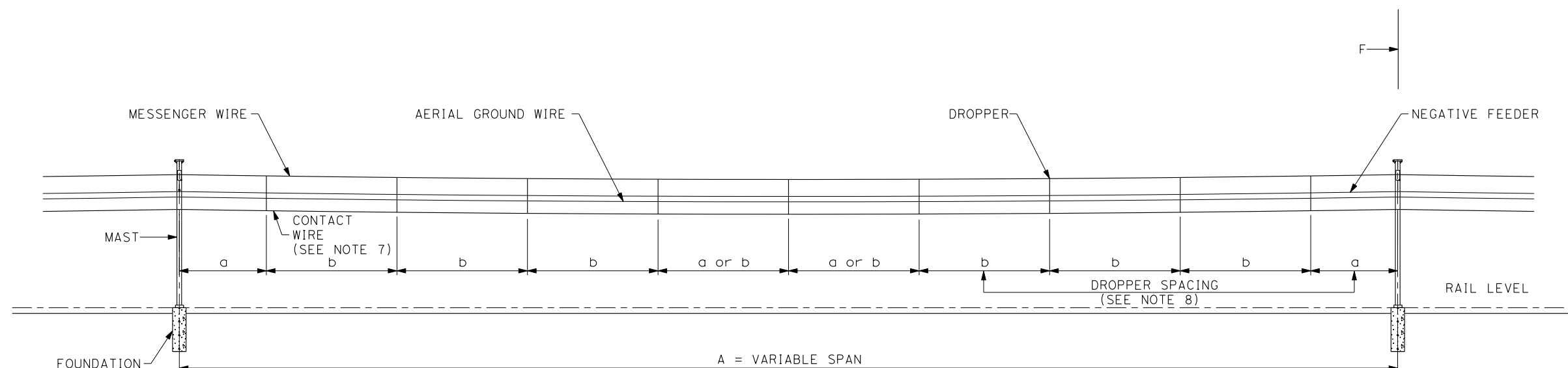


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antonio



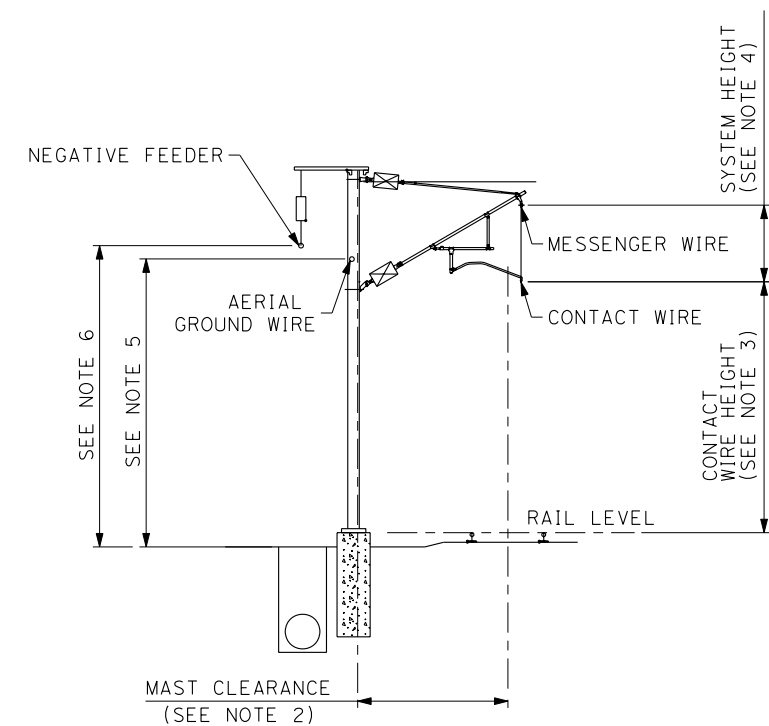
PLAN VIEW

CATENARY CHARACTERISTICS FOR 125 mph

- |                          |   |
|--------------------------|---|
| - 1 MESSENGER WIRE       | BRONZE 0.18 in <sup>2</sup> (116mm <sup>2</sup> ) T=2700 POUND FORCE                      |
| - 1 CONTACT WIRE         | COPPER ALLOY 0.24 in <sup>2</sup> (150mm <sup>2</sup> ) T= 2700 POUND FORCE               |
| - 1 AERIAL GROUND WIRE   | ACSR 0.15 in <sup>2</sup> (93mm <sup>2</sup> ) T= 900 POUND FORCE AT AVERAGE TEMPERATURE  |
| - 1 NEGATIVE FEEDER WIRE | ACS 0.45 in <sup>2</sup> (288mm <sup>2</sup> ) T= 2023 POUND FORCE AT AVERAGE TEMPERATURE |

NOTES:

- OVERHEAD CONTACT SYSTEM TYPICAL CONFIGURATION FOR 125 mph
- FOR THE MAST CLEARANCE AND POSITIONING OF DRAINAGE, REFER TO TYPICAL TRACK CROSS SECTION
- THE TYPICAL CONTACT WIRE HEIGHT FOR THE CHSTP OCS FOR SHARED USE CORRIDOR WITH PASSENGER TRAINS, WHERE THE MAXIMUM SPEED IS 125mph IS 18ft 9in (TBD)
- TYPICALLY 55in
- TYPICALLY 19ft
- TYPICALLY 22ft
- TYPICALLY SAG = A/1000 FOR 125 mph
- DROPPER SPACING TYPICALLY  
a= 15ft AND b= 22ft 6in  
NOTE: b = 1.5\*a



