CITY OF VISTA
CALIFORNIA

GUIDELINES FOR THE PREPARATION OF TRAFFIC SIGNAL DESIGN PLANS

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NOTE: Revisions to these guidelines shall be noted in the revision log below. The Engineer of Work should check with the Engineering Department of the City of Vista to confirm the copy in use is updated with the latest revisions.

REVISION LOG

PAGE NO. (of previous guidelines)	SECTION / SUBSECTION	REVISION DATE	CHANGE
ALL	ALL	10/09/2007	New – Traffic Signal Manual
ALL	ALL	09/12/11	Deleted – Traffic Signal Manual New – Guidelines for the Preparation of Traffic Signal Design Plans

I. FORWARD

These guidelines establish uniform procedures for the design of both new and modified traffic signals in the City of Vista. It is not intended as a textbook or as a substitute for established standards, experience in the principles of traffic signal design and sound engineering judgment, but rather as a guideline to uniformity and to provide the designer with sufficient information to prepare the desired plans with a minimum of uncertainty.

II. STANDARDS

Traffic signal design and installation in the City of Vista shall conform to the following:

1. City of Vista Development Code
2. City of Vista Standard Drawings
3. The latest edition of Caltrans Standard Plans
4. The latest edition of Caltrans Standard Specifications
5. The latest edition of Caltrans Standard Special Provisions
6. The latest edition of the California Manual on Uniform Traffic Control Devices (CA MUTCD)
7. The latest edition of the Caltrans Traffic Manual (only applicable chapters still in effect)
8. Standard Specifications for Public Works Construction ("Green Book"), including supplements thereto
9. San Diego Area Regional Standard Drawings
10. Project Plans and Specifications

The Engineer of Work shall:

1. Be a Civil Engineer (not a Traffic Engineer) with current California registration and shall sign and seal the final Plans.
2. Meet with the City's Project Engineer to review design concepts and shall prepare a "redlined" concept drawing for discussion.
3. Obtain an electrical service point using the applicable process for the serving utility.
4. Send plans to all utility companies (San Diego Gas & Electric, AT&T, Cox Communications, Time Warner Cable, and Vista Irrigation District) for their conflict review. Depict utilities as provided by the above utility companies on the design plans. If conflicts are foreseen, utility companies, at their discretion shall pothole locations of the proposed poles prior to completion of the plans.

5. Perform an as-built and record search to depict on the Plans all existing utilities (water, sewer, storm drain, traffic signal fiber optic, other communications infrastructure, etc.) within the entire footprint of the work area.

6. Verify that all existing traffic signal equipment and any proposed traffic improvements conform to current standards. Additionally, the Engineer of Work shall verify that existing equipment can be re-used, replaced, salvaged and/or disposed of.

7. Submit electronic CAD and PDF drawings reflecting as-built changes as submitted by the contractor using bubbles and deltas. The Engineering Department will plot the as-built, obtain signatures and file the as-builts in the City's system. Note that the original electronic CAD file must be saved separately prior to making any as-built changes.

III. DESIGN PLANS

Plans shall be designed on City standard "D" size sheet including the title sheet. The standard title sheet will be provided by the City as detailed below. The quality of drafting and lettering size shall conform to the highest standards in order to ensure legible reduced prints. Plans shall be produced in the AutoCAD version currently used by the City's Engineering Department. In addition to original signed mylars of all plan sheets, a copy of the original electronic AutoCAD file and an electronic copy of the signed plans in PDF format shall be submitted to the City on a CD.

DESIGN PLAN GUIDELINES

1. A traffic signal design plan shall contain the following elements:

   - Standard title sheet (with all of its contents). The standard title sheet will be provided by the City as detailed below
   - Traffic Signal Notes detailed below
   - Fiber Optic Interconnect Notes detailed below, if applicable
   - Plan view drawing showing traffic signal improvements
   - Conductor schedule, pole schedule, phase diagram, detector assignment and pole placement detail
   - Construction Notes, most of which are detailed below

2. A traffic signal design plan shall use NEMA phasing conforming to the California Manual on Uniform Traffic Control Devices (CA MUCTD), Part 4, Highway Traffic Signals.

