

(Sample plans and figures are located in the index)

Title Page

The following shall be on the title page(s)

1. **Vicinity map:** with all nearby streets and street names see figure 1-A.
2. **Legend:** for all symbols, lines and abbreviations used see figure 2-A and 2-B.
3. **Pole spec and cabinet foundation detail:** showing Lancaster standard pole detail see figure 3-A, 3-A1 and Lancaster standard cabinet foundation detail see figure 3-B.
4. **Traffic signal general notes:** verify that notes are correct and that the current edition of the CALTRANS standard specifications and standard plans and latest edition of the MUTCD are being used. **New Traffic signal poles shall use the 2010 Cal Trans standard specifications and standard plans** See figure 4-A.
5. **Special Provisions:** Ensure Part T specs are correct for CIP Projects See figure 5-A
6. **Signature / Title Block / Engineer's Stamp / North Arrow and Scale:** shall be included on all pages see figure 6-A and 6-B (Scale for signal plans is 1" =20' for signal interconnect 1" =40').

PLAN SHEETS

The following shall be on the plan sheet(s)

7. **Phase Diagram:** indicating the operation of the traffic signal at the intersection shall be complete and shown. See figure 7-A, 7-B, and 7-C.

Verify that the correct signal and pedestrian phases are being used for the intersection to function properly and correspond with Lancaster standard phasing (Vehicle movements shall be indicated with a solid line with an arrow showing the direction of the movement. Pedestrian movements shall be indicated with a dashed line with an arrow at each end shown to the right of the direction of travel). A new signal will have a Phase Diagram (7C), a signal modification there will be a current (7A) and proposed (7B) diagram. New phases being added will be **bold**. Any signal operational notes (Notes describing the operation of the signal) shall be placed directly beneath the Phase Diagram.

8. Verify that current signal phases shown are correct.
9. Verify that new signal phases shown are correct.
10. Verify that current pedestrian phases shown are correct.
11. Verify that new pedestrian phases shown are correct.
12. Verify that Lancaster standard phasing is being used.

Lancaster standard phasing

Phase 1 W/B Left	Phase 5 E/B Left
Phase 2 E/B Thru	Phase 6 W/B Thru
Phase 3 N/B Left	Phase 7 S/B Left
Phase 4 S/B Thru	Phase 8 N/B

Pole and Equipment schedule: Shows an inventory of the poles and pole equipment being used at an intersection. Each item shall be labeled whether it is Existing (E), New (N), Relocated (R), or Remove and salvage (RS). When there is a majority of one type of equipment (Existing, New, Relocated, or Remove and salvage), the following can be written below the pole schedule instead of labeling each item: "All equipment is *existing* unless otherwise noted." All abbreviations or symbols used in the pole schedule shall be identified below the pole schedule. Must be complete. See figure 13-A for 13 thru 31.

13. Verify all poles at the intersection are identified. Poles can be identified by number or letters (POLE A, POLE B / POLE 1, POLE2 etc.).

13.a Is the pole new and being installed?

13.b Is the pole existing and being replaced?

13.c Is the pole existing and remaining?

USE CALTRANS STD PLAN (YEAR BEING SPECIFIED) TO VERIFY THAT 14 – 20 ARE COMPATABLE AND CORRECT. See Figure 14-A.

14. Identify pole year and that it is correct. All poles and mast arms will be ordered based on the pole year **2010 is Lancaster standard for new poles** (Input year).

15. Identify the type of pole. Pole numbering system: 19-4-100, first number is Type of pole. (Determined by length of mast arm and height of pole) Type 15, Type 22 and 1-A poles only have one number since there is no mast arm. (Input type of pole).