SECTION F

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY  
E. SCOTSON  
DRAWN BY  
A. ANTONIO  
CHECKED BY  
T. MURPHY  
IN CHARGE  
E. SCOTSON  
DATE  
07-07-09



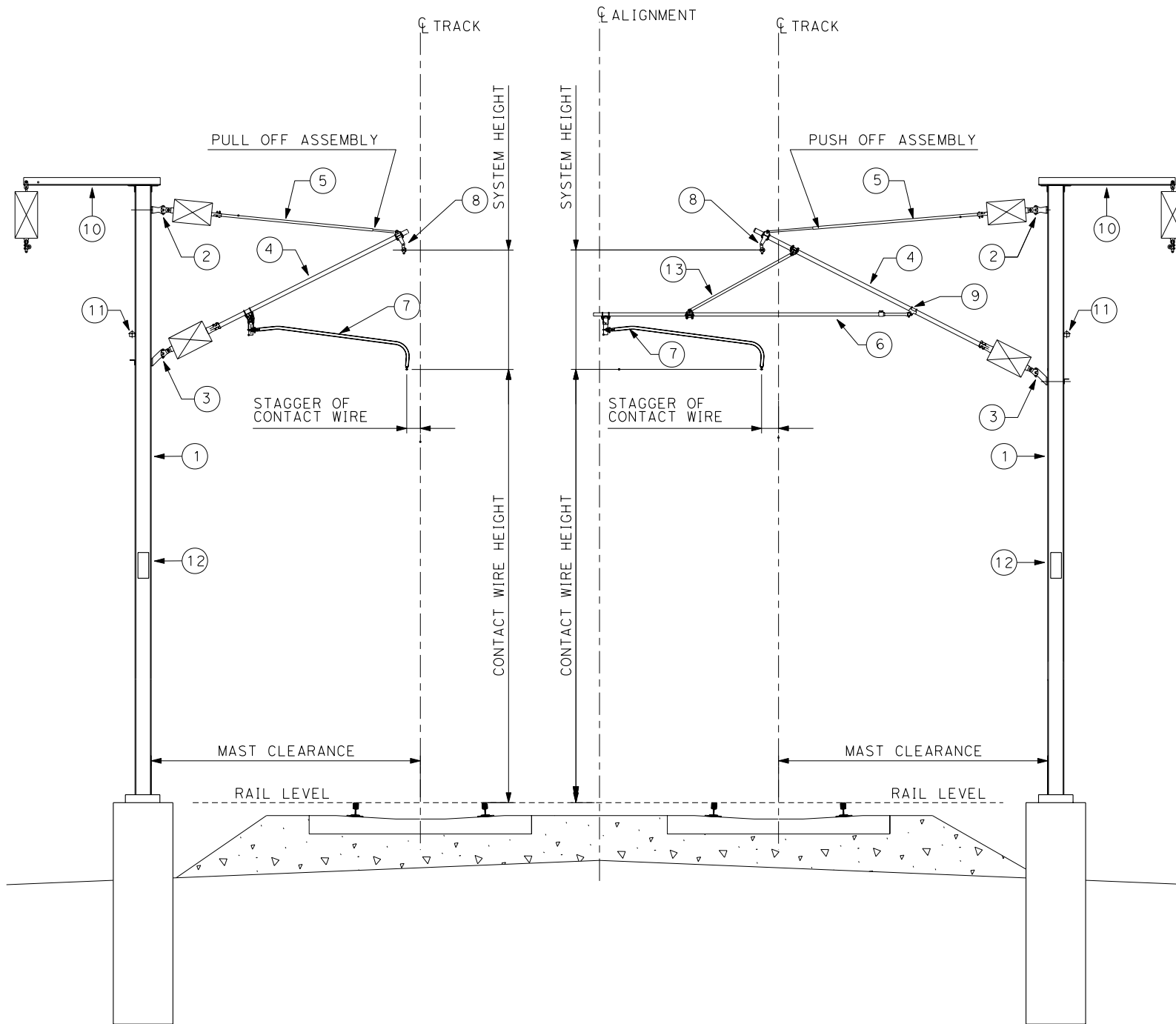
CALIFORNIA HIGH-SPEED RAIL AUTHORITY  
**FLY CALIFORNIA**  
*Without ever leaving the ground.*

**CALIFORNIA HIGH-SPEED TRAIN PROJECT  
OVERHEAD CONTACT SYSTEM**

TYPICAL OPEN ROUTE OCS CONFIGURATION  
SPEED LESS THAN OR EQUAL TO  
125 MPH

CONTRACT NO.  
13259B  
DRAWING NO.  
TM 3.2.1-A  
SCALE  
NO SCALE  
SHEET NO.