3. The traffic movements on the major arterial roadway shall be designated phases 2 and 6. If the two intersecting streets are apparently of equal importance, the City's Engineering Department shall designate which of the two is the major arterial.

   ø 2 + ø 6 = Designate the major arterial vehicle movements
   ø 2 = Eastbound on E - W Arterial
   ø 2 = Northbound on N - S Arterial

4. North shall always be oriented up or to the right on all design plan sheets. The major arterial shall always be horizontal on the plan.

5. Signal design plans shall be drawn at a 1" = 20' scale.

6. Pole identification numbering (or lettering) shall always increase clockwise around the intersection with the lowest numbered pole being always on the corner where the controller cabinet exists or is to be located.

7. Conduit run identification numbering shall start at the farthest conduit crossover from the controller cabinet corner and always increase in clockwise direction toward the home run pull box on the controller cabinet corner. The final home run conduits shall have the highest identification numbers.

IV. TITLE SHEET AND PLAN NOTES

CITY CIP PROJECTS DESIGN PLAN NOTES

For City Capital Improvement Program (CIP) projects, obtain the improvement plan title sheet (includes the border, signature boxes and all pertinent notes) from the Engineering Department. Standard traffic signal and traffic signal interconnect title sheets containing the additional notes below are also available.

PRIVATE DEVELOPMENT PROJECTS DESIGN PLAN NOTES

For private development projects, obtain the improvement plan title sheet (includes the border, signature boxes and all pertinent notes) at the following link:

http://www.cityofvista.com/departments/communitydev/forms.cfm

ADDITIONAL NOTES (TRAFFIC SIGNALS)

In addition to the 'GENERAL NOTES' and 'SPECIAL NOTES' that appear on the City standard improvement plan title sheet provided by the City, the following traffic signal notes shall be included in the design plans for traffic signal projects (the traffic signal title sheet is also available from the City):

TRAFFIC SIGNAL NOTES

1. Contractor shall coordinate service details and scheduling with San Diego Gas and Electric well in advance of need.

2. Contractor shall prepare a traffic control plan and obtain the signed approval of the plan from the City Engineer or his representative for all work impacting vehicular, bicycle and pedestrian traffic and for any traffic signal shutdown. The plan will depict all signing, striping, delineation, flagging and all other traffic control devices necessary to the operation, in the opinion of the City Engineer or his representative. Actual working hours for construction and for traffic signal shutdown will be determined by the City Engineer or his representative upon review of the traffic control plan and based on the impact to traffic. The Project Specifications provide more details regarding traffic control requirements and working hours.

3. Contractor shall notify the City of Vista Public Works Department and the City's Traffic Engineer or his representative, through the City's Construction Inspector, a

minimum of two (2) working days before any traffic signal system shutdown authorized by an approved traffic control plan.

4. Contractor shall notify the City's Traffic Engineer or his representative, through the City's construction inspector a minimum of three (3) working days prior to activation of new or modified traffic signals and shall arrange for a field meeting to perform the activation. The City's Traffic Engineer or his representative will prepare a new or a modified timing sheet as appropriate and will provide the timing sheet to the contractor during the activation field meeting. Activations shall be accomplished within a two-hour period on weekdays between the hours of 9:00 AM and 2:00 PM upon approval from the Traffic Engineering Division.

5. Contractor shall arrange to have a signal technician, employed by the controller manufacturer or his representative and qualified to work on the controller, present at the project site for the entire duration of the activation field meeting.

6. Contractor shall maintain in operation all existing traffic signals and street lighting for the benefit of the public during the progress of the work. Existing electrical services, traffic signal equipment, traffic signs, and street lights that are being replaced or relocated shall remain in service until the replacement facilities are installed and operational or useable.

7. Conduits between adjoining pull boxes shall be Schedule 40, 2" PVC unless otherwise noted on the Plans. Conduits crossing streets shall be 3".

