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H 700 CONSTRUCTION ENGINEERING

H 710 GENERAL

Structural engineering during construction is discussed here with emphasis on the thorough and expeditious completion of the construction processes. Included are commonly encountered construction problems which should be avoided by inclusion of appropriate additional information in the Plans or Special Provisions during design.

Duties and responsibilities of the engineer during construction require skills in addition to the technical knowledge of design. The engineer's relationship with the public, the contractor, the inspector, and representatives of other agencies requires skills in public relations and a good knowledge of construction methods and City standards for construction.

H 711 CONSTRUCTION CONTROL

Control of construction involves several City offices, each having specific duties and responsibilities within the scope of the contract:

Bureau of Contract Administration - Inspects construction materials and workmanship, enforces compliance with the contract documents and administrates the contract.

Department of General Services, Standards - Samples and tests materials used in the work.

Bureau of Engineering

- a. **Survey Division** - Provides construction survey for City contracts.
- b. **Construction Division** - Prepares contract documents for advertising; makes arrangements with the owners of public utilities for needed relocations of their facilities; negotiates change orders and extra work costs; and oversees construction engineering (major construction projects).
- c. **Project Management Division** - Negotiates supplemental agreements, arranges financing, etc.
- d. **Design Division or District** - Makes necessary design changes; interprets the intent of the plans and contract documents; and assists Construction Division personnel as the need arises.

- e. **Real Estate Division** - Performs title services, appraisals, negotiations, relocation assistance, etc., pertaining to the land involved in Public Works construction.

Other City bureaus and departments act primarily as advisors to the engineer on matters pertaining to their specialties, and may be directly or indirectly involved in the construction. These bureaus and departments include:

- a. Bureau of Sanitation.
- b. Bureau of Street Maintenance.
- c. Bureau of Street Lighting.
- d. Department of Transportation.
- e. Department of Water and Power.

The latter three make necessary changes in design of their facilities during project construction.

H 712 PUBLIC RELATIONS

It is usually the function of the Board of Public Works to furnish public information on matters pertaining to projects of the Department of Public Works. The engineer is, therefore, cautioned to answer only routine inquiries within the scope of his responsibility and to be sure of the accuracy of this information. Inquiries pertaining to policies, procedures, and official action of the Department, should be referred to the Division or District Engineer, especially those which might involve claims or lawsuits to which the City might become a party.

In meeting the public, a City representative should be pleasant and helpful and, when necessary, he should refer requests or complaints to the proper party for prompt resolution. Property owner related construction problems should be discussed with the inspector and the contractor to arrive at a solution mutually agreeable to all. The engineer should generate the impression on the property owner that the City is not an impersonal organization, but is responsive to his problems and requests.

H 713 AUTHORITY AND RESPONSIBILITIES

In performance of their functions, the contractor, the inspector, and the engineer should not assume each other's responsibilities. For example the contractor should not deviate from the plans and Specifications without prior approval from the engi-

neer. The inspector should not make field design changes. The engineer should not change or stop work except through the inspector. When a problem arises, all parties involved should be a part of the solution according to his responsibility, always working through the inspector.

During construction, an important attitude of the engineer is cooperation with the inspector, the contractor, and other agencies - Private, Federal, State, and County - without undermining his authority or compromising City standards. Unanswered complaints or unresolved differences should be brought to the attention of the District or Division Engineer when resolution must be delayed.

H 713.1 BOARD OF PUBLIC WORKS

The Board of Public Works executes and has final authority in contract matters. The Board awards the contract, approves major changes and assignments of the contract, and makes final payment and acceptance of the construction work.

H 713.2 ENGINEER

The engineer interprets the contract documents and determines necessary changes in design or construction. Intimate knowledge of the contract documents, and fairness in interpretation are essential elements of the engineer's judgement. A project engineer should visit his projects at important stages of construction. Deficiencies or irregularities should be indicated to the inspector so that they can be corrected. He should keep records on file indicating conditions observed and keep his superiors fully informed of all important facets of the work. Corrections may be less costly to make and less likely to be repeated at early stages of construction. (For final inspection, refer to [Section H 730](#).)

On major construction projects, this function is performed by Construction Division.

H 713.3 INSPECTOR

The inspector represents the Board of Public Works in administering the contract, and determining compliance with the contract documents and applicable regulations of the City, State and Federal governments. Accepting materials and workmanship and determining the progress of construction for payment are included in his responsibilities.

H 713.4 CONTRACTOR

The contractor furnishes materials and labor for construction of the project in accordance with the the contract documents, including work which he subcontracts.

H 713.5 PRIVATE ENGINEER (PERMIT CONSTRUCTION)

For construction projects under permits, the private engineer has primary responsibility. A City engineer also may be assigned if required by the plans or requested by the City Inspector. He should work closely with both private engineer and field inspector, and should make a final inspection ([Section H 780](#)).

As-built corrections to the plans should be made by the private engineer after final inspection. Improvement bonds and fee deposits should not be released until as-built drawings are completed. In cases where the private engineer cannot make the drawings, the City's permit engineer should do so and charge to the permit work order for time spent. After final inspection, a memorandum of satisfactory completion should be forwarded to Street Opening and Widening Division. This should not be sent until as-built drawings are complete. Refer to Section C 238 and Figure C 238.42A, Operations and Control Manual.

H 714 DUTIES OF THE ENGINEER (NON-MAJOR CONSTRUCTION)

The engineer is the technical adviser during construction. When construction cannot progress according to plan, or when differences in plan interpretation occur, he should try to resolve the problem quickly so that work may continue smoothly in accordance with the plans and specifications in a manner equitable to the City and the contractor.

When the prime office is the Structural Engineering Division, the structural engineer is also the project engineer (see [Subsection H 714.2](#)) and has overall responsibility for all engineering aspects of the project. Otherwise, he is usually only responsible for the structural and architectural aspects of design (see [Subsection H 714.1](#)).

The engineer maintains the "Project Control Checklist" ([Subsection H 152.2](#)) and, upon completion of the project, arranges for disposition of the plans and file ([Subsection H 163.5](#)).

