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F 500 PREPARATION OF PLANS

INTRODUCTION

A construction plan shows in detail the type, extent, location and materials of construction. To prepare a good construction plan, the Designer must plan the layout, clearly delineate all construction, and thoroughly check for accuracy and eliminate conflicting instructions. A well-prepared, neat and highly legible construction plan reflects credit upon the Engineer and the City and minimizes construction problems in the field. It also fulfills the City Engineer's City Charter Section 49 duty/responsibility relative to records.

The purpose of this Section is to standardize and establish parameters for the preparation of sewer plans in all design offices of the Bureau. In this pursuit, standards are established, their applications are explained and examples are, where practical, shown. The examples covered apply to the most common types of City sewer construction.

In preparing sewer plans, the Engineer shall endeavor to provide the contractor with concise and simple instructions. It is essential that the Engineer understands that the plan view is the sewer's horizontal alignment (construction plan) and the profile is the sewer's vertical alignment. Construction notes shall not be placed on the profile. Notes on the plan view should be minimized and in accordance with the SSPWC and Special Provisions. If these do not suffice, the Engineer may use general notes on the title sheet or specific construction notes on the plan sheets.

Excessive delineation, dimensions and labels add nothing to the clarity of the plan. On the contrary, they detract from it by obscuring essential construction details. Unnecessary detail on the plans is time consuming, costly and inefficient for both the draftsman and the checker.

Preliminary plans will be necessary for most sewer projects. Where the project is routine, such as, a project of short length, the

Engineer may proceed on a final plan basis. Regardless of the size of the sewer project, the Engineer shall submit two sets of plans to all affected agencies, including substructure owners, requesting review and return of one set with comments as soon as possible.

F 510 PLAN LAYOUT FOR SEWER PROJECTS

The plan layout formats for all City projects are shown on [Standard Plans S-620, S-621 and S-622](#).

The formats are applicable to all City plans and shall be used as guides for sewer plans prepared by the City and other agencies for the City Engineer. In all cases, City standard symbols shall be used.

The general sequence of sheets shall be as follows:

- a. Title Sheet
- b. Plan and Profile Sheets
- c. Intersections and Enlargements
- d. Maintenance Hole Details
- e. Structural Details
- f. Storm drain and Street Reconstruction Details
- g. Excavation and Fill Cross-sections
- h. Log of Test Borings

Only large projects normally require the use of most of these types of sheets. For most City projects, only the first two types are usually required.

F 511 SINGLE SHEET PLAN LAYOUT

The Single Sheet Plan Layout is shown in [Standard Plan S-620](#). This format is useful for short length sewers and other smaller projects. The most frequent uses of this Standard Plan format for sewer plans are Class "B" Permit projects. (See F 123). The Engineer shall check the permittee's sewer plan submittal for conformance with the prescribed format. For sample single sheet plan layout, see [F 511A](#).

F 512 TITLE SHEET PLAN LAYOUT AND SECONDARY SHEET PLANLAYOUT

See [Standard Plans S-621 and S-622](#) for standards which apply to all types of projects for the City, and F 512A, B, C, and D for sample projects. The format and instructions apply to sewer plans prepared by other agencies for the City Engineer, except that, their standard sheets shall be used.

F 512.1 TITLE SHEET PLAN LAYOUT

The Title Sheet Plan Layout as shown in [Standard Plan S-621](#) may be modified to suit the sewer plan requirements, at the Engineers discretion.

F 512.11 KEY MAP

A small scale map showing the streets in which sewers are to be constructed shall be shown on the title sheet. The area shown shall be extensive enough to locate major streets along/adjacent to the sewer.

Sewers to be constructed shall be shown on the map along with the sewer line numbers. The plan sheets on which the sewer line is shown shall also be indicated. If applicable, an Assessment District boundary or Class B Permit Participation boundary shall be shown on the Key Map if practical. The Key Map shall also show the following:

- a. Street limit lines
- b. Street names
- c. Delineation of the proposed sewer, with maintenance holes shown in their correct locations relative to the streets
- d. The sewer line numbers and sheet numbers
- e. North arrow, and scale
- f. Railroads
- g. Important channels and flood control systems.
- h. City boundary

On large projects it may be desirable to reproduce a "Vicinity Map" on the title sheet in addition to the Key Map. The Vicinity Map should be of smaller scale than the Key Map and should show the location of the project in relation to streets, boundaries and important features. The "Vicinity Map" should cover a more extensive area than the "Key Map". Maintenance holes and similar details should be shown on the Key Map, and not on the Vicinity Map.

The Key Map may be used to indicate the street resurfacing required. The Engineer shall use consistent hachures and symbols

to identify the class of pavement and a specific thickness if this technique is utilized. (See F 491.3).

F 512.12 INDEX OF SHEETS

An index, in tabular form and numerical sequence, of the sheets comprising the construction plans for the project, or for the sanitary sewer portion of the project, shall be shown in the upper right corner of the title sheet. See [Standard Plan S-621](#).

F 512.13 NOTICE TO CONTRACTORS

Under the "Notice to Contractors" on the Title Sheet Plan Layout, all general requirements and special notices shall be called out to the Contractor's attention. Some notes supplement or supersede the SSPWC or the Standard Plans and others provide general data.

All general notes on the title sheet shall be of general application. Construction notes of specific work shall be placed on the sheet where the construction is shown. General structural notes shall be located on the structural detail sheet.

F 512.131 INSPECTOR'S/SURVEYOR'S FIELD OFFICE

The Engineer shall check with the Inspector of Public Works, Bureau of Contract Administration, and Survey Division (SURV) for field office requirements. A note shall be added to the "Notice to Contractor" list if field offices are requested. (See Part J of the Manual for additional information on Survey Offices).

F 512.132 PERMITS

All permit information shall be shown on the "Notice to Contractors." CALTRANS and LACDPW encroachment permits, State DIS excavation and tunnel classifications and the NPDES discharge permits are examples which shall be listed, if applicable to the proposed sewer project.

F 512.14 EXISTING SEWER FLOW HYDROGRAPH

If the sewer project involves an existing sewer, the Engineer shall provide a diurnal flow hydrograph, similar to that shown in [Figure F 512.14](#), on the Title Sheet or elsewhere on the plans when the following conditions are met:

- a. Sewers 15 inch and smaller, when the velocity exceeds 10 fps.
- b. Sewers 18 inch and greater, when d/D exceeds 0.5 at PDWF.
- c. Other unusual circumstances, when approved by the District/Division Engineer.

A note shall be placed with the flow hydrograph to advise the contractor that during the storm season, the peak flow could be significantly greater.

The flow hydrograph shall be based on recent field data. The field data shall consist of depth of flow readings at 1/2 hour intervals for not less than 24 hours. When such data is unavailable, or is more than a few years old, the Engineer shall prepare a request to the Survey Division to measure the flow.

Prior to making the request, the Engineer shall make a field check to ascertain that the maintenance holes selected for gauging are accessible, and not paved over. The sewer MHs shall be checked to ascertain the flow characteristics are suitable for accurate gaugings. The following information shall be shown in the request:

- a. The locations of the MHs to be gauged for diurnal flow.
- b. Date or dates and at what frequency.
- c. Special gaugings or measurements.
- d. Whether the request is top priority, priority or routine.
- e. The correct project title and work order number to which the work is to be charged.
- f. The name and telephone number of the Project Engineer.

