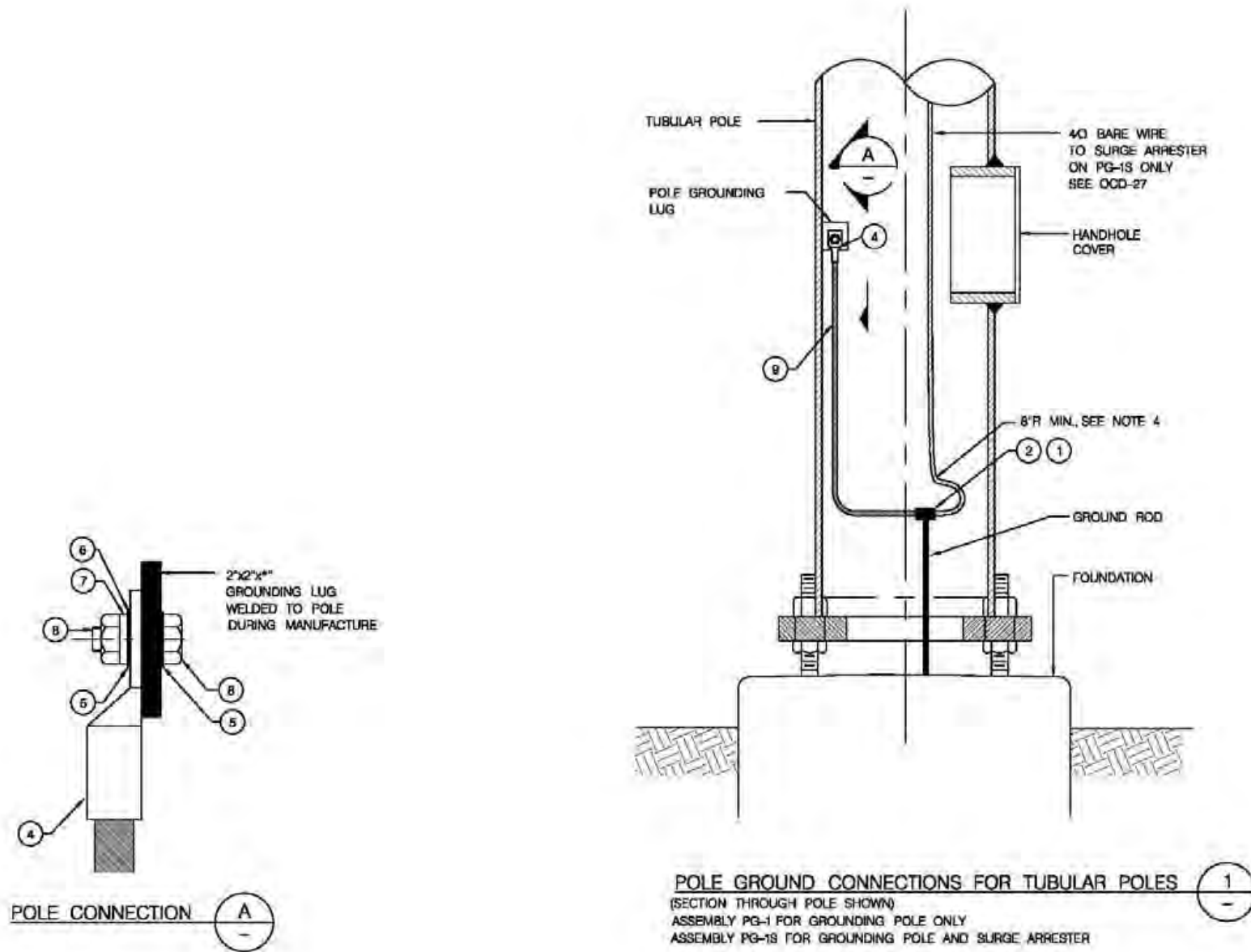
STREETCAR STANDARD DRAWINGS

**OVERHEAD CONTACT SYSTEM
SURGE ARRESTER ASSEMBLIES
TYPES SA**

PROJECT ENG	DESIGNED BY	CHECKED BY	DRAWN BY	PROJECT MGR.	CY
DIVISION CHIEF					
DATE					
FILE					
DWG. NO.	OGD-87				

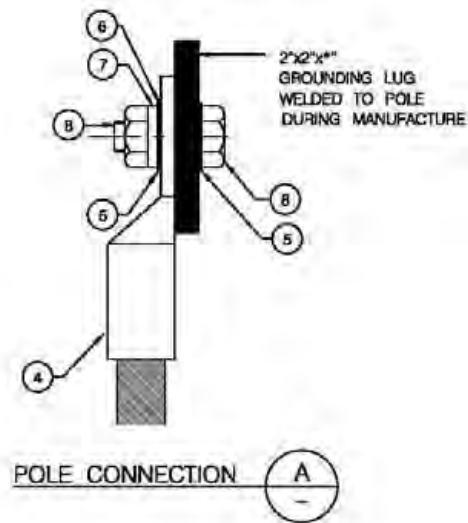
NOTES:

1. GROUND CONNECTION CABLES IN TUBULAR POLES TO BE WELDED TO THE GROUND ROD PRIOR TO FINAL ERECTION OF THE POLE.
2. BENDS IN SURGE ARRESTER WIRE TO BE NO LESS THAN 8" RADIUS.



POLE GROUND CONNECTIONS FOR TUBULAR POLES (1)
 (SECTION THROUGH POLE SHOWN)
 ASSEMBLY PG-1 FOR GROUNDING POLE ONLY
 ASSEMBLY PG-1S FOR GROUNDING POLE AND SURGE ARRESTER

QUANTITIES EACH TYPE		DESCRIPTION	ITEM NO.	PART NO./REMARKS
3 FT (TYP)	3 FT (TYP)			
1	1	COPPRE CONNECTOR, 40 AWG BARE	8	-
1	1	BOLT HEX 1/2", 1-1/2" LONG	7	-
1	1	SPRING LOCK WASHER	6	-
2	2	FLAT WASHER	5	-
1	1	NUT, HEX 1/2"	4	-
1	1	COMPRESSION CABLE LUG	3	-
-	1	CADWELD	2	-
1	-	CADWELD	1	-
PG-1S	PG-1	DESCRIPTION	ITEM NO.	PART NO./REMARKS
BILL OF MATERIALS				



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D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