H 714.1 ENGINEER (Not From Office Originating Design)

During construction the engineer's duties may include any of the following (non-major Construction projects):

- a. Represents the Structural Engineering Division at the preconstruction and other job meetings.
- b. Obtains or arranges for obtaining necessary permits as indicated in Section 7-5 of the Standard Specifications.
- c. Verifies that the required classification of tunnels has been done prior to construction. This is a requirement of the State Division of Industrial Safety (see Subsection H 163.21, Tunnel Classification).
- d. Reviews for approval alternate materials or methods of construction when requested by the contractor.
- e. Reviews and processes shop drawings and other drawings when submitted by the contractor.
- f. Makes design changes and prepares change orders necessary to meet changed conditions during construction.
- g. Interprets the plans and specifications when they are in conflict or unclear.
- h. Keeps abreast of construction progress by:
 1. Making periodic visits to each project.
 2. Maintaining close contact with the inspector.
 3. Keeping a written record of construction progress (such as on the Project Visit Report, [Figure H 714.1A](#)).
- i. Keeps the Division Engineer posted on the progress and problems of the project.
- j. Makes a final inspection after completion of the project (refer to [Section H 780](#)). The engineer is usually responsible for the following:
 1. Notifies the bridge inspector and/or architect of the scheduled final inspection so that they may perform their parts of it.
 2. Determines if the completed structural work complies with the intent of the plans, specifications, and change orders. The bridge inspector and architect assist the engineer in determining necessary corrections. The engineer signs the correction list for structural and architectural design.

3. Upon completion of corrections, the engineer and final inspector recommend acceptance to the Board of Public Works by forwarding a project acceptance memorandum (for cash, assessment, and purchase order projects) to the Coordinating Division. The memorandum form, [Figure H 714.1B](#), recommends the acceptance of that portion for which the design office is responsible. For permit construction final acceptance, refer to [Subsection H 713.5](#).

H 714.2 PROJECT ENGINEER (From Prime Office)

A project engineer serves as a liaison between the contractor/ inspector and all agencies or design offices involved in order to expedite and control the construction. He informs the field inspector of changes and channels all communications and instructions to the contractor through the inspector. His duties may include all those listed above for engineer (not from originating office) and also as follows (Non-major construction):

- a. Arranges pre-construction meetings:
 1. Schedules (if needed) an in-house (City offices only) pre-construction meeting two weeks prior to the general pre-construction meeting.
 2. Schedules a pre-construction meeting and notifies design offices, utilities, contractor, and other parties or agencies involved in the construction. He works jointly with the Construction Division's Utility Coordination Section in this process.
- b. Reviews and processes the contractor's construction schedule.
- c. Issues Change Orders (see [Section H 770](#)):
 1. Keeps a record of all change orders.
 2. Works in cooperation with the Change Order Section, Coordinating Division, in expediting the issuance and negotiation of all change orders.
 3. Issues Emergency Change Orders.
- d. Maintains a daily log (diary) of the progress of all important aspects of the project.

H 714.3 ARCHITECT

During construction, the architect is responsible for reviewing and approving materials and construction procedures which affect the architectural elements of the project when such approval is a requirement of the plans or Specifications.

He should visit the job site at important stages of construction and make a final inspection in order to determine if the appearance of the project meets the intent of the plans and Specifications.

H 714.4 BRIDGE INSPECTOR

The bridge inspector (see Subsection H 182) makes a final inspection, listing suggested corrections or additions primarily from the viewpoint of future maintenance. For those structures he is to periodically inspect, the bridge inspector verifies that the structure has been added to the Computer File of Structures.

H 720 SUPPLEMENTAL GUIDELINES FOR CONSTRUCTION CONTROLS

Engineering design should be oriented toward minimizing construction problems and to facilitate construction equipment and methods commonly used by local contractors. The designer should consider the work area required to operate equipment, realistic traffic lane and pedestrian requirements, and the interface with other work such as utility construction. The use of properties abutting the site should be considered for temporary work and storage area.

Following are some items which may not be fully covered in the Standard Specifications and need to be amplified by Special Provisions or by appropriate notes on the plans.

H 721 STOMPING OPERATIONS

Where pavement or structural concrete is to be removed, the size of the impact or stomping equipment should be limited or stomping prohibited if existing structures may be damaged (i.e., underground vaults, tunnels, conduits, utilities, nearby buildings, hospitals or "quiet zones," or other sensitive or vulnerable existing improvements).

Special removals should be delineated on the plans with the method of removal to be permitted (e.g., hand-held jack hammer, concrete saw, etc.).

H 722 STREET CLOSURES

Where impact on neighborhood business or residential access permits, it may be desirable to close portions of the project to all traffic except emergency vehicles. Portions to be closed and permissible hours of closure should be specified as should streets to be used for detours. (These can be shown on a key map or a special detour map.) Closures should be done with concurrence of the Transportation Department and the district engineering office.

Closure of City streets should comply with the following policy adopted by the Board of Public Works on September 2, 1970:

- a. On major City streets, where unique construction problems are involved, the City Engineer should include in the specifications for the work, alternative construction items for the complete closure of streets during the construction period whenever, in the opinion of the Board, such closure is necessary.
- b. The City Engineer should, in all cases of construction in major City streets, obtain the concurrence of the councilman of the district relative to partial or complete street closures.
- c. The City Engineer and/or the Inspector of Public Works should consult with the businessmen and residents in areas adjacent to construction sites relative to street closures prior to the commencement of any construction work.

H 723 TIME OF CONSTRUCTION

Construction time periods should be adequate to complete all the elements of the project in a logical sequence using efficient methods of construction. Some factors affecting time of construction are:

- a. Traffic volumes - vehicular and pedestrian.
- b. Utilities - relocation or remodeling by others.
- c. Adjacent improvements - access provisions and space limitations.
- d. Type of construction equipment - size that can be used and area required for operation.
- e. Topography - hillside terrain problems, high water tables.

- f. Availability of materials - special order time required.
- g. Time of year project will be under construction - winter rains, holiday period, delays, access to flood control channels.

It may be preferable to require or permit construction operations during periods of off-peak traffic such as weekends, nights, or non-rush hours of the day in order to provide traffic capacity during peak periods or to facilitate the contractor's work.

There may be instances in which the contractor should be required to complete certain operations within a specified time limit once he commences that work (railroad track work, temporary detours, drainage or sewerage bypass, etc.). The Plans or Special Provisions should clearly show these time limits expressed in calendar or working days. A special liquidated damage clause should be included, with the amount of damages set to offset resulting economic loss to the City.

It is not practical to consider liquidated damages for work done under permit. However, provisions can be included in the permit requiring that work cease and improvements be restored to use when needed.

H 724 METHODS AND MATERIALS

Optional materials and methods of construction should be specified where possible to provide the maximum of competition and flexibility to bidders and suppliers.

H 725 TEMPORARY DRAINAGE

Where needed to protect excavation or embankment slopes or prevent flooding, temporary drainage devices should be required during construction. Berms, sandbags, or dikes are often used, but should not be allowed to pond the water upstream of the work area. Drainage should be through or around the site to adequate storm drains.

H 726 BACKFILL AND TEMPORARY RESURFACING

Backfill is specified in Sections 300-3 and 306-1.3 of SSPWC for structures and underground conduits. Exceptions should be specified on the plans or in the Special Provisions. SSPWC specifies mechanical compaction for structures. If jetting or flooding is acceptable, it should be indicated as such and locations specified; Jetting is permitted by SSPWC for underground conduits. If unacceptable for a specific box conduit or tunnel,

it must be prohibited by notation on the plans or in the Special Provisions.