Because accurate gaugings can seldom be obtained at junction structures and at Type "B" MHs having different sized inlets and outlets or with appreciably curved channels, the MHs selected for gauging should, if possible, be Type "B". The MHs should also have

straight channels and inlets and outlets of the same size and on the same grade.

When sewers in residential areas are to be gauged during night hours, the Police Department shall be advised.

F 512.15 SEWER LEGEND AND ABBREVIATIONS

Subsection 1-3 of the SSPWC and [Standard Plan S-610](#) list standard abbreviations. While these are usually adequate, the Engineer may determine additional abbreviations to be incorporated in the plans and specifications for a specific project. If such additional abbreviations are found necessary, they shall be placed on the Title Sheet.

[Standard Plan S-623](#) entitled "Drafting Symbols for Existing Culture" details the standard symbols approved for use on all projects. If additional symbols are necessary, they shall also be placed on the Title Sheet.

F 512.16 SURVEY DATA

Survey data references shall be located in the spaces provided on the Title Sheet. This information includes a listing of all applicable bench marks and their most recently determined elevations.

Sufficient bench marks shall be listed on the plans to enable the surveyors, engineers and contractors to accurately establish horizontal and vertical alignments. In general, bench marks shall be provided at the beginning and end of the project and at least one bench mark shall be provided for each 700 foot length of sewer. If more bench marks are available, it is advisable to show them. When showing bench marks to be used, care shall be taken so that bench marks that have been removed, or are considered "unstable" are not shown.

F 512.2 SECONDARY SHEET PLAN LAYOUT

The Secondary Sheet Plan Layout may be plain or it may have a profile grid at the top one-half of the sheet. Plain sheets shall

be used for miscellaneous details, plans and elevation sections. An example would be structural details with sections. Sewer plans shall be in accordance with the instructions given on Standard Plans [S-621](#) and [S-622](#).

F 512.21 TITLE BLOCK

The work order title and number and the sheet description title shall be shown in the Title Block. The scales shall be shown on the plan and profile sheet.

F 512.22 SCALE

Standard scales used for City sewer plans are usually 1 inch = 40 feet or 1 inch = 20 feet horizontal and 1 inch = 4 feet vertical. These are shown on the margin block provided at the bottom of each Secondary Sheet. In hillside areas, at the discretion of the Engineer, the vertical scale is often 1 inch = 8 feet. When used, it shall be clearly indicated in the profile with large block letters (**DOUBLE VERTICAL SCALE**) enclosed in a box.

F 512.221 STRUCTURAL DETAILS

The SED shall use architectural scales (i.e., 1/4 inch = 1'-0"). These shall be shown below the detail or section title. When the entire sheet is to the same scale, it may be noted in the marginal block. (See Part H of the Manual).

F 512.222 PLANS FOR OTHERS

All City sewer plans drawn for CALTRANS freeway projects shall be 1 inch = 50 feet horizontal and 1 inch = 10 feet vertical.

The LACDPW normally uses the same scales as the City. (See [F 512.22](#)). Other agencies that have sewer plans prepared by the City Engineer shall use the standard scales unless directed otherwise.

F 520 DRAFTING AND MATERIAL

The sewer plan shall be drawn onto standard City transparency sheets. (See [F 511](#) and [F 512](#)). Pencil is the preferred linework. However, ink may be used at the discretion of the Engineer. All work shall be neat, with clear and concise lettering and in conformance with City Engineer standards. The City Engineer Drafting and Cartography policy and procedure shall be per Part I of the Bureau Manual. Engineers shall refer to Part I for preparation of the sewer plans.

F 521 LETTERING

The draftperson shall execute satisfactory Reinhardt freehand lettering or, when available, Computer Aided Drafting (CAD). For title blocks, sheet numbers, major headings and profile grid elevations and stations, CAD or Leroy lettering shall be used. The use of transfer letters, or words preprinted on transparent adhesive shall not be used for record drawings. Central Records Section will not process for signature those drawings which have paste-ons, adhesive tapes, or decals on them. The drawings shall be duplicated onto an archival medium and the replacement mylar processed.

The minimum height for lettering shall be per [Standard Plan S-621](#). The placement of lettering in relation to the bottom edge of the sheet shall be as shown in [Figure F 521](#).

Note that it is permissible to overlap the lettering by 9 degrees in the vicinity of the perpendicular line to the bottom edge of the sheet. However, this should be done uniformly, either to the left or to the right. In general, avoid the overlap.

F 522 LINEWORK

The conventional drafting linework is also shown in [Figures F 522A](#) and [F 522B](#). This linework shall be used on all sewer plans. It is essential that all drawings be consistent in contrasts and symbols. See Part I, Drafting and Cartography, Bureau Manual.

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F 523 DRAFTING MATERIAL

City Engineer standard transparencies shall be made from synthetic material. Plastic sheet pencils shall be used in delineation work. (See [F 520](#)). Excessively hard or soft and graphite pencils shall be avoided.

F 524 REPROGRAPHIC TRANSPARENCIES

Existing plans, maps and aerial photographs can be reproduced on standard City transparency sheets by Reprographics, Administrative Division. The Engineer shall consider the cost effectiveness of reprographic transparencies.

F 524.1 AERIAL TOPOGRAPHIC MAP

The Survey Division has aerial topographic maps of the hillside areas. Topographic maps show existing culture, such as, trees, roadways, walks, buildings and contours. See Part J 520 et.seq. These maps are reasonably accurate but will have to be adjusted to scale through the reprographic work. By "ghost image production" the existing culture and contours can be shown in light contrast in relation to the proposed sewer. The Engineer shall check for changes in current conditions such as trees which may have grown larger since the photograph was taken.

F 524.2 EXISTING SEWER OR STREET PLANS

If a sewer is proposed parallel to an existing sewer or in an existing improved street, the Designer shall consider "ghost image production" of the required limits from existing plans. Any new data for surface culture should be transferred onto the print used prior to reprographics so that the contrast of existing culture is consistent. Since both street and sewer plans should be standard scale (1 inch = 40 feet), the reproduction should be adequate.

F 524.3 CONCURRENT PROJECTS

Street improvement Cash Contract projects and Class "B" Permit projects require plans at standard scale.

A Cash Contract street im-

provement may require sewer reconstruction. (See F 121.23). A reproduction of a Class "B" Permit street plan may be utilized for the sewer plan transparency. The Engineer shall determine if such a procedure will be cost effective for the permittee before starting.

Sewer reconstruction, which consisted of HC remodeling or extensions, has been placed directly on street reconstruction plans. It is more expedient to use prints of the street improvement for "ghost image production" transparencies, thereby attaining good clear street line contrasts light enough to delineate directly over and yet retain the street data, such as, ties, dimensions, elevations, driveways and walks. The sewer location shall be directly tied to street stationing in such cases.

F 524.4 CALTRANS, LACDPW AND OTHER PROJECTS

The "ghost image production" transparency technique will be useful on State, County or Federal projects. Plan and profile scales shall be adjusted in the reprographics. Sheet format shall conform to the standards of the owner or affected agency. (See [F 512.222](#)).

Where the scale of the other agency differs from that used on the available plan, the Reprographics Section of the Administration Division can photographically reduce the scale to the appropriate scale. (e.g. changing from a 40 scale to a 50 scale). It is also possible to increase the scale (i.e. changing from a 40 scale to a 20 scale). However, this practice should be discouraged because increasing an image by photographic methods usually produces poor quality. Where "ghost images" are desired, the loss of quality is not as apparent and may be permissible provided the increase in scale does not exceed 25 percent. The Administration Division should be consulted if the Reprographics Section is able to photographically place the other agencies format directly onto an existing plan by means of photographics processes and at the same time delete the existing plan format.

