

## Traffic Signal Standards

The following guidelines shall be followed when preparing traffic signal design plans and phasing layouts for new intersections which will be operated by the City of New Braunfels (City) on city street or state highways within the city limits. Traffic signal plans shall be signed and sealed by a professional engineer registered to practice in the state. If there is an existing traffic signal at the intersection the Engineer shall review the existing intersection phasing layout, condition, and operation and match the existing condition layout. Existing traffic signal timing and phasing layouts can be requested from the Public Works Department.

### 1- PHASE NUMBERING

The following phase numbering should be followed for **City of New Braunfels** operated intersections:

#### 1-1. Normal Intersections

- For major streets that run north/south: Ø2 is northbound
- For major streets that run east/west: Ø2 is eastbound
- Other through phases are numbered in a clockwise order from Ø2 using the even number phases
- Left-turn phases should be numbered using odd numbers (Ø1,3,5,7) in clockwise order with the Ø1 left-turn opposing the Ø2 through movement
- For minor street split phase intersections, normal phasing applies except that Ø3 would be used for the side whose throughs are normally Ø8. (i.e. Ø3 and Ø4 are used for the split phase).
- For major street split phase intersections, normal phasing applies except that Ø1 would be used for the side whose throughs are normally Ø6. (i.e. Ø1 and Ø2 are used for the split phase).
- If all approaches to the intersection are exclusive, the split phasing rules above would apply, but the phase sequence would be changed to Ø1 - Ø3 - Ø2 - Ø4.
- For intersections with Flashing Yellow Arrows (FYA) the following overlaps shall be utilized. The FYAs shall be wired in “non-compact mode” with the flashing yellow arrow output separated from the opposing pedestrian phase yellow output.
  - Ø1 FYA - Overlap A - Ø1 protected and Ø2 opposing through phase
  - Ø3 FYA - Overlap B - Ø3 protected and Ø4 opposing through phase
  - Ø5 FYA - Overlap C - Ø5 protected and Ø6 opposing through phase
  - Ø7 FYA - Overlap D - Ø7 protected and Ø8 opposing through phase

For locations in which twice a cycle operation is going to be used, then Ø1x should be used to designate the second service of a phase within a cycle (i.e. Ø17 is the second service of Ø7 in a

cycle).

In some rare cases (only in split phase intersections) there might be needed to use different phase numbers, depending on the pedestrian conditions. In these cases, the City shall approve the design. In any cases, Ø2 should always be used for the northbound or eastbound approach.

### *1-2. Diamond Intersections*

Please note that the Texas Department of Transportation (TxDOT) is responsible for the diamond intersections on IH-35. The following information is for future intersections where the City will be responsible for maintaining:

- For diamond interchanges the phase numbering is as follows:
  - Northbound or Eastbound Arterial: Ø2
  - Eastbound or Southbound Frontage Road: Ø4 + Ø12 (OLK)
  - Southbound or Westbound Arterial: Ø6
  - Westbound or Northbound Frontage Road: Ø8 + Ø16 (OLN)
  - Northbound or Westbound Left Turn: Ø1
  - Southbound or Eastbound Left Turn: Ø5
- Inside Overlaps
  - Ø1 left-turn side shall be OLI (OLA – used for FYA)
  - Through movement on Ø1 side should be OLB.
    - This was traditionally called OLA in the standard TTI sequence
  - Ø5 left-turn side shall be OLL (OLC – used for FYA)
  - Through movement on Ø5 side should be OLD.
    - This was traditionally called OLB in the standard TTI sequence

## **2- DESIGN FEATURES**

Traffic signals installed at intersections shall be installed on mast arms. Span wire installations will not be permitted unless approved by the City. All corners of intersections will be illuminated, with LED luminaires installed either on traffic signal poles or on poles already existing at the intersection. All pedestrian signals and ramps shall be consistent with American Disabilities Act (ADA) and Public Right-of-Way Accessibility Guidelines (PROWAG) requirements. All traffic signal heads shall be mounted a minimum of 19 feet vertically above the roadway surface and have 12-inch diameter LED lenses with vented aluminum back plates with reflective borders. Controller cabinets shall be ground-mounted utilizing the TxDOT San Antonio concrete pedestal controller foundation, the TxDOT statewide controller foundation is not permitted. Radar detection systems shall be installed for all approaches. Street name signs shall be installed on all mast arms.

