FINANCIAL PROJECT ID	STATE PROJ. NO.	SHEET NO.

INSTRUCTIONAL NOTES FOR DESIGNERS AND FABRICATORS

1. This Index, 17741, is for use in preparing signalization plans when single arm and double arm mast arm assemblies are required. This standard establishes the requirements of mast arm components listed on the Qualified Products List (QPL). When using components on the QPL, the "Mast Arm Assemblies Design Table", will be the only information required in the Contract Plans, and shop drawings are not required.

2. If a mast arm configuration does not meet the requirements stated below, a special design and shop drawing submittal is required. For Special Designs, Structures Standard Drawing S-1710 must be completed and included in the Contract Plans.

3. The "Standard Mast Arm Assemblies Design Table" on Structures Standard Drawing S-1700 is to be filled out in accordance with the following instructions and examples on Sheet No. 2 of 2 and included in the Contract Plans.

4. The Data for Standard Mast Arm Assemblies are on Index No. 17743. The arm classes are used regardless of single or double arm configurations. The poles are for either single or double arm configurations without luminaires or single arm configurations with luminaires.

5. The standard arm lengths and the signal and sign locations used for design of the arm are shown on the mast arm design loading trees on this sheet. If the same arrangement of signals and signs is used with one or more signals or signs closer to the pole, the standard arm may be used. If the same arrangement is used but one or more signals or signs are further from the pole, or if a different configuration of signals and signs is used, a special design is required.

6. The arm types shall be specified in the "Standard Mast Arm Assemblies Design Table". If the standard arm length is used, no further entries are required under the arm columns. If necessary, a shorter arm length may be obtained by removing length from the arm tip. In this case, enter the actual arm length (FAA) and actual tip diameter (FBA) under the appropriate arm in the "Standard Mast Arm Assemblies Design Table".

7. If a double arm structure is required, both arm types and the angle between the arms (UF) shall be entered in the "Standard Mast Arm Assemblies Design Table". The angle between arms is measured counterclockwise from the first arm and shall be either 90° or 270°. If the angle between the arms is not 90° or 270°, a special design is required.

8. Pole types Q1 thru Q6 and R1 thru R6 may be used with both single arm and double arm structures without luminaires. Pole types Q21 Lum thru Q24 Lum and R21 Lum thru R24 Lum are intended for single arm structures with luminaires. Use the Pole Selection Table to select the pole type to be used with any combination of arm types. The pole, connection plate, base plate variables and drilled shaft variables are shown in the "Pole, Connection and Shaft Design Table" on Index No. 17743.

9. The connection plate variables are constant for all arms used with each pole type. If a double arm structure is used, the same connection plate variables are to be used for each arm.

10. The pole type and arm mounting height (UB) shall be specified in the "Standard Mast Arm Assemblies Design Table". The arm mounting height (UB) shall be between 18' and 22'. A Special Design is required for arm mounting heights greater than 22'. Standard poles Q1 thru Q6 and R1 thru R6 are available in the 24 foot height. If the standard height is used, no further entries are required under the pole information. If necessary, a shorter pole may be obtained by removing height from the pole tip. In this case, enter the actual pole height (UAA) and the actual pole tip diameter (UCA) in the "Standard Mast Arm Assemblies Design Table".

11. Poles Q21 Lum thru Q24 Lum and R21 Lum thru R24 Lum are designed for a luminaire mounted 10 feet off the face of upright at a 40 foot mounting height with a 37.5 foot arm connection height. Luminaire is 2.4 sq. ft. (max) and 45 lbs. (max). Differing arm configurations, pole mounting heights or luminaire will require a Special Pole Design.

12. Component type numbers shall be entered in the Assembly Numbers column using the following format:

Single Arm:
Arm Type - Pole Type = B# - Q#
= C# - R#

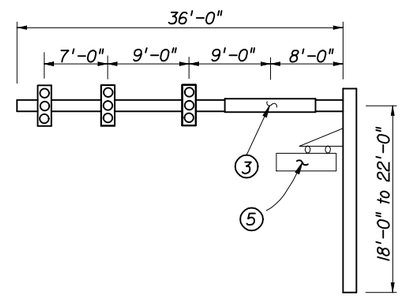
Double Arm:
First Arm Type - Second Arm Type - Pole Type = B# - B# - Q#
= C# - C# - R#