If construction plans are produced at one-half size (bound copies), the Engineer shall ensure the plans have contrast clarity to allow for the reduction in size.

F 530 THE PLAN VIEW

The Plan View shows the proposed sewer and all appurtenant work required as well as all other structures in close proximity to the project. Specific construction notes or symbols pertinent to work shall be concise and placed on the plan view. All proposed construction shall be indicated by bolder line work in contrast to existing culture, surface improvements and construction proposed under separate contracts or future extensions. See Part I of the Bureau Manual for major Plan View elements.

F 530.1 PLAN SHEET ORIENTATION

The plan shall be oriented so that the North Arrow generally points to the top or to the right of the sheet for the major portion of the alignment. Assuming the top of the sheet as due north, the range within which the north arrow may point is from 45° westerly of north to 135° easterly of north. See [Standard Plan S-620](#) "Single Sheet Plan Layout".

Where a sewer is to be constructed in a North-South direction, it is usually not feasible to orient the plan sheet so that North is at the top of the sheet. In this case, it is preferable to orient the plan sheet so that the downstream end of the sewer is at the left, and the upstream end is at the right. In combined projects where sewer plans are part of another plan, the alignment of the originating design office should be followed, if practical, to maintain the same orientation.

F 531 CENTER LINE ALIGNMENT

The proposed horizontal sewer center line alignment shall be delineated on the plan view as a fine alternating short and long dashed line. All ties and stationing shall be referenced to the center line or other survey line. The horizontal center line alignment will be used by the construction surveyors to provide a stake line from which the sewer pipe is constructed. (See Manuals J 632.3 and F 321.2 relative to sewer surveys).

F 531.1 CENTER LINE STATIONING

Sewers shall be stationed with stations increasing in an upstream direction. The fractional stationing shall be shown to 0.01 foot. The Engineer shall maintain continuous stationing for principal sewers from the terminal station of the existing sewer to the terminal of the proposed sewer with a provision for future extension and continuous stationing. Stationing of sewer laterals shall commence at the intersection of the center lines of the main line and the lateral. All full stations shall be identified with a transverse hash on the sewer center line. Each fifth station shall show the station numeral. Negative stationing referred to as "back stationing" should be avoided. A common practice is to commence stationing at 1+00 to preclude the possibility of a "negative" stationing, however, station 0+00 is proper.

F 531.2 HORIZONTAL CURVES

The Plan View shall indicate the sewer horizontal curve data and the BC and EC stationing. The PI, BC or EC shall be tied to street center line intersection(s) or other references. State Grid coordinates (computer checked) shall also be provided. The PI, BC and EC shall also be indicated on the profile. Information for the horizontal curve shall include the following:

- a. Δ = Central angle or angle between tangents
- b. R = Radius of curvature
- c. L = Length of curve
- d. T = Tangent length
- e. Radial point State Grid coordinates (computer)

F 531.3 ANGLE POINTS

An angle point is a minor change in alignment not having a curve to provide a smooth or gradual transition. It should be limited to those cases where a curve is not feasible. The standard pipe bevel end, elbow or allowable joint pull for the pipe specified controls the minor angle point.

The plans shall indicate the station and State Grid coordinates with the deflection angle point to the nearest second. Ties shall be provided to intersection or street center lines or other references.

The plans shall indicate all grade changes (GC) and the BVC, EVC, PI, and where applicable, the R for all VCs. A beginning of VC (BVC) and end of VC (EVC) shall be shown with transverse leaders on the plans. The Engineer shall check the contractor's pipe layout shop drawings for the pipe selected and upon approval and construction of the VC, shall include all VC data shown on the plan as part of "As-Built" records.

F 531.4 SURVEY TIES

Sewers located in streets or alleys shall be tied at right angles to the applicable survey or centerlines. Sewer MHs and terminal cleanout structures adjacent to street or alley survey or centerline intersections, BC's, or EC's shall be tied by right angle ties. Street or alley survey or center line PI's may be used as points to which ties may be made. Ties to structures shall be shown to the nearest 0.01 foot.

In a right-of-way extending between two streets or alleys, the maintenance hole closest to the street or alley shall be tied to the nearest centerline intersection or other known point. Intermediate maintenance holes may be tied to one another by angles and distances or may be tied to a random survey line. Where there is a discrepancy between the measured and the calculated or recorded angle, the measured angle shall be used.

Where sewers are to be constructed on curved or irregular width streets, and the center line of the sewers or structures are not concentric or parallel to the existing survey control lines, a separate sketch showing survey control and the center line of the proposed sewer shall be detailed on the plan. It shall show all angles and distances of the survey control line with ties to the sewer structures, angle points, curve data and sewer stationing. (See F 321.2)

F 532 EXISTING SURFACE CULTURE

If current aerial topographic maps are not available or used for the base transparency, the existing surface culture along the sewer alignment will have to be determined by a field inspection survey.

This data shall be gathered by the Survey Division. All existing surface culture affected by the proposed sewer shall be shown on the plan using the appropriate existing culture symbols. (See [F 512.15](#) and [Standard Plan S-623](#)).

F 532.1 PAVEMENT

The class and thickness of the existing pavement over the proposed sewer shall be shown on the plans. A good practice is to indicate the existing pavement on the Key Map and Resurfacing Plan on the first sheet (See [F 512.11](#)). Where this is not practical, the plan sheets shall be utilized to indicate this information. The Engineer shall determine from existing street plans and field surveys the class of pavements and the specific limits, also the joints in the case of PCC. PCC pavement may be broken to the point where it may be necessary to remove or sawcut for trench work. Pavement removals to the nearest joints or cracks shall be per SSPWC.

F 532.2 CURB, GUTTER, SIDEWALK AND DRIVEWAYS

Existing improvements which might be affected or might require removal and reconstruction in conjunction with sewer HC work shall be shown on the plans. It is important to show driveways and sidewalks since continuous access may be required. Replacement requirements may be placed directly on the plan if the SSPWC does not suffice.

F 532.3 OVERHEAD CULTURE

The plans shall indicate all culture projecting overhead, such as, large trees, power or telephone poles, traffic signal masts and street electroliers. Any overhead culture that will affect construction operations shall be trimmed, modified or removed. A

note shall be placed on the plans directing the contractor to perform such tasks or shall indicate that the conflict will be relocated or otherwise managed by another agency per SSPWC.

F 532.4 WATER METERS, FIRE HYDRANTS AND HANDHOLES

The plans shall show all surface appurtenances to the water systems. Access to appurtenances shall be maintained by the contractor per the SSPWC. All relocations shall be coordinated through the Construction Division at the construction substructure meeting. (See F 321.33).

F 532.5 PUBLIC SERVICE FACILITIES

Public service facilities, especially those providing emergency services and other similar facilities should be shown on the plans. Facilities that shall be shown are fire stations, police stations, hospitals, schools and universities, public auditoriums of significant size and/or importance, major public buildings and facilities, public transportation facilities (bus stations, bus stops, railroad terminals, airports, etc.) among others. Criteria in determining whether to indicate such a facility or not is whether public safety and/or convenience may be affected by the proximity of the facility to the construction operations. In general, it would be prudent to indicate such a facility rather than to omit it.