The following is additional and more specific information concerning signal hardware for traffic signal installations:

#### *TRAFFIC SIGNAL POLES*

- Composition: Steel galvanized unless directed otherwise. TxDOT Standard 80 mph wind zone poles.
- For projects located along Walnut Avenue or Downtown the Engineer shall request the pole color from the City and include a note in the plans.

#### *SIGNAL MAST ARMS*

- Composition: Steel galvanized. Wind dampers shall be provided for all mast arms 40 feet or longer except for the bolt on mast arm on LMA poles.
- For projects located along Walnut Avenue or Downtown the Engineer shall request the pole color from the City and include a note in the plans.

#### *TRAFFIC SIGNAL STRAIN POLES (FOR SPAN SIGNALS, if permitted by the city)*

- Composition: Steel galvanized

#### *SIGNAL POLE FOUNDATIONS*

- All traffic signal pole foundations shall conform to TxDOT specifications.

#### *DAMPERS*

- Dampers shall be installed on all mast arms that extend 40 feet in length or longer.

#### *SPANS*

- All messenger cables mounted on spans shall be attached with stainless steel or galvanized lashing wire., including 5/16 inch upper cable and 3/16 inch bottom sway cable.

#### *PEDESTAL POLES*

- Composition: Aluminum Color: Aluminum
- For projects located along Walnut Avenue or Downtown the Engineer shall request the pole color from the City and include a note in the plans.

#### *SIGNAL HEADS*

- Lenses: LED lenses, 12-inches in diameter
- Signal Housing: Black Polycarbonate Eagle brand only with Astro-bracket style mounts for mast arms.
- Back plates: Black in Color. Eagle brand Vented Aluminum with high intensity prismatic yellow reflective 2 inch border.
- All hanger assemblies for span mounted signal heads shall be nonpainted color with stainless steel or galvanized hardware.

- All hanger assemblies shall have a gasket and washer installed on the collared nipple for watertight seal.

#### *PEDESTRIAN SIGNALS*

- Color of Housing: Black
- Composition of housing: Aluminum or polycarbonate Eagle brand
- Display: “Hand” and “Walking Person” symbols. (Countdown Type)
- All Audible Pedestrian Systems “APS” shall be Polara IN 2 APS or newer model in black.
- Include shelf mounted Polara APS Controller.
- Push Buttons: Conform to ADA requirements and have Push Button signs (Sign R10-3b (L or R) in the Texas Manual on Uniform Traffic Control Devices (TMUTCD)).

#### *LUMINAIRES*

- Luminaire and luminaire arms to be installed on traffic signal poles, unless illumination is already provided on existing poles near signal pole installation.
- Composition of Arm: Steel Color of Arm: Galvanized  
Type: LED overhead lighting

#### *CONTROLLER*

- Cobalt C that is compatible with the City’s current traffic management software (Centracs 2.3.0.1).
- Coordinate with the Public Works Department on the latest software.

#### *BATTERY BACK UP*

- Side mounted APC Battery Back Up complete unit.

#### *MMU*

- EDI Smart Monitor MMU2-16LEip to be compatible with the City’s infrastructure.

#### *CONTROLLER CABINET*

- Ground-mounted. TS-2 Type “P” NEMA Eagle aluminum with front door.
- The Cabinet shall be Mobotrex brand. If there are supply issues, please communicate with the City to help select an alternate model.
- Controller cabinets shall be ground-mounted utilizing the TxDOT San Antonio concrete pedestal controller foundation from standard MTS-18.
- The TxDOT statewide controller foundation is not permitted.