In some cases, it may be desirable to add lime or cement to the soil or use a special backfill material, such as a one sack concrete or sand-cement slurry mix. For example, trenches in streets carrying high traffic volumes, bridge abutments where unacceptable settlements are expected or retaining walls where a reduced design pressure is desired, may require special treatment of backfill. These should be specified in the contract documents.

H 727 TUNNELING OR JACKING

Temporary bridging or steel plates over excavations to handle peak period traffic are sometimes used in lieu of tunneling or jacking procedures. If this is not practical, tunneling or jacking should be considered where conduits are constructed in high traffic street areas or where open cut would require extensive shoring of existing structures or numerous existing underground structures (see Subsections H 212.5 and H 213 for jacking and tunneling).

The tunnel shaft or jacking pit should be located for a minimum of interference to traffic, if practical where a manhole is to be constructed.

Tunneling or jacking operations are especially expensive if ordered by change order and should be specified on the plan.

H 728 UTILITIES

Utility interference during construction can be costly and time consuming and should be thoroughly analyzed during design and provided for on the plans. Where unexpected utility problems arise on the job, the engineer, contractor, and utility company should jointly arrive at a solution acceptable to all.

H 729 MISCELLANEOUS ITEMS

Right-of-Way - In some instances, the right-of-way agent may have made an agreement with a property owner regarding the disposition of material within the construction area by City forces. The project engineer should inform the Bureau of Contract Administration and the Bureau of Street Maintenance of any such agreements in advance of construction.

Project Site Maintenance - If the use of a power sweeper or other equipment is necessary to keep paved areas acceptably clean, it should be specified on the plans or in the Special Provisions in conformance with Subsection 7-3.1, Standard Specifications.

H 730 CONSTRUCTION SCHEDULE

The contractor should submit to the Inspector for approval his proposed construction schedule as specified in Section 6-1, Standard Specifications. For a project involving another agency, their approval of the schedule may also be required.

For complex projects such as grade separations, the contractor may be required to submit his construction schedule in the form of a critical path analysis. The minimum list of activities to be included in this analysis should be included in the Special Provisions for the project.

The proposed construction schedule is usually transmitted to several involved agencies to determine whether it meets with the intent of the plans and is consistent with current practice. The schedule is then approved, and construction shall proceed as prescribed. The schedule should be revised and re-submitted whenever significant changes are made in activities or timing.

H 740 SHOP DRAWINGS

The general requirements for shop drawings are indicated in Subsection 2-5.3, Standard Specifications. Supplemental provisions are available from the Structural Engineering Division.

H 741 PROCESSING CHECKLIST

The processing of shop drawings and distribution of approved prints will usually follow the flow chart diagram shown in [Figure H 741A](#) and the following checklist:

- a. The contractor should be requested, in the Special Provisions, to address transmittals of structural shop drawings to the City Engineer, office of the project engineer (prime design office). Drawings should be forwarded by the project engineer to the Structural Engineering Division (SED) for checking if structural design was done in that office. In some cases, it may be preferable for the contractor to submit structural shop drawings directly to SED. A standard format Special Provision is available from SED for inclusion in the job Specifications.

- b. Transmittal letters need not be sent to Letter Files, Administration Division, unless the letter outlines a problem such as project delay, substantial change order, etc.
 - c. If a subcontractor or person other than the general contractor submits shop drawings, all original replies should still be addressed to the general contractor. However, informal communication related to correction of the drawings may be with the subcontractor.
 - d. Informal communication should be initiated with the contractor's representatives to simplify and expedite the checking.
 - e. All corrections should be neatly printed (preferably in red) or typewritten on the drawings or in letter form.
 - f. If submittals are not complete enough for adequate review, they should be promptly returned to the contractor with a request for complete information.
 - g. City transmittals to the contractor may be on a standard letter form such as shown in [Figure H 741B](#).
 - h. Approved drawings should be stamped or lettered with the following notes:
 - 1. Approved for construction subject to the conditions that all dimensions must be checked and verified in the field and that the contractor is not relieved of any of his responsibilities under applicable sections of the specifications.
 - 2. Shop fabrication shall be made only from approved shop drawings and under inspection by the Bureau of Contract Administration. Telephone 485-3002, 24 hours in advance to arrange for inspection.
- Note 2 is required only where shop fabrication is involved and is not applicable to falsework, shoring, tunnels, or similar drawings.
- i. The Division or District Engineer should sign the drawings for the City Engineer.

Copies of all transmittals should be sent to the affected district engineering office.

H 742 B-PERMITS

B-Permit shop drawings should be checked and approved by the private engineer responsible for the project design. No further review or approval by the Bureau of Engineering is required unless specifically noted on the contract plans or in the special provisions. (Shop drawings should be checked and approved by the City Engineer on major structural items or whenever necessary to assure compliance with City standards).

The private engineer should transmit four copies of approved shop drawings directly to the Bureau of Contract Administration, Room 908, City Hall, 200 North Spring Street, Los Angeles, California 90012.

Refer to Subsection H 172.2, "B" Permit Construction, for additional information.

H 743 SPECIAL DEPOSIT-EXCAVATION PERMITS

Supplementary drawings are processed the same as originals (see Section H 171, Special Deposit Excavation Permits).

H 744 OTHER AGENCIES

Generally, the City is not involved with shop drawings for other government agencies, projects. However, when City facilities are involved, the City may request to review shop drawings for major or critical structures.

H 745 FALSEWORK

Design criteria for falsework are listed in the Standard Specifications (Section 303-1.6). Special provisions which supplement the Standard Specifications are available from the Structural Engineering Division. Review and approval procedures are similar to those for shop drawings.

In order to comply with the Industrial Safety Orders, Section 1717 the following note should be placed on falsework drawings prior to approval:

Prior to placement of reinforcing steel or concrete on falsework the contractor shall obtain the following certification by a Civil Engineer registered in the State of California.

I have inspected the falsework shown herein, and hereby certify that:

1. the construction is substantially in conformance with these approved plans and;
2. the materials and workmanship are satisfactory for the purpose intended.

SIGNED _____
California Civil Engineer No. _____

DATE _____

These certified falsework drawings shall remain available on the work site during the entire period that the falsework is in use.

The project Special Provisions should include the above note where applicable.

H 746 EXCAVATION SHORING AND PROTECTION OF EXISTING FACILITIES

When required by the Plans or Specifications, the contractor submits drawings for excavation shoring and protection of existing facilities (refer to 7-10.4.1, Standard Specifications). Excavation shoring and protective measures are generally needed to:

- a. Prevent damage to existing adjacent sewers, storm drains, utility lines and other underground structures.
- b. Prevent damage to pavements, buildings, or other existing improvements.
- c. Protect the workmen from cave-in.