F 533 SUBSTRUCTURES ON THE PLAN VIEW

All substructures within the public right-of-way in which the proposed sewer is aligned shall be shown on the plans. [Figures F 533A](#) and [F 533B](#) show the substructure legend for conduits, structures and other appurtenances. The term "substructure", shall include conduits, cables, MHs, vaults, and all other similar appurtenances. The size, shape, dimension and other identifying data shall be indicated.

The Engineer shall be responsible for the accuracy of the information shown on the plans. (See F 321.3, et seq.) Potholing shall be performed for possible interferences encountered which cannot be resolved by records or the substructure owner. Substructures containing or conveying unstable substances

or those which are hazardous shall be clearly located and described.

F 533.1 SUBSTRUCTURE CONVENTIONAL LINEWORK AND IDENTIFICATION

See [Figures F 522A](#), [F 522B](#), [F 533A](#) and [F 533B](#) for substructure linework. The plan shall be reviewed for consistency of substructure linework as well as accuracy. Each substructure shall be tied to the nearest property line, street centerline or other appropriate reference. The size or dimension of the substructure shall be indicated, followed by the owner acronym and a tie distance in feet. If potholed the substructure's measured location and dimensions, shall be shown on the plan. (See [F 512.15](#), [F 522](#) and [F 533](#)).

F 533.2 ABANDONED SUBSTRUCTURES

The abbreviation for abandoned shall be ABAND per [Standard Plan S-610](#). Abandoned substructures are those which have been relinquished by the owner. The contractor shall be responsible for removal of interfering sections, sealing of structures and appurtenant work.

F 533.3 SUBSTRUCTURES TO BE ABANDONED-IN-PLACE

Substructures to be abandoned-in-place indicate that the owner will abandon the substructure and will install new substructures clear of the proposed sewer. The substructure owner and the contractor shall coordinate the abandonment necessary in conjunction with the sewer work. The utility substructure owner shall submit "As-Built" substructure records to the Permit Processing Section One-Stop Counter or the public counter of the appropriate district office.

F 533.4 SEWER ABANDONMENTS

Sewers which will be abandoned with the project shall be delineated as "Aband". All maintenance holes on the portion of the sewer to be abandoned and the nearest maintenance holes on the same line shall be stationed. The limits of the abandonment shall be indicated by a leader. The notation "Abandon Ex. _____" Sewer" (show size of sewer) shall be shown on the leader. Maintenance

holes in the portion of sewer being abandoned shall not be separately indicated to be abandoned. The contractor shall abandon an existing sewer between the limits, as well as, all structures and appurtenances between said limits.

Sewers shall be shown to be abandoned only once. Where the same sewer to be abandoned is shown on more than one sheet, it shall be cross referenced to the abandonment sheet.

F 533.5 SUPPORTS, REINFORCEMENT AND PROTECTION OF SUBSTRUCTURES

The plans shall indicate precisely the type and length of protection to be provided by the contractor. Requirements for temporary supports shall be listed or otherwise covered in the Special Provisions and/or detailed on the plans. Reference to [Standard Plan S-253](#), or the owner's, if appropriate shall be made by note or symbol.

F 533.6 UTILITY SERVICE CONNECTIONS

Power and telephone service connections shall be shown on the plan and checked by the DWPPS and Pac Bell or telephone company. Other services shall be marked in the field ahead of construction.

F 534 SEWER PIPELINE DATA

The sewer includes the pipe, MHs and appurtenant structures to be constructed or placed on the alignment per F 531. (See F 400, et seq. for pipe, MHs and structures).

The sewer to be constructed shall be shown only once on the plans, as a solid, unbroken line. If the delineation of a portion of the sewer or its appurtenant structures is repeated on the same sheet or on other sheets, it shall be shown as dashed lines and reference made to the location or sheet on which the sewer and its appurtenant structures were originally shown; for example, "12 inch Sewer shown elsewhere hereon," or "8 inch Sewer shown on Sheet No. 4".

F 534.1 SEWER PIPE

The Engineer shall show the length, size, type, class of pipe and the pipe bedding if other than Case 1, as shown on the [Standard Plan S-251](#), "Pipe Laying in Trenches", for each reach between MHs and/or structures. Plastic pipe shall not be specified on any plan. If plastic pipe is to be allowed it shall be allowed as an alternate (See F 415).

F 534.11 LENGTH OF PIPE

The pipe length shown shall be the true length along the pipe horizontal projection between inside walls of MHs or structures as shown on the Standard Plan or details for structures. The length shall be to the nearest whole foot.

F 534.12 TYPE AND CLASS OF PIPE

The type and class of pipe shall be indicated on the plans and in the Special Provisions. Whenever possible, a single specification or a single note indicating the type and class of pipe should be utilized.

For allowable types of sewer pipes, see F 410, et seq. Whenever possible, the greatest number of alternatives in pipe materials should be allowed in order obtain the most competitive bid prices from contractors and suppliers.

F 534.13 ALTERNATIVE TYPES AND CLASSES OF PIPE

Materials for pipes other than those listed previously in F 410, et seq, may be considered and specified. However, prior to specifying any alternative, the Engineer shall consult with the WSED for recommendations. Only City Engineer approved pipe may be specified on City sewer plans.

F 534.14 PIPE BEDDING

[Standard Plan S-251](#), "Pipe Laying in Trenches" shows the different classes of allowable bedding.

Unless otherwise specified, Case 1 bedding shall be required. Special bedding requirements shall be reviewed by and designed by the SED and approved by WSED.

F 534.15 PIPE JOINTS

Pipe Joints shall conform to F 430, et seq. Other joints shall be subject to District Engineer approval.

F 534.2 MAINTENANCE HOLES AND SIMILAR STRUCTURES

Sewer MHs shall conform to F 440, et seq. Other MHs may be specified for particular problems or circumstances. However, prior to specifying any other MH, the WSED and the Bureau of Sanitation shall be consulted. In general, the use of special MHs should be avoided due to potentially higher construction and maintenance costs. Safety shall be paramount.

If necessary, special MHs or details of modifications shall be drawn directly on the sheet with the plan and profile of the location of the MH involved. When this is not possible, the details shall be drawn on a separate detail sheet. If a note will suffice to indicate the required modification, a detail delineating the modification will not be necessary.

Station MHs to the nearest foot since the contractor may adjust the location up to two feet to meet pipe ends. Where the MH stationing on one line equals some other station on a confluent line, show both stations and the sewer line numbers; for example, 12+62.87 = 0+00 ②. When there is an equation on the same line, indicate which station applies to downstream stationing and which applies to upstream stationing; for example, 6+72.24 back = 6+74.63 ahead. Where the 0+00 of the proposed sewer equals some other station on the sewer into which it outlets, indicate the stations, for example: 0+00 ⑤ = 45+23.72 on Ex. 18 inch Sewer. If an existing sewer is intercepted by a proposed sewer, indicate the stations, thus: 12+24.42 ④ = 8+67.73 on Ex. 8 inch Sewer. Indicate the maintenance hole type immediately beneath the leader to the maintenance hole on which the maintenance hole station is shown. (See [F 531.1](#))

If the proposed maintenance hole differs in any respect from the standard plan for the type of maintenance hole specified, the maintenance hole shall be labeled "Special". State in what respect the specified maintenance hole differs from the Standard Plan: "Special MH B-5, Const. W. Wall Vertical," or show differences on a detail and refer to said detail on the plan: "Special MH B-5 per Detail "C" on Sheet 6". When the detail may be shown on the same sheet and in close proximity to the maintenance hole the detail may be joined to the maintenance hole with a leader marked "Identical," in which instance no reference will be required. The detail shall indicate the location of the MH or structure by a station reference.