#### *COMMUNICATION EQUIPMENT*

- Provide PTZ Camera type AXIS M5525–E PTZ Network Camera.
- TU-MB06- 19005GB-GA Cradlepoint 6Yr Netcloud Mobile Perf Essen Perp Plan and R1900 Router with Wifi

- MB-RX30-POE Cradlepoint R1900 Managed Accessory Poe Cradlepoint Switch
- NCX-0005-SCL Cradlepoint 5-YR NETCLOUD EXCHANGE SECURE CONNECT - LARGE SITE ADD-ON; REQUIRES NETCLOUD ESSENTIALS
- 170870-000 Cradlepoint Power Adapter - Small, 2X3 - For Cradlepoint Rx30-Mc, Rx30-Poe; Rx30 Series Mb-Rx30-Mc, Rx30-Poe
- 170671-001 Cradlepoint Line Cord, Us (C13), 1.8M, Used With Cr4 Sharkfin Antenna
- GP-IN2680 Panorama Antennas 7-In-1 Sharkfin Kit - 4X4 Mimo 4G/5G Lte 2X2 Mimo Dual Band Wifi Gps / Gns with Advanced B13/B14 Advanced Filtering
- Cradlepoint IBR900 Extensibility Dock (Part# 170700-000)
- Cradlepoint IBR900 Power Adapter (Part# 170716-000)

#### *DETECTOR SYSTEM*

- No Traffic Nexus Omni with:
  - Stop bar detection.
  - Advanced detection for approaches over 45 M.P.H.
  - All radar systems shall be programmed by certified, qualified personnel.

#### *ADDITIONAL MATERIALS*

- Any manufacturer provided equipment that is needed to program or properly maintain controllers, radar systems, audible pedestrian systems, and preemption systems including communication cables and technical materials such as manuals are to be turned over to the City of New Braunfels.

#### *CONDUITS*

- All conduits shall be PVC Schedule 80.
- All conduits extending to the signal controller shall be 3 inches in diameter. A minimum of two (2) 3- inch conduits and one (1) 2-inch conduit shall be provided to each major signal pole foundation. The 3- inch conduits shall be used for the signal, detection, and CCTV cables. The 2-inch conduit shall be used for luminaire cables or reserved for future use. A minimum of one (1) 2-inch conduit shall be provided to each pedestrian pole.
- A separate 2 inch PVC Schedule 40 conduit shall be provided for power wire.
- All under roadway bores shall have PVC Schedule 80 conduit. All unused conduit runs shall have 1,500 pound test mule tape.
- All other conduits shall be of correct size to accommodate three times the amount of wiring (measured by adding the cross-sectional areas of the wires). In other words, the total of the cross-sectional areas of the individual wires called for in a specific wire run shall equal no more than 33 percent of the cross- sectional area of the conduit.

#### *STREET NAME SIGNS*

- Street name signs shall follow the typical D3-1G street name sign standard with 18 inches in height with a green background, white letters, block numbers and City Logo. Example detail can be requested from the City.
- Street name signs shall be installed on all signal mast arms.
- All street name signs shall be attached to bottom tether cables with breakaway hardware on span wire signals.
- Larger street name signs may require more than two attachment points to be determined by city.
- Street name signs 8 feet long and larger on span wire signals shall be attached to strain or timber poles with 2 Astro-brackets and V-tubes.

#### *SIGNS*

- All span mounted signs shall have bottom brackets attached to tether cables.
- All span mounted signs must be mounted so that they do not flip over or become lodged in any other position than in the direction they were originally mounted.
- All signs shall be TMUTCD signs.

#### *FLASHING OPERATIONS*

- All signals shall flash “red” during emergencies.

#### *GROUND BOXES*

- All ground boxes shall have TxDOT specification concrete aprons.