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7/7/2009 10:54:06 AM  
antonio



ITEM	DESCRIPTION
1	H-BEAM MAST
2	SWIVEL FASTENING ASSEMBLY FOR TOP TUBE ON H-BEAM MAST
3	STRUT TUBE FASTENING ASSEMBLY
4	INSULATED STRUT TUBE ASSEMBLY
5	ADJUSTABLE INSULATED TOP TUBE
6	REGISTRATION ARM
7	STEADY ARM
8	MESSENGER WIRE SUSPENSION ASSEMBLY
9	REGISTRATION ARM FASTENING ASSEMBLY
10	TYPICAL NEGATIVE FEEDER CANTILEVER SUPPORTING ASSEMBLY
11	AERIAL GROUND WIRE SUSPENSION ASSEMBLY
12	STRUCTURE NUMBER PLATE
13	REGISTRATION ARM BRACE

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY E. SCOTSON
DRAWN BY A. ANTONIO
CHECKED BY T. MURPHY
IN CHARGE E. SCOTSON
DATE 07-07-09



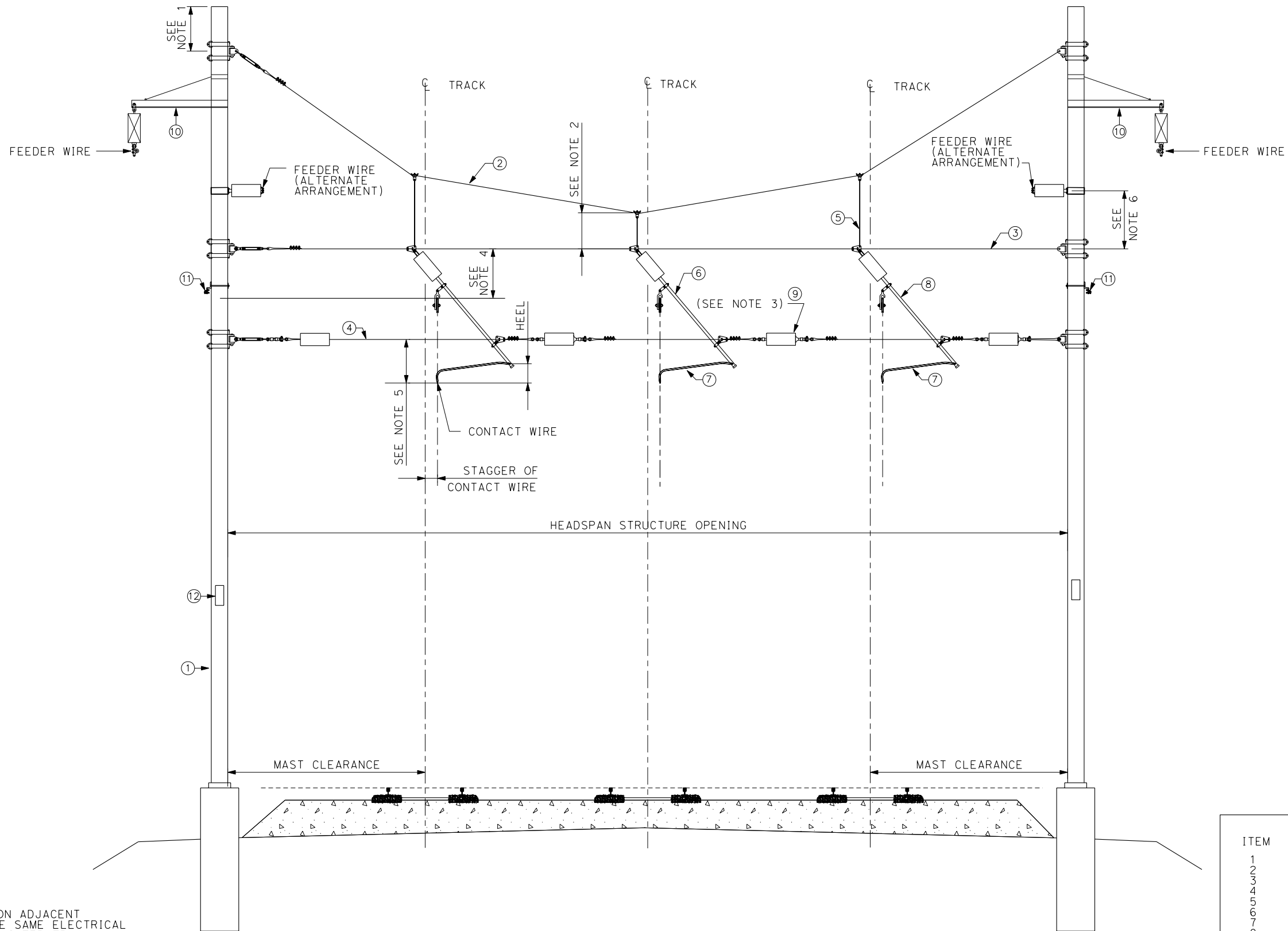
CALIFORNIA HIGH-SPEED RAIL AUTHORITY  
**FLY CALIFORNIA**  
*Without ever leaving the ground.*

**CALIFORNIA HIGH-SPEED TRAIN PROJECT  
OVERHEAD CONTACT SYSTEM**

TYPICAL OCS EQUIPMENT FOR  
TWO TANGENT TRACKS IN OPEN ROUTE  
SPEED LESS THAN OR EQUAL TO 125 MPH

CONTRACT NO. 13259B
DRAWING NO. TM 3.2.1-B
SCALE NO SCALE
SHEET NO.

7/7/2009 10:56:03 AM T:\13259B Calif High Speed Rail\CADD\Directive Drawings\3.2.1 - OCS Configuration\3.2.1-C.dgn



NOTES:

- 1 MINIMUM 1 FT.
- 2 MINIMUM 1 FT.
- 3 WHEN CATENARIES ON ADJACENT TRACKS ARE OF THE SAME ELECTRICAL SUB-SECTIONS, THE INTER-TRACK INSULATORS SHALL BE OMITTED
- 4 MINIMUM 3 FT.
- 5 TYPICALLY 1 FT. 6 IN.
- 6 TYPICALLY 4 FT.