F 535 HOUSE CONNECTIONS ON THE PLANS

House Connections (HCs) shall conform to F 480, et seq. See [Standard Plan S-110](#). Dimensions and data required by the Standard Plan shall be delineated on the plans. Lengths of HCs do not have to be shown on the plan when the street dimension suffices for transverse connection to the sewer. Lengths given at each HC at the ends of the reach of sewer shown on the sheet will suffice. A guide for showing HCs are sewer Wye Maps available at district offices. (See F 321.1).

F 535.1 LOT LINES AND NUMBERS

A short line perpendicular to the street property line shall be shown to indicate the lot line or lot cut line. The cadastral map provides data such as lot numbers, tract numbers and front footage. (See F 321.1). If an Assessment Act sewer is proposed, the entire lot may be delineated on the plan, otherwise, the lot area shall be calculated and shown. If a postal card substantiation of the proposed HC location is filed, the letter "C", in parenthesis, shall be placed after the sewer wye station on the plan.

F 535.2 HOUSE CONNECTION DATA

HCs shall be 6 inches in size and 4 feet below the existing or projected top of curb at the property line. See [Standard Plan S-](#)

110. The following information is required to be shown on the plans for all HCs:

- a. Station opposite the location of the upper end of the HC, and the "Wye" station where the sewer is laid on a curve.
- b. "Wye" or saddle tap stations which are at some location other than 2 feet downstream from the station of the upper end of the HC.
- c. "Tee" stations which are other than the station of the upper end of the HCs sewer.
- d. Type of HC if other than Type "A".
- e. Pipe size and the letters HC if the HC is other than 6 inch.
- f. Length "A" (when the HC sewer length is not apparent from the street dimensions and the sewer ties).
- g. Length "B" on all Type "C" and "D" HC sewers.
- h. Standard Specifications require the following: Unless otherwise shown on the plans, HCs shall be 6 inches in diameter, and shall be Type "A" as detailed on the Standard Plan [S-110](#) titled "Standard House Connection Type 'A'". The figure in a circle on the plans adjacent to an HC station indicates the depth in feet below the existing curb to which the invert of the upper end of the HC shall be constructed. If no depth is indicated, the invert of the upper end of each HC shall be built to the elevation shown on the profile, or if no elevation is shown, to a depth 4 feet below the top of existing or future curb.

Where curbs exist, (unless the depth of the upper end of each Type "A" HC sewer is 4 feet below the top of the curb), the depth shall be shown on the plan to the nearest half foot, enclosed in a circle adjacent to the HC station.

- i. Connections to an existing building sewer or HC. (Building plumbing/sewer is defined as sewer pipe extending 2 feet beyond the building.)
- j. Locations approved by post card from the owner.
- k. Construction in a tunnel.

F 535.21 TYPES OF HOUSE CONNECTIONS

The Engineer shall specify the HC type on the plan when other than Type "A" is required. If all HCs are other than Type "A", but one specific type, a general note is preferable to indicating the type at each HC. An HC schedule on the plan listing variable HC data, in a tabular format may be used (See F 481).

F 535.22 HOUSE CONNECTION WYE

The wye station shall be shown on the plan at the end of the HC at the property line. A second station shall be shown if the end of HC is other than 2 feet greater than the wye.

F 535.23 HOUSE CONNECTION DEPTH

If other than 4 feet, the difference between the HC invert and the existing or proposed curb finished grade shall be shown to the nearest 0.1 foot. It shall be encircled on the plan at the HC station. A minimum depth of 4.0 feet shall be required at curb grade at the upper end of HCs at the property line. A minimum depth of 3.5 feet may be shown on the high side of streets in hillside areas.

F 535.24 HOUSE CONNECTION SLOPE

Normally, the minimum slope for a HC shall be 2 percent. Slopes not less than 1 percent may be used in exceptional cases. (See [F 535.23](#))

F 535.25 HOUSE CONNECTION LENGTH

The HC length shall be shown along the HC delineated on the plan and/or may also be inserted in a HC schedule. The HC length shall be given to the nearest whole foot. (See [F 535](#) and [F 535.21](#)).

F 535.26 LOCATION OF HOUSE CONNECTIONS ON CURVED SEWERS

To assist in locating "Wyes", "Tees", chimneys and the upper ends of HCs after the sewer is constructed, the Engineer shall place on the plan a table of distances and offsets to each of the above.

A sketch similar to that shown in [Figure 535.26](#) shall be placed in close proximity to the table of distances and offsets on the plan. The table of distances and offsets shall show each offset, either right or left.

F 535.3 HOUSE CONNECTIONS ON STREET WIDENING PROJECTS

When HCs are constructed or remodeled in conjunction with a street widening project the HC may be shown to encroach a short distance onto private property beyond the street property line if it is necessary to attain minimum requirements. (See [F 482](#) and [Standard Plan S-111](#)). If Standard Plans do not adequately indicate the work to be done, special detail(s) shall be shown on the plans.

F 535.4 REMODELING HOUSE CONNECTIONS

Existing HCs to be remodeled shall be indicated on the plans. Wherever possible, remodeling shall be per Standard Plan S-111, "House Connection Remodeling." Remodeled HCs shall be protected or supported per [Standard Plan S-253](#). (See [F 474](#), [F 475](#), [F 476](#) and [F 482](#)). The HC remodeling case with supporting data shall be indicated on the plan.

F 536 SPECIAL STRUCTURES AND DETAILS

Except for blanket protection ([Standard Plan S-255](#)) or pipe supports ([Standard Plan S-253](#)), special structures and details shall be shown on the plans. Applicable cross references to such

details including those provided by other agencies shall be noted on the plans. (See F 470, et seq).

F 536.1 BYPASSING STRUCTURES

Major sewage bypass construction shall be shown on the plan sheets in light contrast with a cross-reference to any Bypass Construction Plan. (See F 471). Whenever a Bypass Plan is required, an accurate diurnal hydrograph of the sewage flow shall be shown on the plans. The contractor shall provide shop drawings and any bypass structures remaining in-place with the sewers shall be shown on the "As-Built."

F 536.2 JUNCTION AND DIVERSION STRUCTURES

Junction Structures (JSs) shall be constructed at sewers junctions if a MH is inappropriate (See F 472). Diversion structures resemble JSs in reverse and shall conform to F 473. Flow control devices, such as, stop logs or sluice gates may be necessary. They also require access ports usually in the form of box-shaped shafts. The structures shall be shown on the plans with cross references to structural and other details. JSs and diversion structures shall be reinforced concrete with a plastic protective liner per [Standard Plan S-121](#).

F 536.3 TUNNELS AND JACKED CASINGS

The plans shall station the limits of proposed tunneling or jacking. Cross references shall be made to structural and other details, such as [Standard Plan S-254](#). Remnants of a tunnel or jacking operations left in-place shall be shown on the "As-Built." The SED shall review the contractor's shop drawings submittals, including all provisions intended to fulfill State DIS requirements. (See F 162 and F 477 et. seq.).

F 536.4 SOIL BORING LOCATIONS

The plans shall locate soil borings and numbers referenced to the sewer main line. The plan shall indicate the boring by means of a symbol defined in the legend. (See [F 546](#) and F 330).