#### *POWER SOURCE*

- New Braunfels Utilities (NBU) or Guadalupe Valley Electric Cooperative (GVEC) shall establish location of power source. At each intersection, power via a power cable shall be extended from meter pole to the signal controller by signal contractor. New Braunfels utilities (NBU) or Guadalupe Valley Electric Cooperative (GVEC) shall install wire from power source to meter pole or pedestal with a TxDOT Type D service 70 AMP. The power cables from the meter to the traffic signal controller cabinet shall be #6 cable. After a test period of 30 days without failure of equipment from turn-on, the City will accept the signal.

#### *PRIORITY CONTROL SYSTEM DETECTORS*

- Coordinate with the Public Works Department on latest detectors.

#### *WIRING*

- Wiring for signal heads, pedestrian signals and push buttons, and illuminated signs (where required) shall be provided with either 7/C #14 stranded signal cable IMSA 19-1 or equivalent, 5/C #14 signal cable IMSA 19-1 or equivalent, or 3/C #14 signal cable IMSA 19-1 or equivalent.
- Luminaires shall be wired with 3 THHN 1/C # 12 luminaire cables. Luminaire cable shall bypass

controller and be connected directly into meter pedestal.

- The power cable shall be red, black, white, and green (or clearly marked with appropriately colored marking tape) and shall be placed in a separate conduit.
- The Radar cable shall be consistent with the cable recommended by the manufacturer of radar system and shall be placed in a separate conduit.
- The wiring provided for an individual signal pole (for signal heads, pedestrian signals, push buttons, etc.) shall contain sufficient additional conductors for future use. At least 33 percent additional conductors should be provided.
- All pedestrian signals shall be wired with a 4/C #14 signal cable. All pedestrian push button installations shall be wired with a separate 3/C #14 shielded (Type "C") signal cable.
- All traffic signal messenger cable wiring shall be terminated with 12-10 AWG Yellow Spade connectors and labeled with its associated phase number.
- #6 Bare Wire shall be utilized in all conduit runs and poles.
- No #10 or #20 cables shall be used.

#### *Portable Changeable Message Sign (PCMS)*

- PCMS will be needed at a new signalized intersection.

### **3- DESIGN NOTES**

Add design notes to the plan sheet. It can include the following:

1. Contractor shall pothole signal pole foundation locations near underground utilities prior to installing pole foundation.
2. Utilities shown are approximate. Contractor shall call for locates prior to commencing excavation. All utility locations shall be verified in the field by the contractor.
3. Location of traffic signal poles, cabinet and electrical service shall be verified and approved by City of New Braunfels prior to construction.
4. Signal heads shall have a minimum of 19 feet of clearance above the roadway surface.
5. Tray cable shall be run in 2 inch conduit separate from signal cable.
6. Luminaires are shown for clarity purposes only; orient them as directed by the engineer.
7. Contractor shall remove existing stop signs when traffic signal becomes operational. Removal is subsidiary to bid item 680.
8. Contractor shall furnish and deliver TS 2 type 2 controller cabinet and assembly to the City of New Braunfels Public Works Department for programming and testing four weeks in advance prior to contractor installing equipment in the field.
9. Contractor shall remove and deliver any equipment deemed salvageable to City of New Braunfels Public Works Department located at 424 S Castell, New Braunfels Texas 78130.
10. The contractor shall supply and install the address in permanent numbers and letters to the street side of the service enclosure. Said address shall also be recorded and given to the City of New

Braunfels inspector for their records.

11. Neatly cap/coil all wires and cables in ground box or at termination.
12. Signal operation will be monitored after construction and modified as necessary.
13. Contact the Public Works Department for cabinet set up and traffic signal acceptable equipment list.