ITEM	DESCRIPTION
1	H-BEAM MAST
2	HEADSPAN WIRE
3	BODY SPAN WIRE
4	STEADY SPAN WIRE
5	BODY SPAN SUPPORT HANGER
6	INSULATED STRUT TUBE
7	STEADY ARM
8	MESSENGER WIRE PULLEY WHEEL
9	INTER-TRACK INSULATION
10	TYPICAL NEGATIVE FEEDER
11	SUPPORTING ASSEMBLY
12	AERIAL GROUND WIRE SUSPENSION ASSEMBLY

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY E. SCOTSON
DRAWN BY A. ANTONIO
CHECKED BY T. MURPHY
IN CHARGE E. SCOTSON
DATE 07-07-09

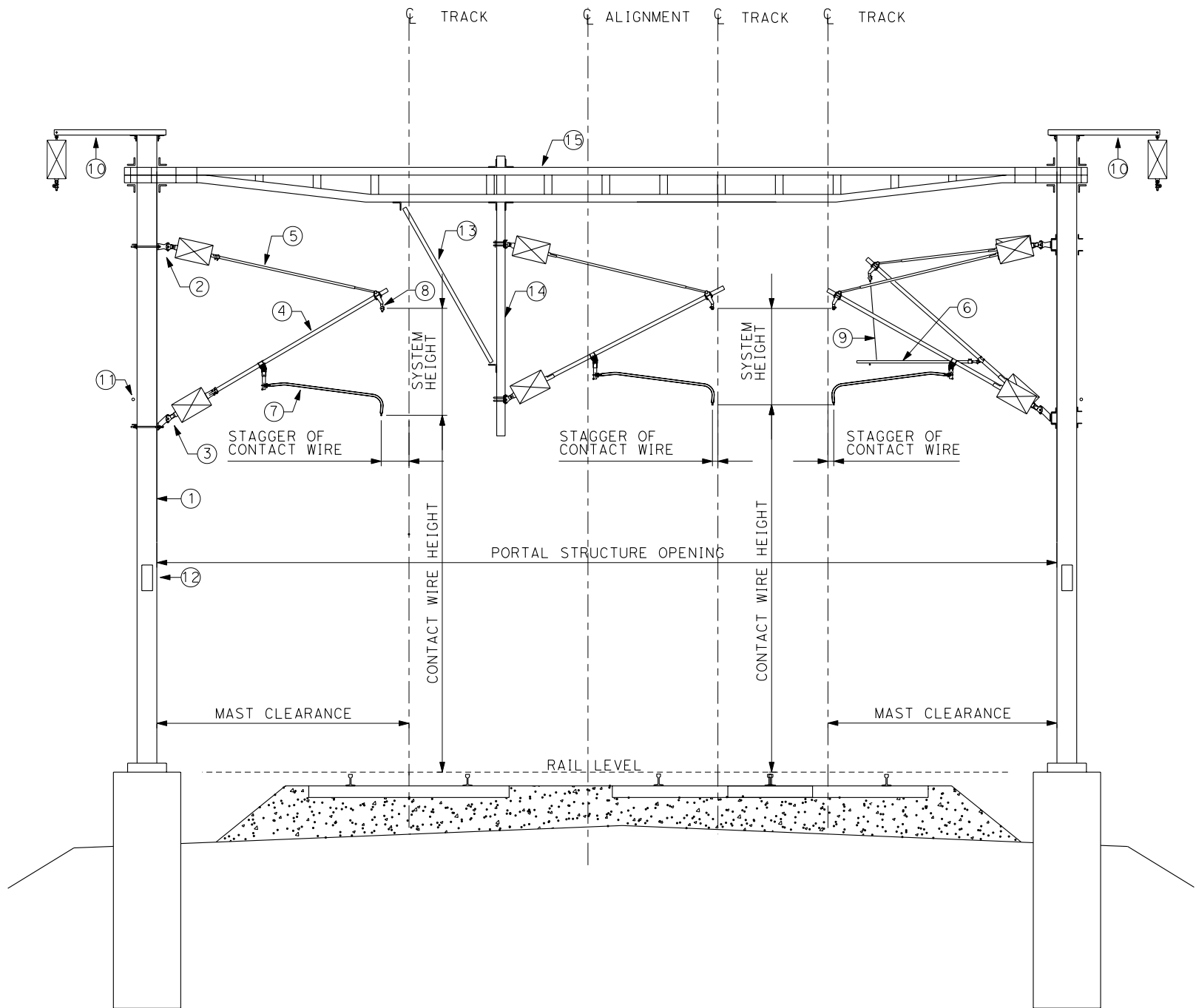


**CALIFORNIA HIGH-SPEED TRAIN PROJECT  
OVERHEAD CONTACT SYSTEM**

TYPICAL HEADSPAN OCS ARRANGEMENT  
TANGENT TRACK  
SPEED LESS THAN OR EQUAL TO 125 MPH

CONTRACT NO. 13259B
DRAWING NO. TM 3.2.1-C
SCALE NO SCALE
SHEET NO.