F 537 PLAN WORK BY OTHERS

Sewer projects frequently require plans prepared by other agencies. Examples include signal remodeling, street light remodeling, street pavement reconstruction, storm drain reconstruction, and other work affected by the proposed sewer. The requirements for any other plan sheets shall be determined during preliminary design. A request for special plans shall be transmitted to the responsible agency(s) as soon as possible after the predesign conference.

F 537.1 TRAFFIC CONTROL PLANS

The LADOT will prepare any Traffic Control Plan (TCP) for the project. Street design shall be coordinated with TCP as necessary. (See F 491.3 et. seq).

F 537.2 STREET REMODELING PLANS

Some sewer projects will require street remodeling. The appropriate District Engineer shall prepare any street remodeling or reconstruction plans as well as the resurfacing schedule.

F 537.3 STREET LIGHTING WORK

Street lighting locations for a sewer project may involve street lighting conduit (ELC) remodeling. This work may be placed directly on the sewer plan view without resorting to extra plan sheets. Any plan sheet for ELC relocations shall be requested from the Bureau of Street Lighting.

F 537.4 STORM DRAIN PROTECTION AND/OR RECONSTRUCTION

Sewer projects may require protection and support of existing storm drains. The District Engineer shall review the plans to ensure they are properly protected and supported. Some sewer projects require the relocation and/or reconstruction of storm drains. The District Engineer shall prepare the necessary plans for inclusion in the project plans. Where the relocation and/or reconstruction

work will be minor, the details may be placed directly on the sewer plans. (See F 322.3).

F 537.5 STRUCTURAL DETAILS

The Structural Engineer shall prepare all structural details required. Where feasible, the modifications and details may be shown on the sewer plan sheets. Otherwise, structural detail sheet(s) shall be prepared by the Structural Engineer. Unusual structural work involves plastic-lined RCP and RCB and special- designed structures for which Standard plans do not suffice. (See F 410, F 420 and F 490 et seq., and [F 512.221](#)). Part H of the Bureau Manual enumerates policy and procedures for structural design.

F 540 THE PROFILE VIEW

Sewer profiles show the vertical alignment. The profile view shows the depth of the sewer in relation to the surface over the sewer or the curbs or other official grade lines of the street or alley in which the sewer is located. The profile shall show as accurately as known, the elevations of the existing and proposed substructure crossings in proximity to the sewer. In addition, surface improvements which will affect the structural requirements of the sewer, such as footings, railroad tracks, etc., shall be shown. The profile shall not show construction notes. See [Figure 512B](#) for typical information shown on a plan and profile sheet.

F 541 THE PROFILE GRID

The standard sewer profile grid shall be 2-1/2-inches by 2-1/2-inches. It shall have the National Geodetic Vertical Datum (NGVD) of 1929 elevations at 10 foot intervals at a scale of 1 inch = 4 feet.

In hillside areas, a scale of 1 inch = 8 feet may be used and shall be clearly labeled "DOUBLE VERTICAL SCALE". The horizontal grid shall be a scale of 1 inch = 40 feet. The scale used shall be shown on each sheet when other than standard scales are used (See [F 512.22](#)).

F 541.1 THE VERTICAL GRID

The Engineer shall include the NGVD (Equivalent North American Datum) elevations at each end of the profile view. See J 211.5 of the Bureau Manual.

F 541.2 THE HORIZONTAL GRID

The Engineer shall place a full station (100 feet) at each primary vertical grid line along the profile grid base. (See [F 531.1](#)). Each station shall be given a numeral representing a full even station (e.g. 4 for station 4 + 00). The Engineer shall show only stations pertinent to the sewer grade, along with an elevation to 0.01 feet. These locations shall include each end of the profile view which shall be identical with the plan view limits and at any

location where there is a GC. As a matter of policy, GCs shall be located at a MH location.

F 542 THE SEWER PIPE IN PROFILE

All sewers shall be shown with two lines to indicate the invert and the soffit. The lines should be as shown in [Figure F 533A](#).

F 542.1 PROFILE ORIENTATION

The profile view of the sewer shall be oriented to the plan view. The pipe shall be stationed commencing at the downstream end and increase in stationing in an upstream direction.

F 542.2 DATA FOR PIPE PROFILE

The pipe or conduit size and the term "sewer" shall be shown on the profile. (e.g., 8 inch SEWER). It shall be shown only once on each sheet unless there is a change-in-size. Where there is a transition, the size on both sides of the transition shall be indicated.

F 542.21 PIPE SLOPE

The pipe construction slope shall be indicated just above the line which identifies the pipe invert. The slope shall be indicated once between GCs in units of ft./ft. Four decimal places shall suffice unless the sewer is large and lengthy or the slope is very flat, less than 0.0020. (e.g., $S = 0.0044$).

F 542.22 SEWERS 18 INCH AND LARGER

The Engineer shall show sewage flow data for all sewers 18 inch and larger. The following data shall be placed on the profile, tabulated in vertical sequence for each pipe size, slope and design flow:

- a. Design flow (cfs)
- b. Design flow Velocity (ft/sec)
- c. d/D, Depth/Diameter or Height Ratio of Flow
- d. $n = 0.014$, Mannings' Coefficient of Roughness.

F 542.23 MAINTENANCE HOLES AND STRUCTURES

The MHs and structures shall be shown with two bold lines to scale. The MH/structure shall be indicated by delineating vertical leader(s) representing the station point(s) of the MH or structure.

The station and the inlet elevation points at junction MHs or structures shall be shown. The side inlet size and direction of entry shall be shown with the elevation(s). See the appropriate MH or structure Standard plan(s).

F 543 HOUSE CONNECTIONS ON PROFILE

A new sewer shall have HCs shown on the profile as an ellipse with stations and elevations. (See [F 535.2](#) et. seq.)

F 543.1 EXISTING HOUSE CONNECTIONS

Where HCs cross the proposed sewer, a dashed ellipse shall be used to identify the crossings. Any support or blanketing requirements shall be noted on the plan view. The terms "existing", "ex." or "exist." are redundant to sewer symbols and linework on the profile and should not be utilized.

F 543.2 PROPOSED HOUSE CONNECTIONS

For Type A HCs where no curb exists, and for Types B, C, and D show the following on the profile, except as noted:

- a. The station of the upper end of the HC sewer.
- b. The letter R or L to indicate the HC sewer is on the right or left side of the public sewer (looking upstream).
- c. Invert elevation on HC Types B, C, and D.
- d. Invert elevation of the upper end of the HC when a curb exists. The depth of the upper end of the HC shall be shown on the plan only.

If only certain types of joints will be allowable, the types shall be shown between reaches of the sewer profile, unless a general note will suffice on the title sheet or applicable plan.

When an existing HC or building sewer is to be joined by a new HC sewer, the precise station on the new public sewer, opposite the connection is seldom known. Because the station, although carefully scaled, is not calculated, the station on the new sewer opposite the connection shall be shown to the nearest scaled foot as a plus or minus station, for example, 132+61? .

With the possible exception of the inverts at the upper ends of some HC sewers, the invert elevations on an existing HC or building sewer are seldom accurately known. For this reason any reference to elevations on an existing HC or building sewer shall be followed by the plus or minus sign, for example, "F"=246.5? , CONNECT EX. 6 inch HC.

F 543.3 HOUSE CONNECTION REMODELING

Construction requirements for HC remodeling shall be noted on the plan view at the HC delineated or in an appropriate table. A solid line ellipse for a new vertical location of a HC crossing the proposed sewer shall be delineated on the profile at the appropriate location. Any HC size larger than 6 inch shall also have the size shown. (See [Standard Plan S-111](#) and [See F 535.4](#)).