13. The foundations for Standard Mast Arm Assemblies are pre-designed and are based upon the following conservative soil criteria which covers the great majority of soil types found in Florida:

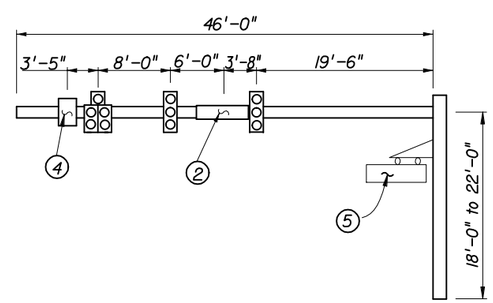
Classification	=	Cohesionless (Fine Sand)
Friction Angle	=	30 Degrees (30°)
Unit Weight	=	50 lbs./cu. ft. (assumed saturated)

Only in cases where the Designer considers the soil types at the specific site location to be of lesser strength properties should an analysis be required. Auger borings, SPT borings or CPT soundings may be utilized as needed to verify the assumed soil properties, and at relatively uniform sites, a single boring or sounding may cover several foundations. Furthermore, borings in the area that were performed for other purposes may be used to confirm the assumed soil properties.

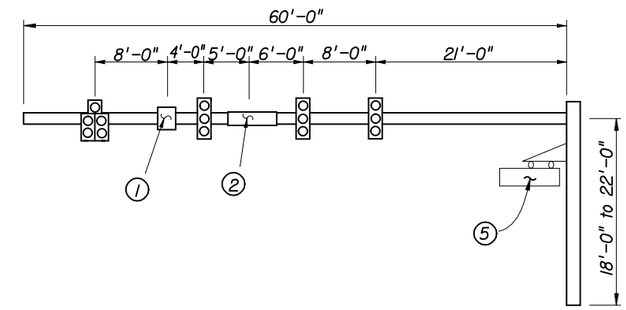
14. Standard Mast Arm Assemblies may be placed on existing foundations with notations to Structures Standard Drawings S-1700 or S-1710 as necessary to implement installation. Anchor installation shall be in accordance with Sections 416 and 937 of the Specifications and in accordance with manufacturer's recommendations. Anchors may be offset from center but must be placed such that all Anchors are within the Foundation reinforcing cage. Remove existing grout pad. Cut existing Anchor Bolts flush with top of Foundation. Replace damaged or removed portions of Foundation, using epoxy bonding compound as necessary, according to Section 400 of the Specifications. Replace grout pad according to Section 934 of the Specifications.



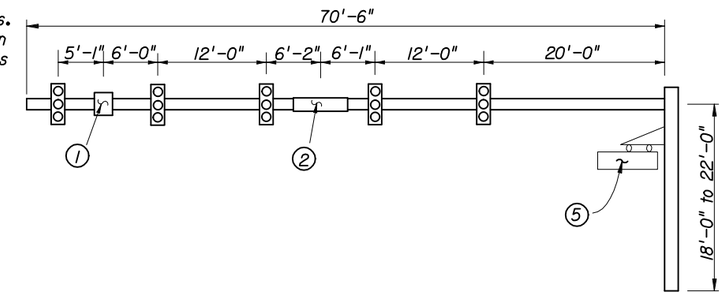
DESIGN LOADING TREE FOR ARM TYPES B1, B2, C1 & C2



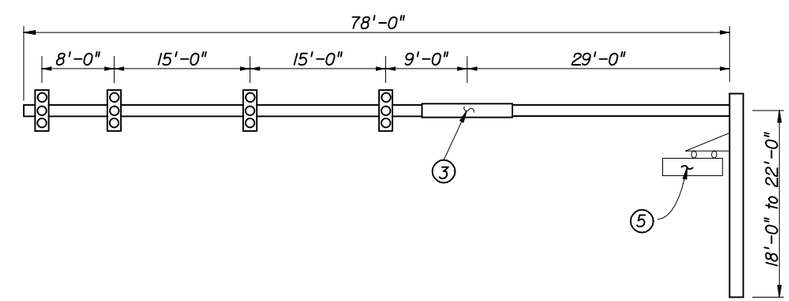
DESIGN LOADING TREE FOR ARM TYPES B3, B4, C3 & C4



DESIGN LOADING TREE FOR ARM TYPES B5 & C5



DESIGN LOADING TREE FOR ARM TYPES B6 & C6



DESIGN LOADING TREE FOR ARM TYPES B7 & C7

THE SEALED RECORD OF THIS STANDARD IS ON FILE IN THE ROADWAY DESIGN OFFICE.