H 746.1 SHORING

Generally, the type of shoring determines the design loading to be used in the design of excavation shoring. For loading conditions, refer to Subsections H 373 and H 374. Allowable stresses and loading criteria for both new and used material should be specified on the plans or in the Special Provisions.

Trench shoring is discussed in Subsection 306-1.1.6 of the Standard Specifications. The division/district engineering office having primary responsibility for the project performs the checking of trench shoring drawings. Non-standard shoring systems or soil conditions should be referred to the Structural Engineering Division for checking.

Unusual soil types may require special design pressures. Test borings, if available, should be shown on the plans. Shoring systems may be categorized as follows:

TYPE A CAL-OSHA Standard Shoring Systems: these are taken directly from the standard drawings and tables shown in the CAL-OSHA Construction Safety Orders. They do not require the signature of a registered Civil Engineer.

Most trench shoring design is of this type. Generally, the contractor will submit a print of Bulletin S-158 of the Division of Industrial Safety, on which drawings, trench shoring specifications for three soil types and general notes are shown; or he may prefer to copy the details on his plans. The checker should verify compliance with the Construction Safety Orders.

Type B Designed Shoring systems: These are designed and plans and calculations must be signed by a Civil or Structural Engineer registered in California. Soil test data and recommended design pressures may be used in lieu of the values shown on Plates C-24-a, b, or c of the Safety Orders.

Following are check lists for Types A and B Shoring:

TYPE A - CAL-OSHA STANDARD SHORING SYSTEMS - CHECK LIST:

The checker should verify the following items:

- a. Design and details should agree with the Construction Safety Orders.
- b. Job title and location, contractor's name and address, and date should be shown. ~
- c. Design and details and scope of shoring should comply with the~plans and the special provisions. Additional shoring should be provided as necessary for the protection of workmen and existing improvements, on public or private property. (See Diagram 1, Figure H 746.11.) Any structure, utility, or improvement which lies above a 45-degree line extending upward from the toe of excavation should be investigated to determine the need for specially designed shoring or

other support. Where special protective measures may be needed, the Permit Section of the Structural Engineering Division may be asked to help establish the design requirements.

- d. Anticipated soil type and water table location should be based on a soil report log of borings or reliable field observation. Consult the Geology and Soils Engineering Section if doubt exists about the nature of the soil.
- e. After the above conditions have been verified, the Division/ District Engineer should approve the plans for the City Engineer.
- f. For distribution of approved plans, refer to [Figure H 741A](#), Flow Chart for Processing Shop Drawing.

TYPE B - SHORING SYSTEMS WHICH DO NOT CONFORM WITH STANDARD SYSTEMS

The checker should verify the following items:

- a. Check items b through f on the above check list for Type A.
- b. Plans and calculations should be signed by a Civil or Structural Engineer registered in California.
- c. Design horizontal earth pressure should be in agreement with Plates C-24-a, b , or c, of the Construction Safety Orders or a soils report substantiating the use of other values. A soil report should be required whenever unusual soils or geologic conditions are encountered.

If in doubt about the soil conditions assumed or the recommendations of a soils report, consult the Geology and Soils Engineering Section.

- d. For structures on private property, design should comply with the Los Angeles City Building Code.

Numerical examples of several common types of trench shoring are included in Appendices A-6 through A-8.

H 746.2 PROTECTION OF CRITICAL FACILITIES

The following structures are examples of those which may require special protective measures:

- a. **Major Utilities** - Telephone trunk lines, high voltage electric lines, and high pressure water and gas lines are particularly hazardous and costly if damaged. The City may require the contractor to: (1) avoid excavating in a manner which will remove support, or (2) provide additional shoring for excavations adjacent to these facilities.

- b. **Outfall Sewers and Major Storm Drains** - These are critical to the public health and welfare. Temporary supports similar to those detailed in [Figure H 746.2](#) should be provided for sewers and storm drains spanning more than 6 feet (1.8 m) over an excavation. Storm drains larger than 60 inches (1.5 m) in diameter which will be exposed during the rainy season (October 15th to April 15th) may require additional special support. Large outfall sewers may require specially designed shoring systems.

Permanent supports, as detailed on Standard Plan S-253, are usually required for sewers and storm drains across trenches. When trench widths of Standard Plan S-253 are exceeded, special support methods should be detailed on the plans or the contractor should submit his alternate support method for approval.

The maximum deflection of supports for sewers or storm drains should not exceed the span divided by 480. Wire rope hangers ([Figure H 746.2](#)) should be installed and pretensioned before removing supporting soil under the drain.

- c. **Buildings** - Settlement of buildings can result in hazard or costly repairs. Special shoring should be shown on the drawings to provide lateral or vertical support for affected buildings. Add the following note to the plans or special provisions when shoring is to be contractor designed:

Special Protective Measures - The contractor shall submit to the engineer for approval, detailed shop drawings and substantiating calculations, in accordance with Section 2-5.3 of the Standard Specifications, for any special shoring or supports. Each drawing shall include the signature and registration number of the contractor's engineer. Special shoring or support is required for the following excavations: (list).

H 747 PLACING REINFORCEMENT

Contrary to the first paragraph of Subsection 303-1.7.1 of the Standard Specifications, reinforcing steel placement drawings are required for approval only when the reinforcing details differ from that shown on the plans. If the contractor submits drawings and no such deviations are noted, the drawings should be transmitted to Contract Administration for their use (see [Figure H 747](#)). Refer to Standard Plan S-610, Note 3-6.

H 748 WELDED STEEL STRUCTURES

The processing of shop drawings ([Section H 741](#)) should be modified for welded steel structures due to special weld inspection and testing by the Bureau of Contract Administration:

- a. Upon receipt from the contractor, one set of prints should be transmitted to Bureau of Contract Administration (see [Figure H 748A](#) for suggested form memo).
- b. The structural design office should check the shop drawings for agreement with the contract drawings and Special Provisions.
- c. The Bureau of Contract Administration should check the shop drawings with regard to weld geometry and procedure and arrange qualification tests as required by the Special Provisions. Where these tests are administered by Contract Administration, results are reported on their "Weld Test Report," Form M-8, [Figure H 748B](#). Where results of State of California testing are acceptable, a copy of the State test report should be obtained by Contract Administration. After Contract Administration has completed their investigation, they transmit one set of shop drawings with their comments and a copy of each acceptable test report to the structural design office with the recommendation that the test reports be approved.
- d. After checking and revision by the contractor, the Division/District Engineer signs the shop drawings and those test reports which are acceptable.
- e. Approved weld procedure test reports are distributed as follows:
 1. Originals - Contract Administration.
 2. Copies, one set each:

- (a) Filed in the Structural Engineering Division Library. Welding Procedures File, for future use on other jobs.
 - (b) Forwarded to the fabricator along with approved shop drawings.
 - (c) Filed in the project file.
- f. Distribute complete sets of the approved shop drawings as shown in the flow chart of [Figure H 741A](#).