16. Identify load case rating the second number in the sequence (how many devices that can be on the mast arm everything counts signal heads, traffic signs, street name signs, etc.) consider future development, go with higher load rating when possible. Input number.
17. Identify the wind rating in miles per hour the third number in the sequence 80 or 100 are acceptable. (Input MPH).
18. Identify the pole height and verify that there are no overhead obstructions, Pole Height is standard based on type of pole (Can be modified when custom ordered if needed).
19. Verify that the mast arm is the correct length, Mast arm should reach the center of the furthest lane. Edge of furthest lane minimum. If the intersection is not developed consider future needs, will more signal heads be needed for future lanes or future protected left turns. Specify the larger pole when possible. Smaller mast arms can be ordered to fit larger poles, you cannot put larger mast arms on smaller poles. (If a new mast arm is being placed on an existing pole the CALTRANS pole year and case load must match the existing mast arm pole).
 - 19.a Verify the F spacing (The distance between the furthest signal head and the next signal head in line shows minimum can be greater).
 - 19.b Verify the minimum spacing between the rest of the signal heads (Shows minimum can be greater).
20. Verify that the luminaire arm is the correct length (15' length standard 12' only used if pole must be placed near curb face or older pole that cannot accommodate a 15') **If there are overhead power wires there must be 15' minimum clearance, if clearance is 15' or less use a flat luminaire arm** - Input length.
 - 20.a Is a flat luminaire arm required?
21. Verify that L.E.D. is correct wattage 120w or 150w. (Match with street lights use the highest wattage of the intersecting streets, streetlight information can be found on the cities GIS streetlight layer) Input wattage.
22. Verify that the Street name signs are on the correct pole.
23. Verify that the Street name is spelled correctly.
24. Identify the number of signal heads on the mast arm. See figure 24-A, 24-B, and 24-C to identify signal head types (Input number).
 - 24.a Verify that the number of signal heads on the mast arm is correct.
- 25 Verify that pole load rating is correct for number of signal items (Automatic for excel spreadsheet).
26. Verify that there is a 10' signal head on the pole.
27. Verify that there is a ped head(s) on the pole (Input phases).
28. Verify that there is a ped button(s) on the pole (Input phases).

29. Verify the ped button and ped button phases on the pole are correct.

30. Verify that the pole location is correct See figure 30-A (6' off curb face is preferred. 5 feet Maximum from edge of crosswalk to face of pole, if intersection is not developed consider future needs, possibly put pole at edge of ROW. If pole is too far from crosswalk a ped pole shall be used). Locations shall be potholed and approved by the engineer before the poles are ordered. (See part T pole section for pothole specifications) Specify location of terminal block 180 degrees from mast arm is preferred (3' minimum working area is needed 90 degree will be used if obstructions are present)

30.a After pole location is approved specify 180- or 90-degree terminal block for pole order

30.b Verify that pole location detail is shown next to the pole schedule. Pole location detail supplements the pole schedule shows how pole should be measured See figure 30-B.

31. Verify that all work being done on the pole is specified in the remarks section with a number that corresponds to the construction notes where the work is described in detail. The F spacing can be shown here also.

Conductor schedule: Shows an inventory of the electrical wires, camera wires, Loop wires, CCTV wires, Fiber / interconnect and conduit being used at an intersection. Each item shall be labeled whether it is Existing, New (N), or Removed. When there is a majority of one type of equipment (Existing, New, or Removed), the following can be written below the conductor schedule instead of labeling each item: "All equipment is *existing* unless otherwise noted." All abbreviations or symbols used in the conductor schedule shall be identified below the conductor schedule. Conductor schedule is furnished as an installation guide only. It shall be the contractor's responsibility to provide the correct conductors required for the intended operation. Shall be listed below the conductor schedule.

Each signal phase requires 3 wires and 1 neutral- each ped head requires 2 wires and 1 neutral. The neutral can be shared. Ped buttons require 1 wire and 1 neutral. All new installations require 12 conductor cables. All 12 conductors (11 wires and 1 neutral), 3 wire PPB wire (2 wires 1 neutral), Video detection wires (Manufacturers spec), and CCTV wire (Manufacturers spec), shall be run continuous from the cabinet to the pole. Luminaire wires (2- # 10 wires may be spliced in pull box). There shall be a minimum of 3 spare wires per pole, some poles will require multiple 12 conductors (2 Phases and one ped on a pole uses- 8 wires and 1 neutral leaving 3 spares) PPB wire can do 2 phases per pole. (No spare required for ped buttons) The signal service wires consist of 3 # 6 wires (1 power wire, 1 neutral, and 1 ground) Conduit shall be run to all equipment. Conduit shall be the correct size and not over filled (Over 25% filled go to larger conduit or add another conduit).

Lancaster conduit requirements

4" Conduit has been used for all crossings.

3" Conduit has been used in pole foundations for all mast arm poles.

2 ½" conduit has been used for Type 15TS and 22 poles.

2" conduit has been used for 1-A poles.

1" conduit has been used for pedestrian push button poles.

Existing locations will have conduit runs on three sides with one open side. For new installations there shall be conduit runs on all sides. (One side shall be empty conduit with a #10 ground wire and pull tape). Most plans will only number the conduit runs from between pull boxes, the runs from pull boxes to poles will be shown but not numbered.

Verify 32 thru 42 on conductor schedule and on drawing.

32. Conductor schedule is shown and complete See figure 32-A.

33. Verify that there is conduit run to all equipment and that it is numbered.

34. Verify that the correct size and number of conduits are being used.

35. Identify wires needed for each pole 35a-35e.

35.a Verify number of signal phases on pole (Input number)

35.b Verify number of ped phases on pole (Input number).