OVERHEAD CONTACT SYSTEM
 FOUNDATION AND POLE GROUND
 CONNECTION ASSEMBLY
 PG TYPES

DATE	APPR.	ISSUED:	REFERENCE

RECOMMENDED: *Mikhael Khalil*
 DEPUTY CHIEF ENGINEER

APPROVED: *[Signature]*
 CHIEF TRANSPORTATION ENGINEER

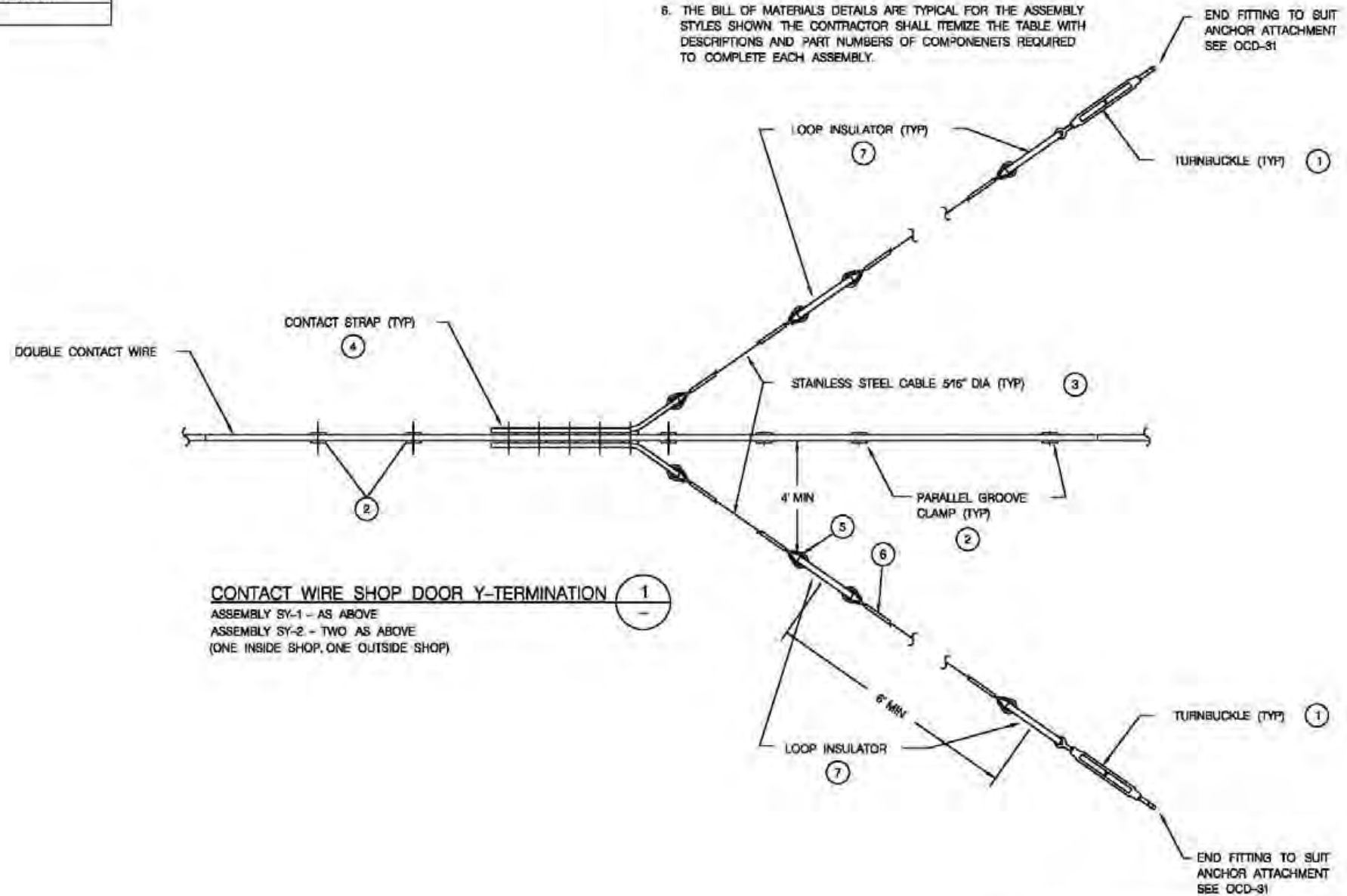
PROJECT ENG
 DESIGNED BY
 CHECKED BY
 DRAWN BY
 PROJECT MGR. CY

DIVISION CHIEF
 DATE
 FILE
 DWG. NO. OCD-28

QUANTITIES EACH TYPE				
8	4	LOOP INSULATOR	7	
32	16	SLEEVE	8	
32	16	THIMBLE	5	
2	1	CONTACT WIRE STRAP	4	
AS REQ'D	AS REQ'D	STAINLESS STEEL CABLE 5/16" DIA.	3	
8	4	PARALLEL GROOVE CLAMP	2	
4	2	TURNBUCKLE	1	
SY-2	SY-1		ITEM NO.	PART NO./REMARKS
ASSEMBLY TYPE		DESCRIPTION		
BILL OF MATERIALS				

NOTES:

1. DETAILS OF BUILDING ATTACHMENTS FOR TENSION REDUCERS AND SHOP DOOR ARRANGEMENTS TO BE COORDINATED WITH SHOP BUILDING CONTRACTOR.
2. TENSION REDUCER TO BE USED AT THE INSIDE AND OUTSIDE OF THE SHOP DOORS. COORDINATE ATTACHMENT METHOD WITH SHOP DESIGNER.
3. MAXIMUM TENSION IN THE CONTACT WIRE IS AS FOLLOWS:
YARD & SHOP AREA - 4477 LB.
4. NOMINAL CONTACT WIRE HEIGHT IS 19.0' IN THE YARD.
5. 350KCMIL INSULATED FEEDER CABLES TO BE CONNECTED BETWEEN DISCONNECT SWITCH AND CONTACT WIRE ON INSIDE AND OUTSIDE OF SHOP DOORS.
6. THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.