H 749 JACKING AND TUNNELING

Shop drawings for these two operations should comply with the Standard Specifications, Section 306-2, Jacking Operations, and Section 306-3, Tunneling Operations. Details shown on Standard Plan S-254 need not be repeated if referenced on the shop drawings.

H 750 PILE INSTALLATION

Pile installation should comply with Section 305-1 of the Standard Specifications and the special provisions. Recommended provisions are available from the Structural Engineering Division. Refer to [Section H 510](#) for more information.

H 751 LOAD TESTING OF PILES

Load testing of piles should be in accordance with the special provisions and Subsection 305-1.7 of the Standard Specifications.

H 752 PILE DRIVING, BEARING VALUE

Weights and energy capacity data for the contractor's pile driver should be reviewed by the engineer prior to commencement of pile driving. This information is used to determine the set or final average penetration per blow as a measure of pile capacity according to the "dynamic formula."

H 760 FIELD INSPECTION OF POST-TENSIONED CONCRETE

The general requirements for prestressed concrete construction (including shop drawings) are discussed in Section 303-3 of the Standard Specifications and the Special Provisions. Following are guidelines for inspecting materials and installation of construction of post-tensioned concrete members.

H 761 INSPECTION OF STRANDS

- a. Strand packages should not be opened until 10 days or less before the grouting operation. This prevents unacceptable corrosion from occurring prior to grouting.
- b. Packaging should be factory sealed and undamaged when delivered. It should be airtight and contain sodium silicate crystals or other moisture absorbing material to prevent corrosion.
- c. Strand should be in an unrusted condition when the package is opened, but some minor rust is acceptable. If there is an even coating of rust over the entire "pak," the "pak" should be rejected.
- d. If one or more wires in a strand show extensive rust throughout their length, the entire "pak" should be rejected.
- e. Isolated spots of rust are likely caused by condensation. These spots can usually be removed by scraping with a fingernail. Even if light streaks or spots remain after rubbing, the steel is acceptable if pitting is not present.
- f. Light, even or spotty rust occurring after opening of the package is acceptable if strands are grouted within 10 days.
- g. No pitting of steel is acceptable at any time.
- h. Bends, kinks, or nicks in the steel are cause for rejection.
- i. The inspector should reject all defective strands. If he has any doubt about the acceptability of some strands, he should contact the engineer for assistance.

H 762 STRESSING PROCEDURES

- a. Prior to placing the forms for closing slabs of box girder cells, the contractor should demonstrate that the prestressing steel is free and unbonded in the duct, or if prestressing steel has not yet been placed, that all ducts are unobstructed.
- b. Before stressing, a "Post Tensioning Record Sheet" (such as [Figure H 764](#)) should be prepared for recording the stressing data during post tensioning.

- c. Stressing limits shown on the plans should not be exceeded by more than three percent. Jacking stress should not exceed 75 percent of ultimate strength at any time. Total jacking force should not exceed that shown on the plans unless verified by the design engineer.
- d. Tensioning of prestressing steel in any post-tensioned member should not be performed until the last placed concrete has attained the design compressive strength.
- e. To compensate for slack, tendons should be stressed to 10 percent of the required load before marking reference points on each end of the strands for elongation measurements.
- f. When stressing tendons, use jack gage pressure or load cell reading to measure force, and compare measured elongation with calculated elongation. If deviation exceeds three percent, discontinue the operation until the cause of the discrepancy is eliminated.
- g. Stress tendons to final jacking force and measure total elongation.
- h. Compare total elongation (before seating of anchorages) with specified elongation. Disagreement by three percent or more should be cause for correction.
- i. Seat anchorages and measure final elongation at jacked ends. Measure anchor slippage at unjacked ends. Any such slippage greater than 1/8 inch (3.2 mm) is unacceptable.
- j. Stressed tendons should be left extended such that they can be detensioned if necessary. Only immediately prior to grouting the tendon should the strands be cut off short.
- k. For safety, do not stand in line with a cable or bar being stressed. They may eject with explosive force if breakage occurs.

H 763 GROUTING

- a. The contractor should verify that the ducts are clean, free of debris and unblocked.
- b. Flushing of ducts prior to grouting is not necessary if ducts are known to be unobstructed and clear. However, when a foreign substance is known to exist in the ducts (such as anticorrosion powder) flushing is required.

- c. For any duct, the initial grout pumping pressure should be small (less than 40 psig (275.8kPa)) and should gradually increase due to friction between the grout and the duct (and grout head, if any) until the duct is filled. The device to limit grout pumping pressure should be set to the maximum planned pumping pressure plus 20 psig (137.9kPa) or a maximum of 150 psig (1.034MPa), whichever is less.
- d. Grout injection pipes should be fitted with positive mechanical shut-off valves. Vent and ejection pipes should be fitted with grout-tight caps, valves, or other mechanical devices for shut-off.
- e. All vents should be open when grouting starts. Grout should be allowed to flow from the first vent after the inlet pipe until any entrapped air has been removed, at which time the vent should be capped or otherwise closed. Remaining vents should be closed in sequence in the same manner.
- f. If the actual grouting pressure exceeds the maximum recommended pumping pressure, grout may be injected at any vent which has been, or is ready to be capped as long as a oneway flow of grout is maintained. If this procedure is used, then the vent which is to be used for injection should be fitted with a mechanical shut-off valve.
- g. Whenever the grout pumping pressure exceeds 150 psig (1.034 MPa) and the bneway flow of grout cannot be maintained, the grout should be immediately flushed out of the duct withwater.
- h. Grout should be pumped through the duct and continuously wasted at the outlet pipe until: (1) no visible slugs or air or water are ejected, and (2) the efflux time of the ejected grout is not less than 15 seconds. The outlet pipe should then be capped (or the valve closed) and the final pumping pressure or 60 psig (413.7kPa), whichever is greater, should be maintained until the valve at the injection pipe (or vent being used for injection) is closed.
- i. Valves and caps should not be removed or opened until the grout has set. Grout must remain tightly sealed in the ducts. Any leaks must be immediately repaired and grouting of remaining ducts delayed until the cause of leaking is corrected.

H 764 POST-TENSIONING RECORD SHEET

Refer to "Post Tensioning Record Sheet," [Figure H 764](#), for implementation of the following procedure for recording stressing data.