35.c Verify number of wires needed plus 3 spares (Automatic for excel spreadsheet).

35.d Verify number of 12 conductors run to the pole (Input number).

35.e Verify that correct number of wires are being used (Automatic for excel spreadsheet).

36. Identify PPB wires needed for each pole 36a-36c.

36.a Verify number of ped buttons on pole (Input number).

36.b Verify number of PPB wires run to the pole (Input number).

36.c Verify that the correct number of PPB wires is being used (Automatic for excel spreadsheet).

37. Verify that service wires are correct and run between the service cabinet and signal cabinet.

38. Verify luminaire wires are run to all poles with luminaires.

39. Verify that video cable and camera power per manufacturers spec are run to all poles with detection cameras.

40. Verify that loops and DLC wire runs are shown when used.

Identify the type of detection on each phase (All phases must have detection unless it is noted that the phase will be in recall).

41. Verify that CCTV wires per manufacturers spec are run to any poles with CCTV cameras.

42. Verify that the Fiber / interconnect runs are shown.

42.a Is the fiber existing?

42.b Is the fiber new and being installed?

Verify 43 thru 72 on the drawing. Use legend 1 for reference.

43. Verify pole location and measurements are correct measurements should match pole schedule (look for conflicts with underground utilities).

43.a Verify poles are being shown as existing, new, being removed, or reused (Matches pole schedule).

44. Verify mast arm measurement (Matches pole schedule).

44.a Verify mast arms are being shown as existing, new, being removed, or reused (Matches pole schedule).

45. Verify the signal phases are on the correct pole (Phases have been identified on the plan view at all signal heads and ped heads).

46. Verify Lancaster standard phasing is being used.

47. Verify the correct number of signal heads are on the pole (matches pole schedule).

48. Verify placement of signal heads and that F spacing is correct See figure 48-A for preferred layout. Measure distance between signal heads (matches F spacing and signal head spacing).

48.a. Verify the plans show which signal heads are existing, new, being removed, or reused (matches pole schedule).

49. Verify that there are enough indications for each phase (through movements 3 indications min. (2 min if combined with a protected left turn phase) left turns 2 indications standard 2 min.

50. Verify signal head detail is correct and shown if needed. Any signal head that is not a standard 3-section head with circular indications shall be shown on the plans with a corresponding detail letter. See figure 50-A.

51. Verify the pedestrian heads (matches pole schedule) and pedestrian phases on the pole are correct See figure 51-A and 51-B for placement.

- 51.a Verify pedestrian heads are being shown as existing, new, being removed, or reused (Matches pole schedule).
- 52. Verify that the street name signs are shown and on the correct pole (Matches pole schedule)
- 52.a Verify street name signs are being shown as existing, new, being removed, or reused (Matches pole schedule).
- 53. Verify that the luminaires are shown and on the correct pole (Matches pole schedule).
- 53.a Verify luminaires are being shown as existing, new, being removed, or reused (Matches pole schedule).
- 54. Verify vehicle detection is shown and correct. (video detection or loops)
- 54.a Verify video detection cameras are on the correct pole and detection zones are shown (Show detector assignments, do not show measurements).
- 54.b Verify loop locations are being shown if used and are in the correct location (2 loops per lane for que's, 4 loops per lane for left turns, and 1 loop per lane for advance. Right turn lanes are 2 loops per lane only used for locations with heavy right turns)
- 54.c Verify detection cameras and loops are being shown as existing, new, being removed, or reused.
- 55. Verify that if CCTV is being installed that it is shown and on the correct pole (Inspect location in the field for best visibility).
- 55.a Verify CCTV is being shown as existing, new, being removed, or reused.
- 56. Verify that if a wireless antenna is being installed that it is shown and on the correct pole (Needs clear line of sight to the other antenna).
- 56.a Verify wireless antenna is being shown as existing, new, being removed, or reused.
- 57. Verify that if any traffic signs are being installed that they are shown and on the correct pole.
- 57.a Verify signs are being shown as existing, new, being removed, or reused (Matches pole schedule).
- 58. Verify all conduit runs are shown and numbered (Match with conductor schedule) See figure 58-A.
- 58.a Verify that conduit is being shown as new or existing.
- 58.b Verify that new signal installations have conduit runs on all four sides.
- 59. Verify that all pull boxes are shown (Pull boxes shall be near all equipment and connect conduit runs together. No pull box shall be located within one foot (1') of any curb ramp. Pull boxes shall not be placed in curb ramps, drive ways, or other locations that may be subject to vehicle traffic. Pull boxes for traffic signal interconnect shall be spaced at not more than 500'. Pull boxes shall be set parallel to the curb or roadway See figure 58-A.