F 544 SUBSTRUCTURES ON THE PROFILE VIEW

All substructures crossing the proposed sewer shall be shown as a dashed ellipse, rectangle, or other appropriate geometric shape along with the size and the identifying service, such as; gas, water, power, telephone, ELC, TSC, etc. (See [F 533](#)).

F 544.1 ABANDONMENTS

ABAND to indicate abandoned may be used on the profile view when they are also indicated on the plan view. Consistency in the use of the term **abandoned**, shall be maintained. See [F 533.2](#) and [F 533.3](#)). The ABAN shall not be used on the profile. ABAN indicates a construction execution (plan only).

F 544.2 UTILITY RELOCATIONS

If the substructure owner proposed relocation for a substructure, the vertical location on the profile shall be shown as a solid ellipse, rectangle, or other appropriate geometric figure with the word "proposed" and the size and type of service. The owner acronym shall be indicated on the plan view.

F 545 SURFACE LINE OVER SEWER

The existing and/or proposed ground or finished surface over the center line sewer shall be shown on the profile. Current elevations and conditions can be obtained by requesting the Survey Division to prepare a preliminary sewer survey for a calculated centerline alignment. This procedure is appropriate for major sewers, such as, outfalls, relief or interceptor sewers which traverse longer alignments with greater exposure to surface culture.

F 545.1 CUT AND FILL AREAS

Proposed or existing cut and fill zones along the proposed sewer alignment shall be determined. If the former ground line was substantially below the finished surface, the original ground line shall be shown in dashed line and labeled as the former ground line. If the existing pavement was left intact or broken and filled over, a leader with a note shall indicate the type and thickness. All existing substructures at old street levels shall be located (e.g., old street sumps).

F 545.2 RAILROAD OR STREET CAR RAILS

Existing railroad (RR) tracks shall be shown on the profile surface line at crossing points and identified as RR rails. Sewer construction in a jacked casing or tunnel will be required across active RR crossings.

Abandoned RR/street car tracks (rails and cross ties) exist in many streets which have been resurfaced with asphalt concrete pavement. Existing trackage shall be indicated on the profile. They shall be shown on the profile in section at its crossing or double-dashed

lines if they are located longitudinally over the excavation limits.

F 545.3 EXISTING OR PROPOSED CURB GRADES OVER SEWER

Curb grades have been used in the past to indicate sufficient HC depth at the property lines. The Standard Plans for HC construction ([Standard Plan S-110](#)) and HC remodeling ([Standard Plan S-111](#)), together with the required plan view data for HCs, should provide sufficient design detail to construct the sewer. The delineation of curb grades in addition to the ground or finished grade line over the center line sewer may be included at the discretion of the Engineer. The function of the profile is to show the contractor the required vertical alignment. It should not have redundant information.

F 546 LOG OF SOIL BORING(S)

Soil boring log(s), when included in the plans, shall be shown on the profile (See [Figure F 332B](#)). Where several borings will be made, a separate Log of Soil Borings Sheet should be made. The Log shall be per the United Soil Classification System. (See F 330, [F 536.4](#) and Part G of the Bureau Manual).

Soil boring(s) for short length sewer projects can be placed on the profile at or near the corresponding location (station) indicated on the plan by the soil boring symbol. On larger sewer projects where many soil borings will be taken, separate sheets shall show all soil borings. In addition to the log, the soil boring identification number and station, the groundwater level on the date the soil boring was taken and any other significant data shall be included according to the Unified Soil Classification System (USCS). The USCS, including symbols and abbreviations are shown in [Figure F 332A](#).

F 550 THE CROSS SECTION VIEW

One cross sectional view shall be included on each plan sheet to indicate substructures in relation to the sewer line. It is policy to include it. Sewers larger than 15 inch shall have a cross sectional view in the upper right of the profile grid for each plan and profile sheet. The location of the section taken should be representative of the limits of work or at critical substructure situations.

F 551 SUBSTRUCTURES WITH UNSTABLE SUBSTANCES

If a substructure containing or conveying an unstable substance lies within 6 feet of the proposed construction, a cross sectional view shall be shown on each plan and profile sheet affected. (See F 321.32).

F 552 CROSS SECTION STATION

The cross section shall be taken at a full station unless there is a critical substructure conflict at a specific fractional station.

F 553 CROSS SECTION DATA

F 553.1 GRID ELEVATIONS

Cross section grid elevations should be identical to the profile grid elevations. (See [F 541](#)).

F 553.2 HORIZONTAL SCALE

The cross section horizontal scale should be 1 inch = 10 feet.

F 553.3 VERTICAL SCALE

The cross section vertical scale shall be the same as that used for the profile. (See [F 512.22](#)).

F 553.4 LEADERS AND DIMENSIONS

The leaders to identify substructures should be vertical with the size, shape and identity of the substructure noted and an arrowed leader to the substructure. (See [F 521](#) for lettering). All substructures shall be dimensioned horizontally to the closest street or right-of-way limit line. The proposed sewer shall be tied with horizontal dimensioning to the street center line.

F 553.5 GROUND LINE OR FINISHED SURFACE

The existing or proposed surface over the proposed sewer shall be shown and identified on the cross section. Since the vertical scale is, usually, 1 inch = 4 feet, the pavement thickness can be shown to scale. Thickened Portland Cement Concrete pavement shall be shown on the cross section.

F 554 MISCELLANEOUS DETAILS

Details, such as street reconstruction, modifications of structures, etc., shall be drawn on the sheet(s) titled MISCELLANEOUS DETAILS. Each detail shall be titled and cross referenced to a plan and profile sheet. The structural details shall be drawn by the Structural Engineer on sheet(s) entitled STRUCTURAL DETAILS.

F 560 PREPARATION OF SEWER PLANS FOR OTHER AGENCIES

The policies and procedures for preparing sewer plans for agencies other than the City shall be, essentially, the same as the BE projects except the standard sheets, scales and required approvals shall be as requested by the owner/agency. See F 121.21 and F 121.22 for liaison responsibilities with CALTRANS and LACDPW projects. (See [F 512](#) et.seq. and [F 524.4](#)).

F 570 CHECKING SEWER PLANS

Checking should be limited to those features of the design that require numerical accuracy, textural clarity, and sufficiency of data. It is not the function of the checker to review the entire design and to duplicate the work of the Engineer, provided the development of the design has had proper supervision. The fundamental requirements should have already been determined during the design. Checking should be accomplished as follows:

- a. Check the final plan set against the reviewed preliminary plan sets for accuracy.
- b. Check the final plan set against the check list for compliance with requirements (See [Figures F 570A & F 570B](#)).

Deficiencies shall be noted by the checker, for the attention of the Engineer. The final plan should be submitted for check within the design schedule.

The title sheet should be checked against the SAMPLE TITLE SHEET. The preliminary, as well as, the final plans shall be checked, using the check lists shown in [Figures F 570A](#) and [F 570B](#).

Plan sets shall be ordered/transmitted to all affected agencies, in particular to all owners whose existing substructures might be affected by the proposed sewer construction. The orders/ transmittals shall be followed/accompanied with an Interdepartmental Communication or City Engineer letter requesting review and comment relative to their facilities. This procedure should be executed as soon as possible after preliminary plans are completed.