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antonio



ITEM	DESCRIPTION
1	H-BEAM MAST
2	SWIVEL FASTENING ASSEMBLY FOR TOP TUBE ON H-BEAM MAST
3	STRUT TUBE FASTENING ASSEMBLY
4	INSULATED STRUT TUBE ASSEMBLY
5	ADJUSTABLE INSULATED TOP TUBE
6	REGISTRATION ARM
7	STEADY ARM
8	MESSENGER WIRE SUSPENSION ASSEMBLY
9	FLEXIBLE CABLE SUSPENSION
10	TYPICAL NEGATIVE FEEDER CANTILEVER SUPPORTING ASSEMBLY
11	AERIAL GROUND WIRE SUSPENSION ASSEMBLY
12	STRUCTURE NUMBER PLATE
13	BRACE OF DROP TUBE
14	DROP TUBE SUPPORTED FROM PORTAL BEAM
15	PORTAL BEAM

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY E. SCOTSON
DRAWN BY A. ANTONIO
CHECKED BY T. MURPHY
IN CHARGE E. SCOTSON
DATE 07-07-09



**CALIFORNIA HIGH-SPEED TRAIN PROJECT  
OVERHEAD CONTACT SYSTEM**

TYPICAL OCS ARRANGEMENT UNDER  
PORTAL BEAM - TANGENT TRACK WITH TURNOUT  
SPEED LESS THAN OR EQUAL TO 125 MPH

CONTRACT NO. 13259B
DRAWING NO. TM 3.2.1-D
SCALE NO SCALE
SHEET NO.

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FOR CONTACT WIRE HEIGHT		18ft 9in OR LESS
HORIZONTAL CURVES RADIUS (ft)		MAXIMUM SPAN LENGTH (ft)
FROM	TO	
650	850	70
850	1150	90
1150	1500	100
1500	2000	120
2000	2500	130
2500	3250	150
3250	4500	160
4500	9850	175
9850	24,500	190
24,500	TANGENT	210

MAXIMUM TENSION SECTION LENGTHS COUNTERWEIGHT TO COUNTERWEIGHT	
NORMAL	4600ft
EXCEPTIONAL	5000ft
AT TUNNELS	4000ft
AT SUPPLY STATIONS	4000ft

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY E. SCOTSON
DRAWN BY A. ANTONIO
CHECKED BY T. MURPHY
IN CHARGE E. SCOTSON
DATE 07-07-09

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CALIFORNIA HIGH-SPEED RAIL AUTHORITY

**FLY CALIFORNIA**

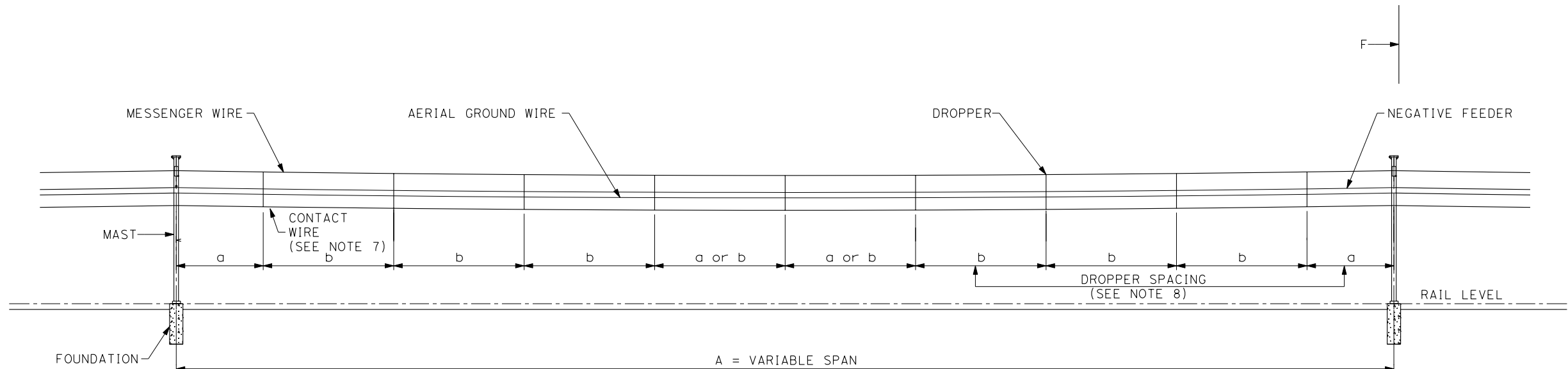
Without ever leaving the ground.

**CALIFORNIA HIGH-SPEED TRAIN PROJECT  
OVERHEAD CONTACT SYSTEM**

MAXIMUM SPAN AND TENSION SECTION LENGTHS  
SPEED LESS THAN OR EQUAL TO  
125 MPH

CONTRACT NO. 13259B
DRAWING NO. TM 3.2.1-E
SCALE NO SCALE
SHEET NO.