H 764.1 GENERAL

- a. **Prestressing System** - The prestressing system should be as specified on the shop drawings.
- b. **Expected Anchor Set** - Shown on shop drawings.
- c. **Jack No. and Gage No.** - The jack No. and gage No. must agree with the calibration chart.
- d. **Date Calibrated** - The jack and gage should have been calibrated within 30 days of stressing tendons.
- e. When jacking from one end, one column on the Post-Tensioning Records Sheet is completed for each tendon jacked. When jacking from both ends, two columns will be required per tendon and Items 7, 13, and 14 may be deleted.
- f. Deviations in jacking force, elongation, anchor set, and prestressing sequence or procedure should be approved in advance by the design engineer.

H 764.2 RECORDS SHEET ITEMS

ITEM NO.

1. Indicate girder identification as shown on the shop drawings. The end jacked should be specified by abutment or pier number shown on the plans or cardinal points (N, S, E, W).
2. Indicate tendon identification -as shown on the shop drawings. The No. of Strands should be verified in the field and must agree with the shop drawings.
3. Initial Jacking Pressure = 10 percent of final jacking pressure taken from the calibration chart. Plot 10 percent of the final jacking force shown on the shop drawings and read the initial jacking pressure.

4. Final jacking pressure is taken from the calibration chart. Plot the final jacking force shown on the shop drawings and read the final jacking pressure. Do not exceed specified final jacking pressure unless verified in advance by the design engineer. Where anticipated gage pressures are shown on the shop drawings, they are theoretical values and should only be used as a guide until calibration charts are available.
5. Expected elongation at final jacking pressure (before seating anchorage) is shown on the shop drawings.
6. Length of Cable to Reference Mark (jacked and unjacked ends)
7. Mark strands and measure cable lengths while holding initial jacking pressure. Cable lengths should be measured from a stable point (such as face of bearing plate) to a reference mark painted on all strands.
8. Measure cable length at jacked ends before seating anchorage while holding final jacking pressure.
9. Measured elongation before anchor set must agree with expected elongation (Item 5) within 3 percent.
10. Measure elongation after seating anchorage.
11. Measured Anchor Set at Jacked End must agree with expected anchor set within 1/4-inch (3.2 mm).
13. Measure cable length after seating anchorage.
14. Slippage at unjacked end should not exceed 1/8 inch (3.2 mm).

H 770 CHANGE ORDERS

After award of a contract, or issuance of a construction permit, changes in the contract documents (plans, permits, special provisions, specifications, etc.) can require the issuance of a change order. A change order should provide a complete description of the proposed change in construction and should be issued to the contractor at the earliest possible time so as to minimize conflict with his schedule.

A change order, as the name implies, is an order to the contractor to do something other than that required by the contract documents. It is needed to describe the work to be done and to prepare cost estimates and as-built drawings. The change order should be as complete and specific as original design plans and

should include detail sketches or supplementary plans as necessary.

The following samples of typical Board reports and change order documents are included for reference.

Figure H 770A - Board Report (to authorize change order work in excess of \$25,000). Sheets 1 and 2.

Figure H 770B - Emergency Change Authorization (to authorize change order work up to \$25,000).

Figure H 770C - Accompanying change order (to identify unit cost and approximate total cost).

Figure H 770D - Follow-up change order (to authorize progress payment or to establish final cost of contract).

Figure H 770E - Change order form (showing additions, deductions, and quantity items).

Figure H 770F - Accompanying change order sketch.

Figure H 770G - Board Report containing supplemental agreement used when a major bid item (10 percent or more of the original contract cost) changes more than 25 percent). Sheets 1 and 2.

Figure H 770H - Accompanying change order Sheets 1 and 2.

Figure H 775.2 - Interim Change Authorization, Class "B" Permit projects.

H 771 GENERAL PROCEDURE

Unless conditions dictate otherwise (refer to [Subsection 774](#), Financial Limitation) and providing funding is sufficient (Part a, below), the Project Engineer prepares the change order in accordance with the following procedures:

- a. No change order shall be written without sufficient funds available to pay for the extra work. It is incumbent upon the Project Engineer to understand the nature of the change and its approximate cost. Assistance in obtaining preliminary costs can be obtained from the construction be verified by calling the Project Management Division's Advertisement and Award Section.
- b. The Project Engineer notifies all parties involved as to the impending change order. This would include the inspec-

tor, the contractor, and any design office or agency affected by the cost or work changes. The Construction Division's Utility Coordination Section should be notified when utilities are affected. They notify utility owners of any necessary relocations or modifications of their facilities.

- c. Change Orders for amounts exceeding \$25,000 require Board approval. A Board Report prepared by the originating office shall accompany the original change order forwarded to the Coordinating Division. In emergency situations ([Subsection H 776](#)) where work cannot be stopped, and it is anticipated that the extra work cost may exceed \$15,000, the Division Engineer shall immediately notify his Deputy City Engineer and request that the Board be notified.
- d. Change Orders shall be promptly prepared, submitted and processed to reflect the proposed change and its cost prior to the work being started. If the issuance of a normal change order would delay the project, the Emergency Change Authorization shall be used ([Subsection H 776](#)). This form can be quickly hand written in the field by the authorized engineers, and its issuance will allow the project to continue without delay. However, any time and project to Materials (T and M) method of payment of agreed prices must also be negotiated prior to starting the work and be so indicated on the Emergency Change Authorization.

For extra work which is not to be paid by contract or stipulated unit prices, the Capital Change Order Section negotiates any changes in contract cost or authorizes T and M procedures. The Project Engineer authorizes T and M work after he has discussed the change order with the Change Order Section and has received their concurrence. This method of paying for extra work is not always appropriate, for the work involved can often be more expensive than a negotiated price.

- e. Project Engineer should not accumulate individual change order items and include them in one large "clean-up" type change order at the close of the project construction.

H 772 PREPARATION OF CHANGE ORDERS

The change order format includes a complete title block and four numbered paragraphs, with subparagraphs for multiple items:

Title Block - Includes the contract title and plan reference number. The job number is the project Work Order (W.O.), Assessment Act (A'll), or "B" Permit number. On those projects involving City payment of non-reimbursed funds, the contract

number should be obtained from the Coordinating Division along with the change order serial number. The serial number is the change order sequential number for the project. The order number is an accounting number entered by the Administration Division.

Item 1 - Reason for Change - A brief, clear, and accurate statement of the reason for the change, not a duplicate of Item 2 below. Examples are: (1) Requested by contractor; (2) To clear interfering substructures; (3) To meet existing grades, etc.

Item 2 - Description of Change - A clear and complete description of the change, indicating materials, stations, dimensions, elevations, etc. This should be in sufficient detail to enable the quantities in Item 3 to be determined. If a sketch is provided, state, "The work shall be performed in accordance with Change Order Sketch Serial No..." The sketch serial number is the same as the change order serial number. Do not state "attached," because all copies distributed do not require sketches. The sketch title block must contain the job title and number, the change order serial number, and the plan reference. Each sketch sheet should be numbered and the total number of sheets used should be shown on each sheet -(e.g. Sheet 7 of 10).