8. Underground signal conductors shall not be spliced.

9. All pull boxes shall be No. 5 unless otherwise noted on the Plans.

10. Pull boxes shall not be located in or within 1' of any part of any curb ramp (sloped portions of the ramp; wings; grooves; or landings).

11. All pull box and vault covers shall be marked with the words TRAFFIC SIGNAL.

12. The contractor shall verify with the City's Inspector and Traffic Engineer the precise field locations of all traffic signal equipment prior to installation.

13. All pedestrian push buttons shall be audible ADA compatible accessible pedestrian signal system of the Polara Navigator APS series audible-tactile model #N25BB1-Y type complete with push button stations (PBS) and configurator.

14. An "AS-BUILT" drawing clearly showing the actual locations of all traffic signal components and other improvements shall be submitted by the contractor and approved by the City Engineer prior to the acceptance of the improvements.

15. All equipment and parts called out on the Plans to be salvaged must be delivered to the City's Public Works Satellite Yard located at 2430 Lupine Hills Drive. However, the contractor must first contact one of the following Public Works staff

members at least two working days in advance to coordinate delivery of the salvaged equipment and parts:

Ken Shaw.....760.277.8102
JD Rubidoux...760.644.6797

ADDITIONAL NOTES (TRAFFIC SIGNAL INTERCONNECT)

In addition to the 'GENERAL NOTES' and 'SPECIAL NOTES' that appear on the City standard title sheet provided by the City, the following traffic signal interconnect notes shall be included in the design plans for traffic signal interconnect projects (the traffic signal interconnect title sheet is also available from the City):

TRAFFIC SIGNAL INTERCONNECT NOTES

1. Conduit runs are shown on the Plans in schematic form only.
2. Contractor shall verify linear feet of conduit and fiber optic cable by field inspection.
3. Distances shown on the Plans are approximate. Contractor shall carefully measure actual distances and make allowance for slack before cutting fiber optic cable.
4. Contractor shall call underground service alert at (800) 422-4133 prior to beginning work.
5. All trenching for conduit installation must be accomplished using underground boring methods unless specifically noted on the Plans.
6. Conduits must be installed within three feet of the face of curb or, if no curb exists, within two feet of the edge of pavement, expect as necessary to avoid conflicts.
7. If open trenching is allowed for certain segments, then trench paving must be performed in accordance with City of Vista Standard Drawing Number SRF-8A & B, Type B.
8. Fiber optic cable shall be installed in Schedule 40, 2" PVC conduit. Conduit installed by open trenching methods shall have sand encasement, and 30" minimum cover.
9. All conduit shall be buried a minimum of 30" under sidewalk and street surfaces.
10. All conduit bends are to be factory made.
11. Pull boxes shall be No. 6E unless otherwise noted on the Plans, spaced no more than 500' apart and shall not be closer than three feet to driveways.
12. Pull box locations between intersections shown on the Plans are approximate and may be field located by the Contractor with the approval of the City Inspector to avoid obstructions and facilitate construction.

13. Pull boxes shall not be located in or within 1' of any part of any curb ramp (sloped portions of the ramp; wings; grooves; or landings).

14. All pull box and vault covers shall be marked with the words SIGNAL COMMUNICATIONS.

15. It is the responsibility of the contractor to determine the exact location of all loop detectors prior to commencing work in the area. The contractor is responsible for avoiding all loop detectors during construction and shall not cut or break any loops. Any damage to existing loop detection during construction shall be the responsibility of the contractor to replace. Boring under loop detector lead-in cable is allowed provided that a minimum 5' distance be observed on each side of the loop, and operations do not result in pavement sag or loop damage.

16. Contractor shall replace, at contractor's expense, any fiber optic cable in which the attenuation of any single mode strand at 1300 nm exceeds 6dB/miles, excluding single point events at authorized splices and connectors.

17. When three or more fiber optic cables enter an enclosure, each fiber optic cable shall be labeled indicating the location of the far end of the fiber optic cable.

18. Deflection limits of all single mode fiber optic cable shall not exceed 20 times the outside diameter of the fiber optic cable being installed.