CONTACT WIRE SHOP DOOR Y-TERMINATION (1)
 ASSEMBLY SY-1 - AS ABOVE
 ASSEMBLY SY-2 - TWO AS ABOVE
 (ONE INSIDE SHOP, ONE OUTSIDE SHOP)

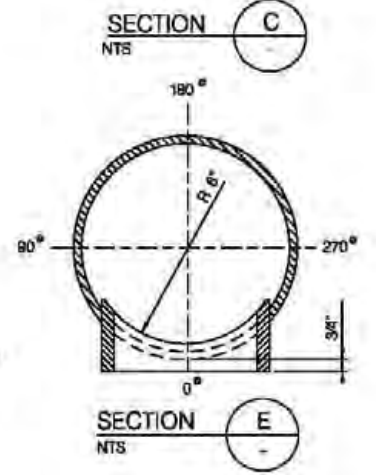
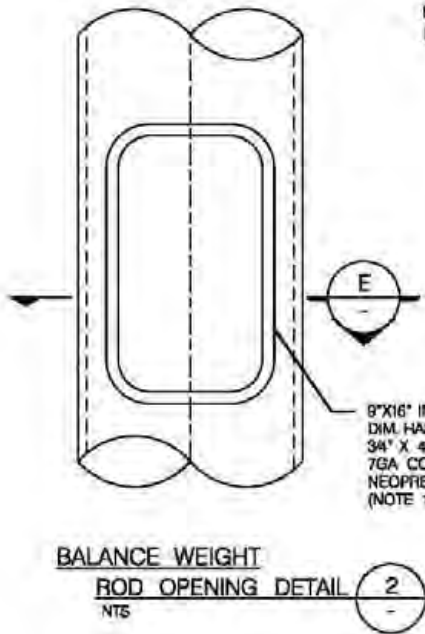