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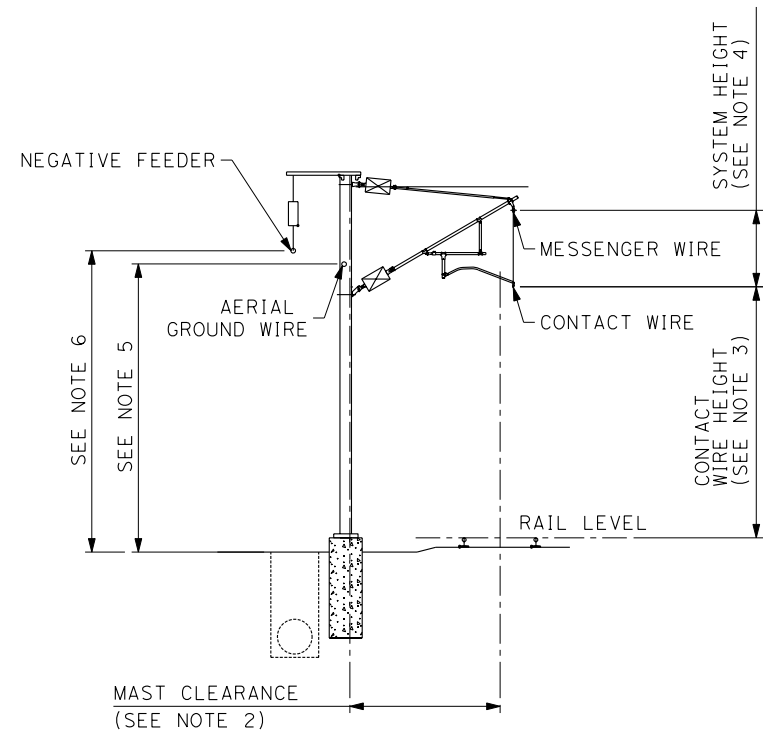
PLAN VIEW

CATENARY CHARACTERISTICS FOR 220 MPH (350 KPH)

- |                          |  |
|--------------------------|--|
| - 1 MESSENGER WIRE       | BRONZE 0.18 in <sup>2</sup> ( 116mm <sup>2</sup> ) T=4500 POUND FORCE                      |
| - 1 CONTACT WIRE         | COPPER ALLOY 0.23 in <sup>2</sup> ( 150mm <sup>2</sup> ) T= 5845 POUND FORCE               |
| - 1 AERIAL GROUND WIRE   | ACSR 0.15 in <sup>2</sup> ( 93mm <sup>2</sup> ) T= 900 POUND FORCE AT AVERAGE TEMPERATURE  |
| - 1 NEGATIVE FEEDER WIRE | ACS 0.45 in <sup>2</sup> ( 288mm <sup>2</sup> ) T= 2023 POUND FORCE AT AVERAGE TEMPERATURE |

NOTES:

- 1 HIGH SPEED OVERHEAD CONTACT SYSTEM TYPICAL CONFIGURATION FOR 220 mph
- 2 FOR THE MAST CLEARANCE AND POSITIONING OF DRAINAGE, REFER TO TYPICAL TRACK CROSS SECTION
- 3 THE TYPICAL CONTACT WIRE HEIGHT FOR THE CHSTP HIGH SPEED OCS IS 17f+ (TBD)
- 4 TYPICALLY 55in
- 5 TYPICALLY 19f+ (TBD)
- 6 TYPICALLY 22f+ (TBD)
- 7 TYPICALLY SAG = A/2000 FOR 220 mph (350 kph)
- 8 DROPPER SPACING TYPICALLY  
a= 15f+ AND b= 22f+ 6in  
(b = 1.5\*a)



SECTION F

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY E. SCOTSON
DRAWN BY A. ANTONIO
CHECKED BY T. MURPHY
IN CHARGE E. SCOTSON
DATE 07-07-09