Add a Caution Note that states:

THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT UNDERGROUND UTILITIES INCLUDING GAS ARE KNOWN TO EXIST IN THE VICINITY OF THIS WORK. CONTRACTOR SHALL CALL FOR LOCATES PRIOR TO BEGINNING WORK AND SHALL EXERCISE CAUTION WHEN INSTALLING SIGNAL EQUIPMENT INCLUDING POLE FOUNDATIONS AND CONDUITS

Add a Dig Note that states:

CONTRACTOR SHALL CONTACT DIGTESS @ 1-800-DIG-TESS OR TEXAS-811 FOR UTILITY LOCATION AT LEAST 72 HOURS PRIOR TO BEGINNING CONSTRUCTION

Add design notes to the elevation sheet. It can include the following:

1. Contractor shall pothole signal locations near underground utilities prior to installing pole foundation.
2. Minimum clearance of 40 inch radius from neutral and 10 feet radius from primary or secondary shall be maintained between proposed traffic signal equipment and existing overhead electrical lines.
3. All signal heads shall have back plates.
4. See "signal mast arm assembly" (SMA-80) standards for signal pole and mast arm details.
5. See "traffic signal foundation" (TS-FD) standards for drilled shaft details.
6. See "miscellaneous traffic signal detail" (MTS) standards for pedestal poles details.
7. Signal heads shall have the minimum of 19 feet clearance above roadway surface.
8. Contractor is responsible for verifying vertical clearance before pouring pole foundations.

#### **4- DESIGN CONSIDERATIONS**

- The Engineer should consider adding supplemental signal heads mounted on the signal pole upright on all intersections due the vertical and horizontal curves, presence of trucks, sight distance, and added visibility.
- The Engineer should review the existing adjacent Traffic signal locations and advanced signing on the approaches. Existing traffic signal or pedestrian crossing warning signs/roadside flashing beacons may need to be relocated or removed since a new signal is being added.
- The Engineer should review using vehicle travel path to ensure that left-turning and right-turns can occur within existing/proposed pavement. It should also be used to determine if opposing left-turns can occur simultaneously or if no serves phases are required. There should be a 10 ft separation



between opposing left-turn vehicles to occur simultaneously. Additionally, left-turn lanes should be designed offset to help a vehicle see the opposing thru vehicle when there is a left-turn vehicle waiting in the opposing lane.

- The Engineer should try to ensure that equipment is offset from back of curb by a minimum of 2 ft. Mast arms and span wire poles should be located 5 ft from edge of travel, if possible.

#### *SIGNAL HEAD CONFIGURATIONS*

- All vertical signal heads shall be used and have reflective back plates.
- The minimum clearance from the pavement to the bottom of the signal heads/signs shall be a minimum of 19 feet. The top of the foundation can be extended above the ground to meet the minimum clearance requirements.

#### *FLASHING YELLOW ARROW (FYAS) DESIGN CRITERIA*

- In general, FYAs should not be included on roadways with posted speeds over 45 miles per hour unless the engineer has verified sight distance and adequate gaps are available. FYAs should not be installed with 3- lanes or more opposing traffic.
- The City of New Braunfels can program the FYAs to operate by time-of-day which would allow protected only operations during some periods and protected/permitted operations during others.
- The Engineer should discuss the specific situation with the City during the 30% design review meeting if there are questions about the left-turn signal head treatment for a specific location.

#### *DIAMOND OPERATIONS*

- The signal head configuration at a diamond intersections should match the movements which can be made out of that specific lane.
- Left-turn only lanes – Four Section FYA signal head (between frontage roads or on a dedicated left-turn lane phased separately from the through movements on a frontage road OR Three section all arrow signal head.
- Shared Left-turn/through lanes – Five Section Signal Head (between frontage roads) OR Four Section Split Phased Signal heads (frontage road movements only).
- Through only lanes – three section all ball signal head .

#### *UTILITIES*

- A utility conflict matrix is required for all traffic signals. Level “B” SUE information is desired and Level “A” potholing is recommended in areas with congested utilities. The Engineer will coordinate with utility providers when there is a conflict.
- 10 feet of clearance must be provided between the overhead electric lines (Secondary) and any signal equipment.
- 2 feet clearance is typically desired from all underground utilities unless specified otherwise. Sometimes pipeline owners will specify 10 feet minimum unless a representative is present onsite during construction.