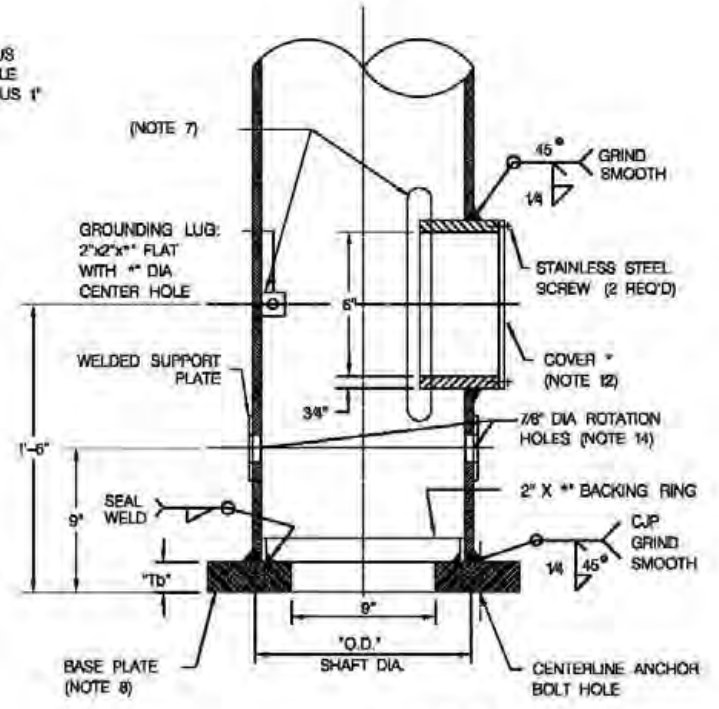
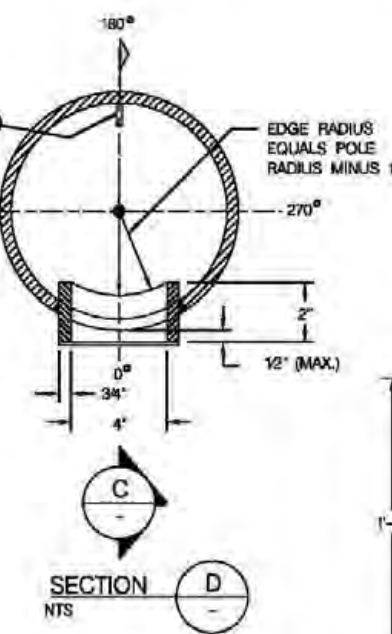
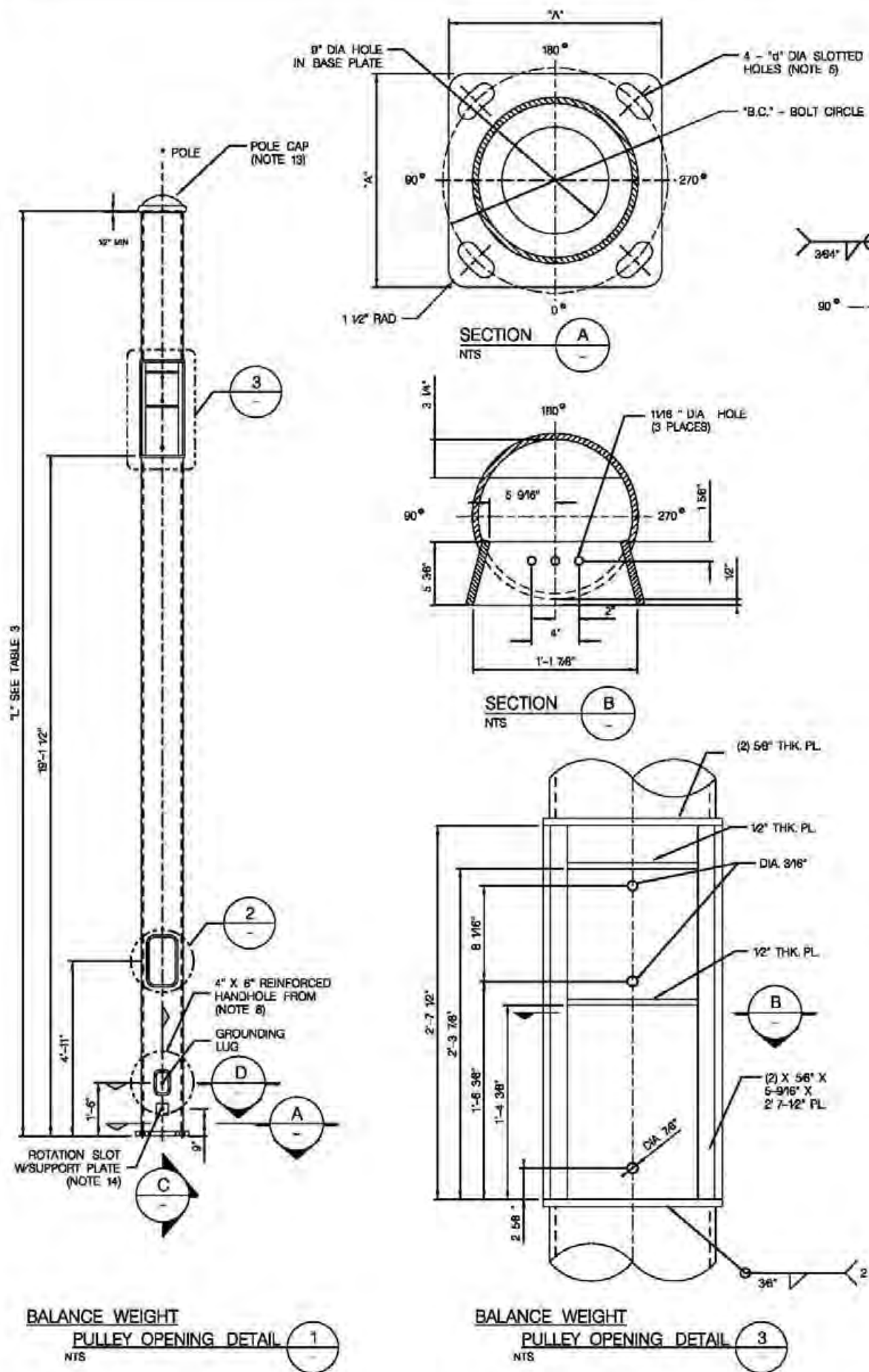
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D.C. DEPARTMENT OF TRANSPORTATION