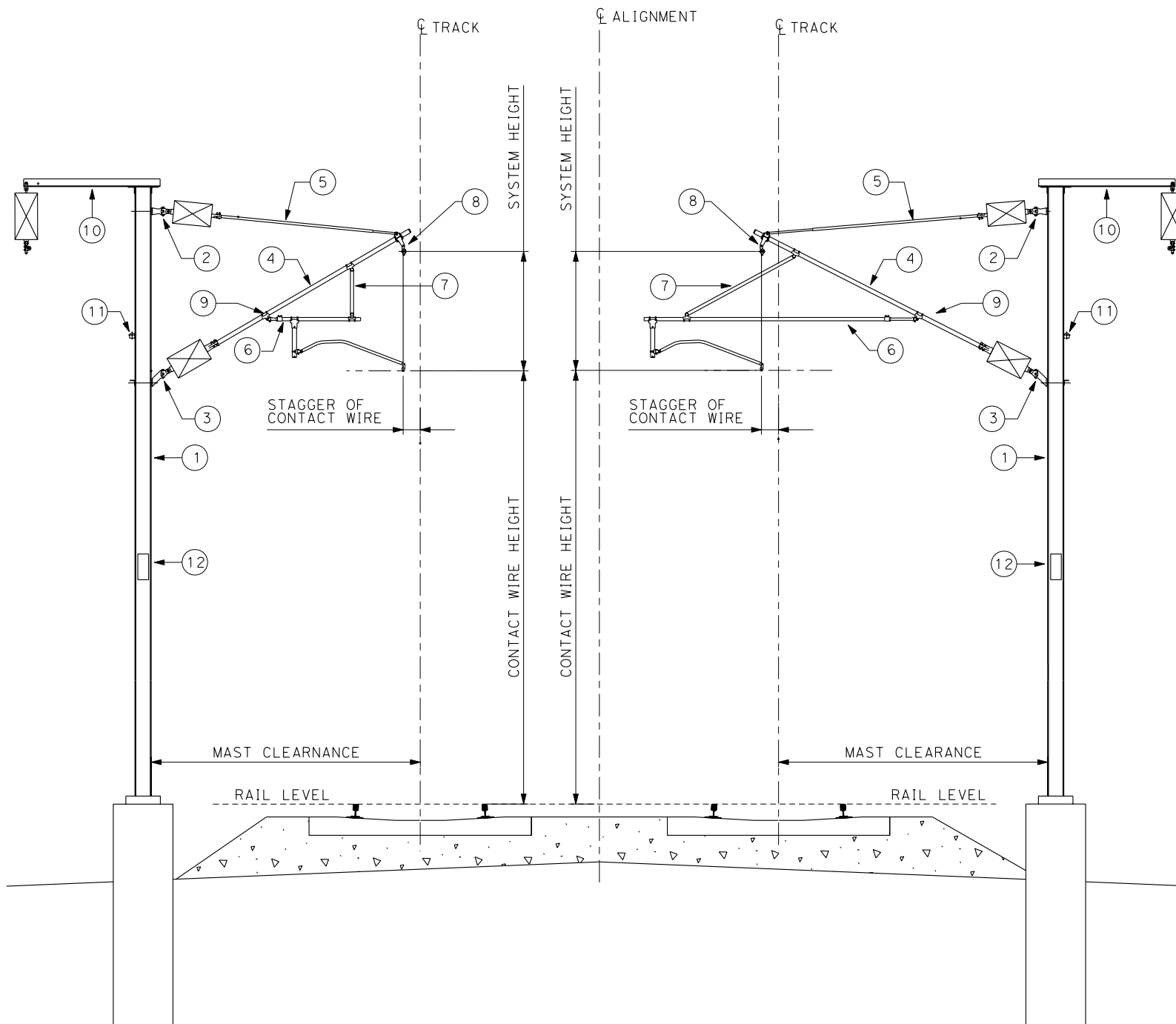
CALIFORNIA HIGH-SPEED TRAIN PROJECT  
OVERHEAD CONTACT SYSTEM

TYPICAL OPEN ROUTE  
HIGH SPEED OCS CONFIGURATION  
220 MPH

CONTRACT NO. 13259B
DRAWING NO. TM 3.2.1-G
SCALE NO SCALE
SHEET NO.

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antonio



ITEM	DESCRIPTION
1	H-BEAM MAST
2	SWIVEL FASTENING ASSEMBLY FOR TOP TUBE ON H-BEAM MAST
3	STRUT TUBE FASTENING ASSEMBLY
4	INSULATED STRUT TUBE ASSEMBLY
5	ADJUSTABLE INSULATED TOP TUBE
6	REGISTRATION ARM WITH STEADY ARM
7	REGISTRATION ARM BRACE
8	CATENARY WIRE SUSPENSION ASSEMBLY
9	REGISTRATION ARM FASTENING ASSEMBLY
10	TYPICAL NEGATIVE FEEDER CANTILEVER SUPPORTING ASSEMBLY
11	AERIAL GROUND WIRE SUSPENSION ASSEMBLY
12	STRUCTURE NUMBER PLATE

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY E. SCOTSON
DRAWN BY A. ANTONIO
CHECKED BY T. MURPHY
IN CHARGE E. SCOTSON
DATE 07-07-09



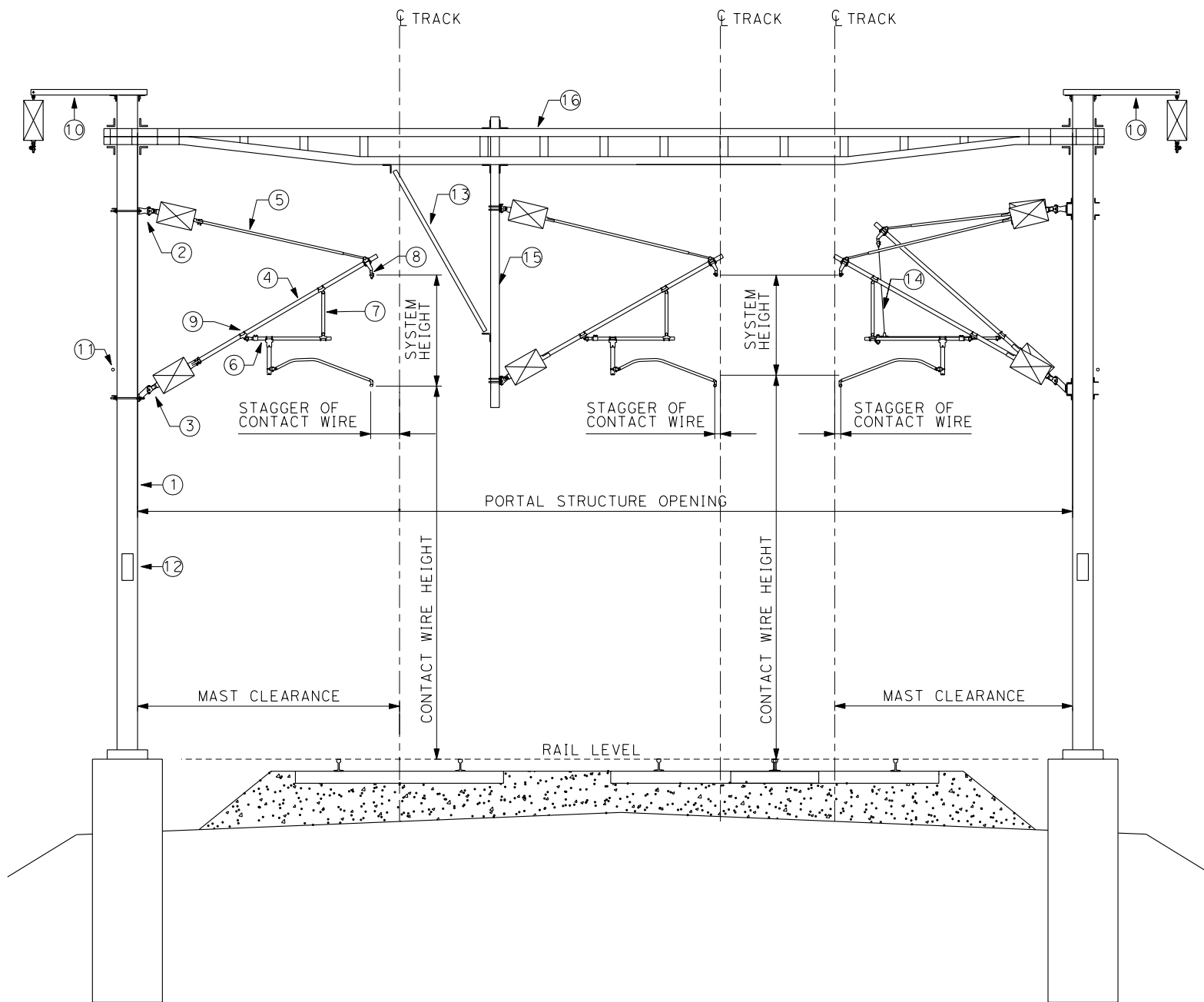
CALIFORNIA HIGH-SPEED RAIL AUTHORITY  
**FLY CALIFORNIA**  
*Without ever leaving the ground.*