19. Concrete sidewalk near controller cabinets that are in conflict with proposed conduit routing and impracticable to bore or tunnel under shall be removed and replaced between expansion joints, and not saw cut through slab. Removal and replacement of concrete shall include complete slab.

20. If a spandrel section of an existing cross gutter in conflict with proposed conduit routing and impracticable to bore or tunnel under shall be removed and replaced between expansion joints, and not saw cut through the slab. Removal and replacement of concrete shall include complete spandrel section from joint to joint.

21. An "AS-BUILT" drawing clearly showing the actual locations of all system components and other improvements shall be submitted by the contractor and approved by the City Engineer prior to the acceptance of the improvements.

22. All equipment and parts called out on the Plans to be salvaged must be delivered to the City's Public Works Satellite Yard located at 2430 Lupine Hills Drive. However, the contractor must first contact one of the following Public Works staff members at least <u>two working days in advance</u> to coordinate delivery of the salvaged equipment and parts:

    Ken Shaw.....760.277.8102
    JD Rubidoux...760.644.6797

CONSTRUCTION NOTES

The following sample construction notes shall be used on traffic signal design Plans and traffic signal interconnect design Plans as applicable. Please note that these notes are general and only cover the most common installations in traffic signal and interconnect design. The notes may be modified and other notes may be added as appropriate. In addition, a note need not be shown on the plans if the item(s) is not being installed.

1. Furnish and install a McCain, Inc. model 170E traffic signal controller assembly in a McCain, Inc. model 332 anodized aluminum cabinet with an internal light with front and back door switches and integral rack mounted document drawer assembly under the controller. Cabinet shall be wired for red monitor and full eight (8)-phase capability including the necessary accessories to provide phasing shown on these Plans. Install foundation per Caltrans Standard Plan Drawing ES-3C. Controller assembly shall be equipped with the latest version of the McCain, Inc. 233 signal timing program; model 412C system memory module; EDI model 222 two-channel loop detectors (if video detection; an Iteris Vantage Edge 2 card); PDA2 assembly Model 242 DC Isolator units; latest Tomar Optical Signal Processor; McCain, Inc. 24VDC Model 206 power supply; model 210ECL conflict monitor; and all necessary load switches. Alternative equal components may be used as approved by the City.

2. Furnish and install Type III-BF City approved signal and lighting service per SDG&E requirements in an anodized aluminum cabinet. Provide metered 50A-1P 120V signal circuit breaker; metered 15A-1P; and 30A-1P, 240V unmetered lighting circuit breaker. See Caltrans Standard Plan Drawings ES-2C and ES-2E for details.

3. Furnish and install loops for vehicle and bicycle detection per City of Vista Standard Drawing TRF-5; Caltrans Standard Plans; Caltrans Standard Specifications; the Green Book; and the California MUTCD.

4. Furnish and install an Iteris RZ-4 Advanced (or City approved equal) camera and equipment necessary for video detection of vehicles and bicycles. Location of cameras shall be determined in the field by the City's Traffic Engineer and Inspector. Camera locations shown on these plans are to illustrate design intent only and are subject to adjustment due to field conditions or equipment requirements. Provide an Iteris Vantage Edge 2 (or City approved equal) card; Samsung LCD (or City approved equal) control display (Cyberview BNC+S-Video video input) in a lockable rack-mount drawer; computer mouse; all cables; and accessories and make all connections and programming necessary for full and proper operation of the video detection system.

5. Furnish and install a complete Dimensions Model 24MIL-WBE (or City approved equal) battery back-up system (inverter/charger; power transfer relay; batteries; manual bypass switch; and all other necessary components for full functionality). Install the system in a separate battery McCain, Inc. Dimensions style back-up cabinet Model M64438-1A BBS Cabinet (27"X24"X8") (or City approved equal) equipped with a generator plug; thermostat; and a fan.

6. Furnish and install the latest Tomar (or City approved equal) emergency vehicle pre-emption (EVP) detector assembly (including mounting hardware and cables) for each direction. EVP shall be mounted on mast arm using astro bracket with threaded nipple and lock washers.