INTERIM STANDARD IN ENGLISH UNITS APPLICABLE TO ROADWAY AND TRAFFIC DESIGN STANDARD BOOKLETS PUBLISHED IN EITHER ENGLISH OR METRIC UNITS.

NOTES:

1. Standard Mast Arm Assemblies are designed for the following criteria:

Arm Type B - 110 mph Wind Speed with Signal Backplates
Arm Type C - 90 mph Wind Speed with Signal Backplates
or 110 mph Wind Speed without Signal Backplates

2. Signal Heads are shown mounted vertically; however, heads may be mounted horizontally when so indicated in the plans.

(1) Denotes a 2'-0" x 2'-6" Sign.
(2) Denotes a 1'-6" x 6'-0" Sign.
(3) Denotes a 1'-6" x 10'-0" Sign.
(4) Denotes a 2'-0" x 3'-0" Sign.
(5) Denotes a 12 sq. ft. (max), 75 lbs. (max) internally illuminated sign on a hinged bracket attached to pole which is acceptable by Contractor Certification provided it meets applicable requirements of Specification Section 699.

Date: 7-17-02

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

INSTRUCTIONS AND EXAMPLES FOR DESIGNERS AND FABRICATORS OF STANDARD MAST ARM "B" & "C" ASSEMBLIES

INTERIM STANDARD

THIS INDEX IS A SUPPLEMENT TO THE DESIGN STANDARDS, BOOKLET DATED JANUARY 2002.

APPROVED BY Robert E. Nichols Jr.
State Structures Design Engineer

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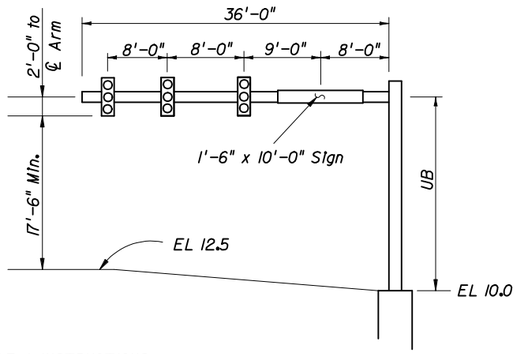
EXAMPLE 1

Single Arm Structure as shown,
90 mph Wind Speed with Signal Backplates.

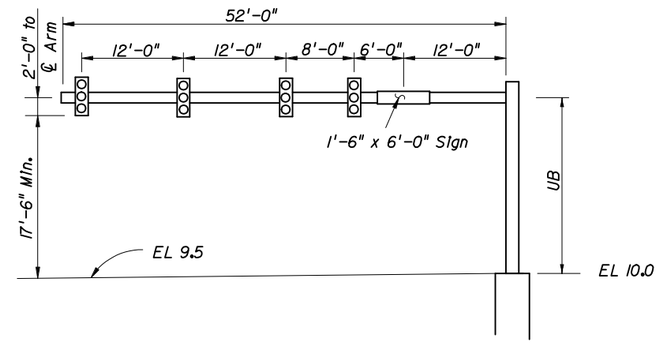


EXAMPLE 1 INSTRUCTIONS

1. Select Arm Type
   Compare attachment sizes and locations with design loading trees. In this case, all signals and signs are no farther from the pole than shown in the 36' Arm loading tree. Enter Arm Type C1 in the "Standard Mast Arm Assemblies Design Table" on Structures Standard No. S-1700.
2. Select Pole Type
   Use Pole Selection Table (Single Arm) on Index No. 17743 (2 of 2) with Arm Type C1 and select Pole Type 'R1'. Enter Pole Type 'R1' in the "Mast Arm Assemblies Design Table".
3. Determine Arm Mounting Height 'UB'.
   'UB' + 10' = 12.5' +17.5' (Min.) + 2'
   'UB' = 22.0' Min. Use 22'
   Enter UB = 22'-0" in the "Standard Mast Arm Assemblies Design Table"
4. Enter Assembly Numbers
   C1 - R1
   Arm Type - Pole Type

EXAMPLE 2

First Arm Structure as shown, Second Arm same as Example 1
except 110 mph Wind Speed with Signal Backplates.