#### *PEDESTRIANS/BIKES*

- Pedestrian and Bikes should be accommodated at all intersections including during the TCP phase of a project. Pedestrians shall be accommodated throughout the project development and construction at signalized intersections.
- The Engineer shall reference the PROWAG requirements, TxDOT PED-18 Standards, and TMUTCD when placing pedestrian push buttons at an intersection making sure the buttons are accessible from the ramp landing
- It is desirable to have two separate poles/pedestrian buttons located a minimum of 10 feet apart on a corner. If 10 feet of separation cannot be met then the voice messages shall be programmed.
- The Engineer should consider the location of the signal pole hand holes and foundation sizes when placing push buttons as a button extender may be required to meet the minimum reach distances required by PROWAG.

#### *Controller Cabinet*

- When selecting the location of the controller cabinet, select a location where two approaches are visible at the cabinet. Additionally, the location of the cabinet should be accessible. If far away, provide a sidewalk path.

#### **5- GENERAL NOTES**

- Use the latest TxDOT San Antonio District General notes.
- In addition, add the following sections:
  - Portable Changeable Message Signs (PCMS) should be installed on each major street approach and activated when the signal is flashed. The intersection should be flashed a minimum of 7 days prior to full signal operation to notify the public. The PCMS signs should remain in place a minimum of 7 days after activation of the signal.
  - The signal shall not be flashed until the city has approved the signal, all equipment is set-up and operational, and the push list has been completed.

#### **6- SHEET SET-UP**

- All traffic signal systems shall be designed in accordance with the Texas Manual on Uniform Traffic Control Devices (TMUTCD) latest edition and acceptable engineering practices to ensure a safe and efficient operation.
- All traffic signal systems shall be designed to meet the latest and/or state-of-the-art operational and functional features for traffic signal system required by the City of New Braunfels.
- All traffic signal systems shall be designed in accordance with the City of New Braunfels' latest specifications and standard drawings.
- All traffic signal projects shall include a Topographic Surveys.
- The basic set of traffic signal system construction drawings shall include, but is not limited to the following categories:

1. Title Sheet
  2. General Notes Sheet
  3. Quantity Summary Sheet(s)
  4. Existing Conditions Sheet(s) with any Removals
  5. Proposed Traffic Control Sheet(s) – if required
  6. Proposed Paving Plan Sheet(s) – if required
  7. Proposed Traffic Signal Layout Sheet(s)
  8. Proposed Traffic Signal Conduit & Conductor Sheet(s)
  9. Proposed Traffic Signal Elevation View Sheet(s)
  10. Proposed Signing and Pavement Marking Sheet(s) – if required
  11. Standard Drawing Detail Sheet(s)
- Unless otherwise specified, all drawings are to be 11” x 17” in size at a 1” = 40’ scale. Typical project milestones for traffic signal system design requirements are the following:
    - First Submittal Design Drawings 30%: (1) Title, (2) General Notes (4) Existing Condition, (5) Proposed Traffic Control Sheet, (6) Proposed Paving Plan if required, (7) Proposed Traffic, (10) Permanent signing, pavement marking, & curb ramps, and (11) Standards.
    - Second Submittal Design Drawings 60%:(8) Conduit Conductor Schedule, (9) Elevation Sheets, and all from First Submittal
    - Third Submittal Design Drawings 90%: (3) Quantity Summary and all from First & Second Submittals
    - Final Submittal Drawings (Signed and Sealed) 100%
  - For Development projects:
    - Pre-design meeting
    - First Submittal Design Drawings 30%
    - Final Submittal Drawings (Signed and Sealed) 100% with a 2-year Warranty

#### *SUBMITTAL SCHEDULE*

All submittals shall be in PDF format and include the following items:

- Construction Plans
- Cost Estimate, PDF and Excel Format

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Traffic signal system construction drawings shall consist of, but are not limited to, the following:

1. Title Sheet
  - Project title including road names
  - Site map with North arrow.
  - Index of sheets

- Name and seal of Engineer.
2. Quantity Summary Sheet(s)
- Complete list of all construction items related to project with associated quantities using TxDOT bid items
  - All construction items shall reference a specification, construction contract and/or drawings.
  - Title block completely filled in, sheet is numbered.
  - No seal on sheet
3. Existing Condition and Removals Sheet(s)
- Legend showing all symbols and utility lines
  - North arrow and scale bar.
  - Utility notes
  - Existing right-of-way and easements.
  - Existing roadway geometrics (including sidewalks, ADA ramps, driveways, median openings, inlets, manholes, etc.).
  - Existing utility locations.
  - Annotation of proposed Lane widths
  - Existing signing and pavement markings.
  - Any existing signal equipment.
  - Use of match lines and not break lines – if applicable.
  - Existing speed limit on roadways.
  - Gray/fade/screen back existing that will remain and bold existing that will be removed.
  - Use callouts for existing to be removed items.
  - Title block completely filled in, sheet is numbered.
  - Name and seal of Engineer.
4. Proposed Paving Plan Sheet(s) – if required
- Legend showing all symbols and utility lines.
  - North arrow and scale bar.
  - Utilities, utility notes, special notes.
  - Right-of-way and easement(s).
  - Show any easement(s) or right-of-entry(s) that may be needed.
  - Annotation of proposed Lane widths
  - Centerline or baseline description.
  - Location of proposed improvement areas.
  - Typical roadway section(s).
  - Median nose section
  - Dimensions for any median or left turn lane improvements (including stations and offsets)
  - ADA facilities.
  - Block Sodding (placed around ADA ramps and adjacent to proposed roadway improvements)

as needed).

- Title block completely filled in, sheet is numbered.
- Any reference to a different sheet should have sheet numbers filled in.
- Name and seal of Engineer.

5. Proposed Traffic Signal Layout Sheet(s)

- Legend showing all symbols and utility lines.
- North arrow and scale bar.
- Utilities, utility notes, special notes.
- Right-of-way and easements.
- Roadway geometrics (including sidewalks, ADA ramps, driveways, median openings, inlets, manholes, etc.).
- Pavement markings.
- Poles – including signal, pedestrian, electrical service, etc.
- Luminaires.
- Vehicular signal head locations.
- Vehicle detection and zone
- Pull boxes and ground boxes.
- Conduit runs.
- Leader call-outs for all conduit and wire runs.
- Phasing diagram.
- Signal head schedule.
- Sign details table.
- Controller and controller cabinet description.
- Advance signal signing and/or flashers - if required.
- Title block completely filled in, sheet is numbered.
- Any reference to a different sheet should have sheet numbers filled in.
- Show any easements or right-of-entry that may be needed.
- Name and seal of Engineer.

6. Signal Conduit Conductor Sheet(s)

- Conduit and Conductor plans view run table
- Conduit and conductor pole run
- Proposed equipment table with northing and eastings
- Street sign details (Can be on its own sheet)
- Title block completely filled in, sheet is numbered.
- Any reference to a different sheet should have sheet numbers filled in.
- Name and seal of Engineer.

7. Proposed Traffic Signal Elevation Sheet(s)

- Legend.

- Special Notes.
  - Elevation views for all approaches including roadway section view.
  - Title block completely filled in, sheet is numbered.
  - Any reference to a different sheet should have sheet numbers filled in.
  - Name and seal of Engineer.
8. Permanent Signing, Pavement Marking, and Curb Ramp Sheet(s)
- Legend showing all symbols and utility lines.
  - North arrow and scale bar.
  - All proposed pavement markings.
  - All proposed signing. Show visual examples of signs
  - Annotation of proposed Lane widths
  - Annotate curb ramps landing, ramp, flare, and/or level surface.
  - Title block completely filled in, sheet is numbered.
  - Any reference to a different sheet should have sheet numbers filled in.
  - Name and seal of Engineer.
9. Standard Drawing Detail Sheet(s)
- Include all applicable standard drawings
  - Add revisions as necessary with name and seal of Engineer
  - Title block completely filled in, sheet is numbered