The final plans shall be reviewed to ensure they conform to the provisions of recent special orders and memoranda, as well as, the SSPWC including the current Supplement and the latest revision of [Standard Plan S-610](#).

F 571 LIST OF AFFECTED AGENCIES AND SUBSTRUCTURE OWNERS

A list of all agencies and substructure owners whose facilities might be affected by the proposed sewer shall be provided with two sets of prints for review and comment. One set should be kept by the reviewer and one set with notations and comments should be returned to the Engineer. In order to avoid unnecessary work and expense, each agency or owner should be contacted to determine the precise number of prints to be produced for their review.

F 572 REVIEW AND EVALUATION OF AFFECTED AGENCY COMMENTS

The Engineer shall review all plans and comments returned by the affected agencies to determine any changes or revisions. Comments shall be evaluated carefully prior to making any corrections, notes, details, and modifications to the plans and/or adding any Special Provisions to the project specifications. Any requested correction, modification or notation that need further work shall be investigated and resolved. Additional print sets may be transmitted for further review.

F 573 FINAL PLAN REVIEW

After all revisions have been made on the sewer plans, the final plan review shall commence. All BE divisions/districts offices affected by or involved in the project shall receive two sets of prints for their review, prior to plan circulation for approval signatures.

F 574 SUBSTRUCTURE REVIEW IN CONJUNCTION WITH PREADVERTISEMENT

Prior to advertisement for bids, a substructure review shall be made by the Engineer to determine whether recent or proposed installations along the proposed sewer alignment will affect the construction. New substructures unaccounted for on the plans require immediate investigation. The investigation shall include:

- a. The initiation of a "pothole" investigation to determine the substructure location in both plan and elevation. The plans shall reflect the investigation's findings. If

the plans have been signed, a plan revision shall be prepared.

- b. In the event of marginal clearances, a request to the Construction Division to include in the Special Provisions or Notice to Bidders that the contractor perform the "potholing." In the case of substructures containing or conveying unstable substances the use of power tools and equipment shall be limited to pavement breaking (See F 321.32).

F 575 PLAN REVISIONS

If the sewer plans have been circulated and approval signatures secured, any additions or changes on the plans shall be made as a plan revision. See Part C of the Bureau Manual for plan circulation policy and procedures. Check the current Special Orders.

F 580 PLAN PROCESSING AND APPROVALS

The Project Management Division Engineer shall be responsible for final plan processing and distribution of the plans. (See Part C of the Manual). PMD will ensure that each agency or party affected by the proposed project receives a set of the approved plans.

F 581 PROCESSING SEWER PLANS FOR OTHER AGENCY PROJECTS

The District Engineers or WSED shall be responsible for sewer plans prepared in conjunction with other agency projects, such as, CALTRANS, LACDPW and agencies other than the DPW. Plans shall be processed for approval by the specified liaison office within the BE.

F 581.1 CALTRANS PROJECTS WITH SEWER WORK

The Central District Engineer (CED) shall be the project liaison to CALTRANS. All sewer plans in conjunction with CALTRANS projects shall be processed and coordinated by the Central District. This includes encroachment and excavation permits for streets that are State Highway routes. See Part E of the Bureau Manual for further information.

F 581.2 LACDPW AND FEDERAL DISTRICT ENGINEER

The CED Engineer shall coordinate with LACDPW and other flood control and drainage agencies. All plans in conjunction with the LACDPW and any other flood control or drainage agency shall be processed and coordinated by the CED. See Part G of the Bureau Manual for detailed information.

F 582 UNINCORPORATED TERRITORY AND MUNICIPALITIES

Unincorporated areas adjacent to LA City boundaries are usually under the jurisdiction of the LACDPW. An approval block for that agency's approval shall be provided on City sewer plans affecting unincorporated areas. If any adjacent municipal or other Special District is involved, an approval signature block shall be provided as requested by the individual City or district involved. The Engineer shall secure the agency's requirements for inclusion in an

approval block. All plans pertaining to existing or proposed sewage flows into or from adjacent areas of other agencies shall be submitted to the WPMD prior to transmittal of such plans for approval. The WSED is responsible for maintaining sewage service contract records for treatment plant obligations.

F 590 THE ENGINEER'S CHECKLIST

The "Engineer's Check List" which follows is intended to minimize omissions and delays to the project.

F 591 ITEMS TO BE CHECKED WHEN A PROJECT IS AUTHORIZED

- a. Prepare and submit a "Preliminary Engineering Report" for the project.
- b. Determine right-of-way required.
- c. Arrange a joint field trip with the Real Estate Division and other interested representatives.
- d. Pothole substructures which may cause a conflict.
- e. Consult with the Engineer of Surveys concerning the necessity of a survey field office.
- f. Consult with the Division or District Engineer about the following:
 1. Deviation from standards
 2. Approval of preliminary plan
 3. Criteria for major business or industrial districts
 4. Design flows for outfall, interceptor and relief sewers
 5. Sewers in potential slide areas, subsidence areas, fills, peat, diatomaceous earth etc.
 6. Measuring devices
 7. Necessity for inspector's or surveyor's offices
 8. Portions of lots to be served
 9. Relocation of existing substructures
 10. Limited operations
 11. Work in or through other municipalities
- g. Write memorandum to the Structural Engineer requesting design or structural check of the following:

1. Sewers specified to be constructed in a tunnel
 2. Reinforced concrete structures
 3. D-Loads
 4. Special pipe bedding per "Table B" of [standard plan S-251](#) titled "Pipe Laying in Trenches"
 5. Surcharges over existing sewers
 6. Support or reinforcement of sewers located in areas having an unstable subbase
- h. Send two sets of prints of preliminary plans to the District Engineer for storm drainage review.
- i. Send two sets of prints to LADOT Traffic.
- j. Send two sets of prints to the Bureau of Street Lighting.
- k. Send print sets of preliminary plans to affected agencies and utility owners if the project is to be expedited.

F 592 ITEMS TO BE COMPLETED PRIOR TO PREPARATION OF CONSTRUCTION PLANS

- a. Check old street profiles for fill areas.
- b. Search index for previous plans covering same areas.
- c. Consult with others that planned the project.
- d. Make preliminary field investigation of the following:
 1. Area to be served
 2. Topography
 3. Locations and elevations of possible outlet sewers
 4. Possible obstructions
 5. Existing buildings
 6. Existing basements and low ground
 7. Zoning
 8. Vacant property and probable future development
 9. Present population
 10. Location of existing storm drains and appurtenances

11. Geological and soils conditions

- e. Make necessary field survey requests.
- f. Request necessary soil borings.
- g. Request Geology and Soils Report.
- h. Secure street grades.
- i. Check for future storm drains.
- j. Check capacity in outlet sewers.
- k. Request flow measurements where needed.
- l. Check predicted future population and land use.
- l. Determine location of large industrial waste producers and determine type and quantity of wastes produced.
- n. Furnish post card notices to property owners (For Assessment Act Projects, only).

F 593 ITEMS TO BE COMPLETED AFTER DISTRICT/ENGINEER'S SIGNATURE BUT PRIOR TO CITY ENGINEER'S APPROVAL

Secure encroachment, excavation and construction permits, as well as, approvals of other agencies or owners. This is in addition to approvals by other Division or District Engineers secured by the PMD.

F 594 ITEMS TO BE COMPLETED AFTER CITY ENGINEER'S APPROVAL

Send print sets to agencies or owners approving plans and any District Engineer on projects extending beyond the Design District boundary.