EXAMPLE 2 INSTRUCTIONS

1. Select First Arm Type
   Designate longest Arm as First Arm. For a 52' Arm, investigate Arm B5 (Maximum Arm Length = 60') As in Example 1, compare attachment sizes and locations with design loading tree. In this case, all attachments are no larger than and are closer to the pole than shown in the design loading tree. Select and enter Arm Type B5 under the First Arm in the "Standard Mast Arm Assemblies Design Table" on Structures Standard No. S-1700.
2. Specify shorter Arm.
   Since the full 60' of Standard Arm 'B5' is not required, provide the required 52' arm by entering an actual length of 28' under 'FAA' for the first Arm ('FAA' + 'FE'-Splice = 28' + 26'-2'=52').
   Determine actual tip diameter 'FBA' for Arm shortened by 8'.
   FBA = FB + (60' - 52')(0.14"/ft)
   FBA = 7.96" + 8' (0.14"/ft) = 9.08"
   Enter 9.08" for FBA under First Arm.
3. Select Second Arm Type - choose B2.
4. Enter angle between arms as 'UF' in "Standard Mast Arm Assemblies Design Table". The angle is measured counter-clockwise from the First Arm and must be either 90° or 270°.
5. Select Pole Type
   Use Pole Selection Table (Double Arm) on Index No. 17743 (1 of 2) with Arm Types 'B5' and 'B2', and select Pole Type 'Q3'. Enter Pole Type 'Q3' in the "Standard Mast Arm Assemblies Design Table".
6. Determine Arm Mounting Height 'UB'.
   'UB' + 10' = 9.5' +17.5' (Min.) + 2'
   'UB' = 19.0' Min. Use 20'
   Enter UB = 20'-0" in the "Standard Mast Arm Assemblies Design Table"
7. Specify shorter Pole height.
   This procedure is similar to specifying a shorter Arm. Select actual height of 22' and enter under 'UAA' in the "Mast Arm Assemblies Design Table".
   Determine actual tip diameter 'UCA' for shortened Type 'Q3' Pole.
   UCA = 18.64" + (24' - 22')(0.14"/ft.) = 18.92"
   Enter 18.92 under "UCA" in the "Standard Mast Arm Assemblies Design Table".
8. Enter Assembly Numbers
   B5 - B2 - Q3
   First Arm Type - Second Arm Type - Pole Type

STANDARD MAST ARM ASSEMBLIES DESIGN TABLE

STRUCTURE ID NUMBERS	ASSEMBLY NUMBERS (1)	FIRST ARM			SECOND ARM			UF (deg)	POLE				SPECIAL DRILLED SHAFT DATA(4)			
		ARM TYPE	FAA (ft.)(2)	FBA (in.)(2)	ARM TYPE	FAA (ft.)(2)	FBA (in.)(2)		POLE TYPE	UAA (ft.)(3)	UB (ft.)	UCA (in.)(3)	DA (ft.)	DB (ft.)	RA	RB
Example 1	C1 - R1	C1			·		·	·	R1	·	22	·	·	·	·	·
Example 2	B5 - B2 - Q3	B5	28	9.08	B2	·	·	270	Q3	22	20	18.92	·	·	·	·
·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·

TABLE NOTES:

(1) Assembly Number Legend

Single Arm:
Arm Type - Pole Type = B# - Q#
= C# - R#

Double Arm:
First Arm Type - Second Arm Type - Pole Type = B# - B# - Q#
= C# - C# - R#

(2) If an entry appears in columns "FAA" and "FBA", a shorter arm is required. This is obtained by removing length from the arm tip. For these cases the mast arm length shall be shortened from "FA" to "FAA" and the tip diameter shall be increased from "FB" to "FBA".

(3) If an entry appears in columns "UAA" and "UCA", a shorter pole is required. This is obtained by removing length from the pole tip. For these cases the pole height shall be shortened from "UA" to "UAA" and the pole tip diameter shall be increased from "UC" to "UCA".

(4) The foundations for Standard Mast Arm Assemblies are pre-designed and are based upon the following conservative soil criteria which covers the great majority of soil types found in Florida. Only complete the "Special Drilled Shaft Data" information if site conditions dictate drilled shafts with additional foundation capacity.

Classification = Cohesioless (Fine Sand)
Friction Angle = 30 Degrees (30°)
Unit Weight = 50 lbs./cu. ft. (assumed saturated)

Date: 7-17-02

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