Change order sketches should be drawn on standard engineering forms Eng. 3.155A and B (Figure H 770F). Larger plan or profile sheets may be used if necessary, provided title blocks are revised to provide complete information as described above.

Item 3 - Change in Contract Cost - For each change noted in Item 2 above, show the change in contract cost in the following format:

- a. Quantity - expressed in bid units (rounded off to nearest whole units where practical).
- b. Item description (as described in bidding form if applicable).
- c. Unit price (contract unit price if available).
- d. Basis for price - in parentheses (see below).
- e. Extension (unit price times quantity).

The basis for price should be the contract unit price, stipulated unit price, agreed price, or extra work price in that order of preference as listed in Subsections 3-2 and 3-3 of the

Standard Specifications. Agreed prices are negotiated by Construction Division's Change Order Section when contract or stipulated unit prices are not available. When agreement cannot be reached, extra work prices must be used. However, a Project Engineer should not authorize Time and Materials (T and M) work unless he has discussed the change order with Construction Division and received their concurrence.

Additions and deductions should be extended in separate columns and summarized to show total net addition or deduction. The term "Net" is used only if both additions and deductions are shown.

If a property owner has agreed to pay the contractor directly, state this on the change order and attach a copy of the letter of agreement to the original change order. If there is no letter of agreement, be certain that the contractor has been assured of such payment. Also, where applicable, copies of "Emergency Change Authorization" (Form Eng. 3.154, [Figure H 770B](#)), "Right of Entry" or "Consent to Enter Private Property and Assess Same for Work Performed Thereon" (Figures E 144.22A, B, Street Manual), or written requests from other bureaus should be attached to the change order.

Prices should be extended for tonnage or estimated quantity items as shown on the sample change order, [Figure H 770E](#) and a statement included such as; "final payment will be made under the respective bid item based on actual tonnage laid."

Item 4 - Change in Contract Time - When change order work does not affect contract time, Item 4 is completed; "No change in contract time."

If the contract time is affected, the Change Order Section will determine the extension of time required and will complete Item 4.

Additional information of value to the Change Order Section in negotiating prices or checking calculations should be forwarded in an office memorandum.

Each page of a multi-page change order should be numbered above the signature block, including the total number of pages (e.g. Page 2 of 4 Pages).

H 773 APPROVALS

Change orders are subject to limitations and approvals as listed below and in [Sections H 774](#) and [H 775](#). Signatures are required only on the last sheet of a series.

For Capital Improvement, Street Improvement Act, and Assessment Act projects, a change order which requires approval by the Board of Public Works is prepared by the prime office and forwarded to the Construction Division with the following note near the bottom of the last sheet:

Approved by the Board of Public Works on _____
(Date)

If negotiation is required and extra work prices are used, the change order should contain the following notes placed below Board approval:

Approved by _____ on _____
(Signature) (Date)

Type the construction company firm name here as it appears on the contract.

For FAU projects, Caltrans' approval is required in advance by telephone, and the following statement should be placed below the contractor's approval and completed by the prime office.

Approved by _____ on _____
(Name) (Date)

State Department of Transportation

The district or division engineer signs all change orders and initials required Board reports before forwarding them to the Construction Division for securing of remaining signatures. Initials of the person writing the change order and the typist's initials are shown in the lower left corner above the signature block.

H 773.1 APPEAL PROCEDURES

On November 14, 1979, the Board of Public Works adopted the following appeal procedure in connection with Change Orders processed by the Bureau of Engineering:

1. Within five working days following receipt of written notice from the contractor notifying the City Engineer that an unresolvable dispute exists, a meeting shall be scheduled

with the Division Engineer, Construction Division, in an attempt to resolve the differences.

2. Within five working days following the meeting described in No. 1 above, if the results of that meeting are not satisfactory to the contractor, a meeting will be scheduled with the Bureau of Engineering top management; i.e., Deputy Engineer level; or above.
3. Within five working days following the meeting described in No. 2 above, if a contractor is still not satisfied, the design office or Construction Division will prepare and submit to the Board of Public Works a report which will include a comprehensive explanation of the positions of the contractor and the City. This report will recommend that the contractor's position be heard by the Board. This hearing should be scheduled as quickly as possible so that the matter can have a final disposition.
4. If the contractor is still not satisfied, he retains the right to initiate legal action.

H 774 FINANCIAL LIMITATIONS

There are limits to the dollar amount for which a change order can be issued in Capital Improvement, Street Improvement, and Assessment projects. Refer also to SSPWC, Section 3.

For Capital Improvement (or Cash Contract) Projects, each net deduction or addition to contract cost exceeding \$25,000 requires approval by the Board of Public Works. The Board may approve aggregate accumulated- changes in work up to 25 percent of the original total contract amount, after which renegotiation with the contractor is required. Added work which is clearly outside the scope of the original contract (and which is not exempted by Section 386 of the City Charter) is limited to \$5,000. A change in a major bid item (item totaling 10 percent or more of the total contract price) of more than 25 percent requires renegotiation with the contractor for that portion exceeding 25 percent of the item.

For 1911 Assessment Act Projects, the State Streets and Highways Code specifies the following limitations in addition to those stated above for Capital Improvement Projects:

- a. For a contract not exceeding \$20,000, each change order is limited to \$1,000.

- b. For a contract in excess of \$20,000, each change order is limited to five per cent of the contract amount, but not to exceed \$10,000.
- c. Aggregate accumulated increase in assessment to property owners cannot exceed 20 percent under any circumstance (including modification procedures).

Each change exceeding the above amounts must be made through the modification procedures (Chapter 8.5 of the Code), which require a resolution of modification, public hearings, and other procedures. The above limitations do not apply if a change is paid for by the City or requested by a property owner who will be assessed for the work. Such requests must be made in writing with clear agreement as to apportionment of costs.

For projects under the Street Improvement Act of 1941 (St41), the City Administrative Code, Sections 6.17 to 6.62, limits that portion of a project which can be assessed to property owners (including the cost for change orders) to exceed 10 percent of the engineer's cost estimate or the bid price, whichever is lower. All other funds must be provided by the City Council.

Contact the Assessment Division for additional information.

H 775 B-PERMITS

Change orders for B-Permit projects are usually initiated and prepared by the permittee's private engineer, although the City Engineer may also do so. Both parties must approve the change. If the cost of the change is more than that of the work already completed and the existing improvement bond is inadequate to insure the remaining work, the amount of the bond should be increased before additional work is authorized, (refer to Subsection H 172.2).

"B" Permit change orders are prepared using the format described in [Subsection H 772](#) with the following differences.

H 775.1 CHANGE ORDER - CITY PARTICIPATION IN CONTRACT COST

- a. The project engineer establishes the sequential change order serial number.