7. Furnish and install a mast arm-mounted reflectorized street name sign per City of Vista Standard Drawing Numbers TRF-3A through TRF-3E.

8. Furnish and install a two-inch (1-2") (minimum size) DB electrical service conduit and pull rope with a minimum of 30 inches of cover (from the service point to the electric meter pedestal) per SDG&E requirements.

9. Furnish and install a verbal audible ADA compliant accessible pedestrian signal system of the latest model of Polara Navigator APS series audible-tactile (or City approved equal), yellow in color, complete with push button stations (PBS) and a handheld Polara Navigator Configurator.

10. Furnish and install the latest model of GE Lumination (or City approved equal) countdown pedestrian signal indications.

11. Furnish and install the latest model of 12" GE Lumination (or City approved equal) red, yellow and green signal indications.

12. Furnish and install a new 44" X 32" X 36" splice vault for fiber optic cable per Detail 'A' on sheet XX. Contractor shall provide two (2) grounding rods, lifting rings and bolts. Cover shall be 24" X 36" with 1" diameter pick holes. All metal surfaces shall have a galvanized finish.

13. Furnish and install a No. 6E pull box (with extension) with 45 degree bends for fiber optic cable per Detail 'B' on sheet XX. No.6E pull boxes shall be spaced no more than 500 feet apart.

14. Furnish and install 2" schedule 40 PVC conduit to a depth of 30" for fiber optic cable. All conduit bends shall be factory made. Furnish and install a new No. 8 TWHN tracer wire. Conduits crossing the roadway shall be installed using directional boring.

15. Furnish and install new trunk Corning (or City approved equal) 12-strand single mode fiber optic (SMFO) cable or an equivalent approved. SMFO cable shall be 12-strand single mode cable, with fibers placed in water locked buffer tubes and stranded around a fiberglass central strength member. Contractor shall coil 20 feet of trunk 12-strand SMFO cable slack in every pull box or vault per Detail 'C' on sheet XX unless noted otherwise on the Plans. All fiber optic cable shall be installed in its own conduit separate from electrical conductors.

16. Furnish and install new branch Corning (or City approved equal) 6-strand single mode fiber optic (SMFO) cable or an equivalent approved. SMFO cable shall be 6-strand single mode cable with fibers placed in water locked buffer tubes and stranded around a fiberglass central strength member.

17. Furnish and install a new splice enclosure per Detail 'D' on sheet XX. Splice enclosure shall be the latest Corning model or City approved equal. It shall have a minimum 48-fiber splice capability; provide cable ports as required; have a moisture-tight sealing arrangement; and have re-entry capability.

18. Perform necessary splicing of the 12-strand trunk fiber cable with the 6-strand fiber cable per Detail 'E' on sheet XX. All remaining unused fiber strands in the trunk cable must remain intact and if cut, must be rejoined by splicing.

19. Furnish and install a Vilink Model VK 230 (or City approved equal) fiber optic modem to be installed in the traffic signal controller cabinet per Detail 'F' on sheet XX. Provide all cables; connectors; and auxiliary equipment necessary to establish communication.

20. Contractor shall provide and install all necessary equipment at the traffic signal and at the Civic Center to establish full communications between the traffic signal and the Civic Center. This includes, but is not limited to, connectors; fiber optic pig tails; splice closures; splice enclosures; splice trays; connector panels; patch panels; cords; etc.

21. Furnish and install a Pelco Spectra IV Series CCTV (or City approved equal) remote-control dome camera to be mounted on traffic signal pole; a camera mount with transformer; a pole mount adapter; an IFS VT 1930WDM video transmitter / data transceiver to be installed in the traffic signal controller cabinet; and an IFS VR 1930WDM video receiver / data XTMCR to be installed in the Civic Center control room. Installation shall include all trenching; conduit; cabling; ancillary equipment; and splicing between the nearest splice vault or pull box; the traffic signal controller cabinet; and the new camera.

22. Contractor shall adjust conduit, pull boxes and cabinet locations to clear existing utility facilities except with regards to minimum conduit depth.