DATE	APPR.	RECOMMENDED:	<i>Muhammad Elabd</i> DEPUTY CHIEF ENGINEER
ISSUED:	REVISED	APPROVED:	<i>[Signature]</i> CHIEF TRANSPORTATION ENGINEER
		REFERENCE	

STREETCAR STANDARD DRAWINGS		PROJECT ENG.	
OVERHEAD CONTACT SYSTEM SHOP DOOR WIRE TERMINATION ASSEMBLIES TYPES SY-1, & SY-2		DESIGNED BY	
		CHECKED BY	
		DRAWN BY	
		PROJECT MGR.	CY
		DIVISION CHIEF	
		DATE	
		FILE	
		DWG. NO.	OCD-30

POLE TYPE NUMBER	LENGTH L (FT-IN)	POLE SHAFT		BASE PLATE			
		O.D. (INCHES)	t _n (INCHES)	d (INCHES)	A (INCHES)	B.C. (INCHES)	t _b (INCHES)
PB4-27	27'-0"	14"	0.3125"	2.25"	20.5"	20"	2.25"



- NOTES:**
- THE FABRICATION OF POLE ASSEMBLY SHALL BE IN CONFORMANCE WITH THE REQUIREMENTS OF THE AISC MANUAL OF STEEL CONSTRUCTION AND CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES LATEST EDITION.
 - POLE STEEL SHALL BE ASTM A585 GRADE 55 (FY = 56 KSI). THE POLE MINIMUM THICKNESS SHALL BE 3 GAGE (0.2391").
 - BASE PLATE STEEL SHALL CONFORM TO ASTM A572 GRADE 42 STEEL WITH A MINIMUM YIELD STRENGTH, FY = 42 KSI.
 - MISCELLANEOUS STRUCTURAL STEEL SHALL CONFORM TO ASTM A36 WITH A MINIMUM YIELD STRENGTH (FY) OF 36 KSI. ROUND OFF INSIDE EDGES.
 - THE BASEPLATE SLOTS SHOULD BE SLOTTED RADIALLY FOR A TOTAL OF 12 DEGREES OF ROTATION OF THE POLE ON ITS FOUNDATION BOLTS.
 - WELDING SHALL BE IN CONFORMANCE WITH THE AWS D1.1 SPECIFICATIONS LATEST EDITION USING E70XX WELDING ELECTRODES.
 - ROUND OFF INSIDE EDGES AND REMOVE ALL BURRS TO PREVENT DAMAGE TO CABLES DURING INSTALLATION INSIDE POLE.
 - THE BASEPLATE IS SHALL BE PREHEATED BEFORE WELDING OF POLE SHAFT TO BASEPLATE.
 - POLE ASSEMBLY TO BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM 123, THEN FACTORY PAINTED WITH PRIMER.
 - POLES ARE TO BE DESIGNED IN ACCORDANCE WITH NATIONAL ELECTRICAL SAFETY CODE (NECE C2-2002), AND ASCE-72, DESIGN OF STEEL TRANSMISSION POLE STRUCTURES.
 - ALL POLES SHALL HAVE POLE TYPE IDENTIFIER STAMPED ON POLE BASE AS REQUIRED IN SPECIFICATIONS.
 - HANDHOLES SHALL BE COVERED WITH A MINIMUM OF 7 GA. PLATE BY FASTENING WITH 2"-DIA. STAINLESS STEEL SET SCREWS.
 - POLE CAP SHALL BE REMOVABLE DOMED HOT-DIPPED GALVANIZED STEEL CAP FASTENED TO POLE USING 2" DIA. STAINLESS STEEL SET SCREW (3 REQUIRED).
 - THE ROTATION HOLES ARE FOR ERECTION USE. THEY WILL BE USED WITH A 2" DIA. ROD AS A LEVER, TO ROTATE THE POLE ON ITS FOUNDATION ANCHOR BOLTS, TO ALIGN THE BALANCE WEIGHT ASSEMBLY WITH THE LINE OF WIRE PULL.

D.C. DEPARTMENT OF TRANSPORTATION

STREETCAR STANDARD DRAWINGS

OVERHEAD CONTACT SYSTEM
TUBULAR BALANCE WEIGHT
ANCHOR POLE ASSEMBLY
PB4 TYPES

DATE	APPR.	RECOMMENDED:	<i>Michael H. ...</i> DEPUTY CHIEF ENGINEER
ISSUED:	REVISED	APPROVED:	<i>[Signature]</i> CHIEF TRANSPORTATION ENGINEER
		REFERENCE	

PROJECT ENG.	
DESIGNED BY	
CHECKED BY	
DRAWN BY	
PROJECT MGR.	CY
DIVISION CHIEF	
DATE	
FILE	
DWG. NO.	OGD-84

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