**CALIFORNIA HIGH-SPEED TRAIN PROJECT  
OVERHEAD CONTACT SYSTEM**

TYPICAL OCS EQUIPMENT FOR  
TWO TANGENT TRACKS IN OPEN ROUTE  
220 MPH

CONTRACT NO. 13259B
DRAWING NO. TM 3.2.1-H
SCALE NO SCALE
SHEET NO.

7/7/2009 11:05:13 AM T:\13259B Calif High Speed Rail\CADD\Directive Drawings\3.2.1 - OCS Configuration\3.2.1-1.dgn  
antonio



ITEM	DESCRIPTION
1	H-BEAM MAST
2	SWIVEL FASTENING ASSEMBLY FOR TOP TUBE ON H-BEAM MAST
3	STRUT TUBE FASTENING ASSEMBLY
4	INSULATED STRUT TUBE ASSEMBLY
5	ADJUSTABLE INSULATED TOP TUBE
6	REGISTRATION ARM WITH STEADY ARM
7	REGISTRATION ARM BRACE
8	CATENARY WIRE SUSPENSION ASSEMBLY
9	REGISTRATION ARM FASTENING ASSEMBLY
10	TYPICAL NEGATIVE FEEDER CANTILEVER SUPPORTING ASSEMBLY
11	AERIAL GROUND WIRE SUSPENSION ASSEMBLY
12	STRUCTURE NUMBER PLATE
13	BRACE OF DROP TUBE
14	FLEXIBLE CABLE SUSPENSION
15	DROP TUBE SUPPORTED FROM PORTAL BEAM
16	PORTAL BEAM

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY E. SCOTSON
DRAWN BY A. ANTONIO
CHECKED BY T. MURPHY
IN CHARGE E. SCOTSON
DATE 07-07-09



**CALIFORNIA HIGH-SPEED TRAIN PROJECT  
OVERHEAD CONTACT SYSTEM**

TYPICAL OCS ARRANGEMENT UNDER  
PORTAL BEAM - TANGENT TRACK WITH TURNOUT  
220 MPH

CONTRACT NO. 13259B
DRAWING NO. TM 3.2.1-1
SCALE NO SCALE
SHEET NO.



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FOR CONTACT WIRE HEIGHT		18ft 9in OR LESS	
HORIZONTAL CURVES RADIUS (ft)		MAXIMUM SPAN LENGTH (ft)	
FROM	TO	WIND SPEED 80 MPH	WIND SPEED 90 MPH
4950	6550	160	130
6550	8200	160	130
8200	11300	160	130
11300	14440	160	130
14440	19500	160	130
19500	32800	160	130
32800	65600	175	145
65600	TANGENT	175	160

MAXIMUM TENSION SECTION LENGTHS COUNTERWEIGHT TO COUNTERWEIGHT	
NORMAL IN OPEN ROUTE	4600ft
EXCEPTIONAL IN OPEN ROUTE	5000ft
AT TUNNELS	4000ft
AT SUPPLY STATIONS	4000ft

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY C. LALOGUE
DRAWN BY A. ANTONIO
CHECKED BY A. MURPHY
IN CHARGE E. SCOTSON
DATE 07-07-09

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CALIFORNIA HIGH-SPEED RAIL AUTHORITY

**FLY CALIFORNIA**  
*Without ever leaving the ground.*

**CALIFORNIA HIGH-SPEED TRAIN PROJECT  
OVERHEAD CONTACT SYSTEM**

MAXIMUM SPAN AND TENSION  
SECTION LENGTHS 220 MPH

CONTRACT NO. 13259B
DRAWING NO. TM 3.2.1-J
SCALE NO SCALE
SHEET NO.