- b. Item 3 (Change in Contract Cost) is completed in the same manner as for a cash project, and the following note is inserted above the signature block:

The City's share of this cost addition (or reduction) is _____ percent of \$ _____ (cost of change, Item 3) or \$ _____ in accordance with City Contract No. _____ between the permittee and the City.

- c. Item 4 is not used on "B" Permit change orders.
- d. Procedure and distribution should be as outlined in [Subsection H 771](#) except as follows:
1. Survey Division copy should be deleted if survey is being done privately.
 2. Private Engineer - three copies; one copy signed by the private engineer should be returned to the prime office.

H 775.2 INTERIM CHANGE AUTHORIZATION - NO CITY PARTICIPATION

This change authorization, prepared on Form Eng. 3.156, is the most common form of change order in B-Permit projects. Procedure and distribution are similar to that outlined in [Subsection H 775.1](#), except that copies need not be stamped preliminary and no copies are sent to Survey Division and Construction Division. Change order Items 3 and 4 are not required. The initial distribution is the only distribution made and the signature of the Division or District Engineer constitutes final approval by the City (see [Figure H 775.2](#)). The cost of the additional work should be covered by improvement bond.

H 776 EMERGENCY CHANGE AUTHORIZATION

In an emergency or where it is not practical to delay construction until a change order can be routinely issued, an Emergency Change Authorization can be issued immediately. Authority to issue an Emergency Change Authorization is limited to personnel designated in writing by each Division or District Engineer. Increase or decrease in cost is limited to \$25,000. The Change Order Section of Construction Division should negotiate any costs not included in the bid items before the work is started. Forms should be signed by the following parties before starting the work:

- a. Division or district office.
- b. Contractor.
- c. Construction Division.
- d. Field Inspector.

An Emergency Change Authorization should be confirmed by a regular change order as soon as possible. Refer to [Figures H 770B, C, and D](#).

H 777 DISTRIBUTION

Preliminary copies should be distributed in advance of final authorized copies in order to notify the contractor of the pending change at the earliest possible time. All copies except the original and first copies of the change order should be stamped at the bottom of the last sheet as shown below and distributed (prior to the City Engineer's signature) as soon as possible.

PRELIMINARY CHANGE ORDER

THIS IS NOT AN AUTHORIZATION TO PERFORM WORK
BUT IS A NOTIFICATION TO NOT PERFORM WORK
WHICH MAY CONFLICT WITH THE PROPOSED CHANGE.

Received by _____ on _____
Contractor Date

Received by _____ on _____
Project Field Inspector Date

Preliminary change orders (and supplementary sketches, if any) are distributed as follows:

- a. Construction Division - original and first copy. Additional copy when changes involve street work, grade changes, or utilities.
- b. Prime office - one copy.
- c. Bureau of Contract Administration - three copies; one copy signed by the field inspector and the contractor, should be returned to the prime design office.
- d. Survey Division - one copy.

H 777.1 DISTRIBUTION EXCEPTIONS

With the concurrence of Construction Division, distribution may be withheld until final approval is obtained. Examples of cases where preliminary distribution may be withheld include:

- a. Public controversy may be involved.
- b. Cost or scope of project change may not be determined without approval of the City Engineer and/or Board of Public Works in advance.
- c. Cost or scope of project change may not be determined until after the Construction Division's negotiations with the contractor are complete.
- d. An emergency change order has already been issued (see [Subsection H 776](#)).
- e. Design changes involve a deviation from standards.
- f. The City's legal position or bargaining position may be affected by the change.

H 780 FINAL INSPECTION

Upon completion of the work, the contractor calls for a final inspection. The Bureau of Contract Administration schedules the final inspection and notifies all design offices involved.

Each office reviews the work for conformance with the Plans and Specifications and if all agree that the work is satisfactory, the City accepts the project. If not satisfactory, then corrections or omissions are listed. When all corrections are made and the work is complete, including change orders, the contractor is paid; the bonds are released; and the contract is fulfilled. Bonds should not be released in B-Permit Projects until as-built plans have been completed by the private engineer.

H 781 AREAS OF INSPECTION JURISDICTION

Responsibility for final inspection and acceptance of completed projects is shared by involved design offices, Construction Division and the Bureau of Contract Administration and by other agencies with funding or maintenance-ownership functions.

H 781.1 BETWEEN THE CITY AND OTHER AGENCIES

City facilities may be constructed under State or County contract, or conversely, State and County facilities may be constructed under City contract. Work to be maintained by another agency is often performed under its specifications and reviewed by its own representative at the time of final inspection. In that case, the City representative is primarily concerned only with those portions of the work which will be owned and/or maintained by the City, if any.

H 781.2 BETWEEN BUREAUS

The functions of the Bureaus of Engineering and Contract Administration are parallel and may overlap to some degree as outlined below.

H 781.21 BUREAU OF CONTRACT ADMINISTRATION

The Bureau of Contract Administration is primarily interested in matters of contract compliance involving construction operations, procedures, finished appearance, quality of materials, correctness of line and grade, and adequacy of cleanup.

H 781.22 BUREAU OF ENGINEERING

The Bureau of Engineering, in addition to contract compliance, is concerned with adequacy of design, safety, and utility of the finished structure, and ease of future maintenance. The engineer should make periodic inspections during the construction to minimize the number of changes or corrections made during final inspection.

H 782 JOINT INSPECTION

For most jobs, it is recommended that the engineer join the final inspector in the job review and completion of the "Final Inspection Correction List". The engineer from each design office should review that portion of the project for which he is responsible and inform the inspector of corrections to be made by the contractor. The inspector compiles the final correction list. The list should be thorough and complete without reference to unimportant details or "technicalities" and without need for supplementary items or explanation, so that the contractor knows precisely what work is needed to complete the project for acceptance.

H 783 AREA OF DISAGREEMENT

If there is an area of disagreement between the engineer and the inspector during joint final inspection, it should be resolved with their supervisors either in the field or in conference, but should not be debated in the presence of the contractor or others not representing the City's interest.

H 784 FINAL ACCEPTANCE

After corrections have been made by the contractor, the final inspector will notify the engineer who then has the option of accepting the work with or without an additional field review. Unnecessary delays in acceptance should be avoided because they delay final payment to the contractor. Such delays create poor public relations and may even contribute to higher bids from contractors on future projects. On Federal-Aid Projects, a report of completion of structures on Local Roads and Streets is due within 90 days of project completion.

Each engineer should forward a "Project Acceptance Recommendation Form" immediately following his acceptance of his portion of the work. This should be transmitted to Project Management Division for work order and assessment act projects or to Street Opening and Widening Division for B-Permits. (Refer to [Subsections H 713.5](#), [H 714.1](#), and [H 714.2](#)).

For structures to be maintained by the City, the engineer should provide bridge maintenance personnel with a copy of the "Project Acceptance Recommendation".