59.a Verify that pull boxes are shown as existing, new, or being removed.

60. Verify that Fiber / interconnect run is shown.

60.a Verify that Fiber / interconnect is shown as existing, new, or being removed.

61. Verify that splice vaults are being shown where fiber is to be spliced (Splice Vault utility boxes shall be No. 06E pull boxes, including 6" extension to accommodate fiber optic splice enclosures). *The Fiber Optic Cable being spliced shall be pulled back from the nearest intersection, spliced, and a new Fiber Optic cable shall be pulled back to the intersection (List this in a construction note)*

61.a Verify that fiber splice vaults are shown as existing, new, or being removed.

62. Verify that signal cabinet and service are shown.

62.a Verify that the signal cabinet and service are shown as new, existing, remove and reuse, or being replaced.

62.b Verify that signal cabinet and service are in the correct location (Signal cabinet shall be located on the far side of the intersection (far side is the side after traffic has passed through the intersection).

62.c Cabinet is 20' from ECR. (Location can vary do to visual obstructions and utilities conduct a field inspection).

62.d Service shall be located on the same corner as the cabinet.

62.e Verify Edison service point has been identified on new installations.

63. Verify that if a Fiber cabinet exists or is needed that it is shown and if it is existing, being installed, or being replaced.

64. Verify that construction notes are shown and complete see figure 64-A and 64-B (Construction notes: All work being done should be described in the notes with a number box associated with it. Place call out box with a leader at all locations on the plans where work is being done). Number box shall be included in the remarks section of the pole schedule.

64.a Verify that a number box that corresponds with the construction notes is placed in the remarks section of the pole schedule.

64.b Verify that a call out box that corresponds to the construction notes is placed on the plans where the work is being done.

64.c Verify that the number box in the construction notes, the number box in the remarks, and the call out box all match and list all of the work being done.

65. Verify that all signing, striping, pavement, crosswalks, and curb markings are shown and labeled.

65.a Verify signing, striping, pavement, crosswalks, and curb markings are being shown as existing, new, or being removed. (No more than 3 minor changes can be shown on the signal plan anything more than that shall be on a separate signing and striping plan)

65.b Is a Signing and striping plan required?

66. Verify that curb and gutter, lane and road widths, and R.O.W. lines are shown (Road and lane widths are labeled at project limits and at match lines).

66.a Verify that curb and gutter, lane and road widths, and R.O.W. are identified as existing or proposed.

67. Verify that all underground and overhead utilities (water, sewer, storm drain, electric, gas, etc.) are shown and have been identified and confirmed correct with no conflicts.

68. Verify that any on surface or near surface structures that may affect the installation or modification of the signal are shown and confirmed correct.

69. Verify that traffic signals, sidewalks, driveways, and intersections are shown and are correct.

70. Verify that any objects that can obstruct the view of the traffic signal are shown.

71. Verify that streetlights are shown (any street light within 100' of a signal standard with a luminaire should be removed).

72. Verify that any work being done that is not listed in the construction notes or where extra emphasis is needed is shown on the plans with Miscellaneous details and that they are correct and called out with a Detail " " See Figure 72-A

Improvements that should be included in the project:

Equipment Upgrades: Is there any existing equipment that should be upgraded? If any work is being done on a pole, everything on the pole must meet current standards.

Signal cabinet and service: Verify that signal cabinet and service cabinet are at current standards, if not replace.

Wiring: Check condition of wiring, replace if needed.

Communications:

Is there existing fiber or wireless communications?

If the fiber installation is over a long area, or it is extensive it shall be on a separate Fiber/ Interconnect plan.

Does fiber need to be installed? (If a connection can be made with a nearby cabinet that has existing fiber).

Is a wireless antenna needed? (if there is not a nearby signal with fiber) multiple antenna will be necessary located at the next signal(s) in line for wireless communications.

Splice vaults may be needed to connect to existing fiber.

How many strands are there in the existing fiber (If it is under 72, new fiber meeting the current standard shall be installed to the closest connection point).

Is a Fiber / Interconnect plan required?

Detection: If the detection system is not current it should be upgraded. If there are bike lanes or bike lanes are being installed, bike detection must be installed. If the intersection is small, check into loops or 2-way detection with recalls.

CCTV: Check if location has been identified for CCTV.

Overall condition: Check with signal crew for any equipment that needs to be replaced.

Everything possible should be brought up to current standards during the project