

June, 1969

**TABLE OF CONTENTS**  
**PLAN PREPARATION (G 700)**

SECTION NO.	SUBJECT	DATE
G 710	<b>STANDARDS</b>	June, 1968
G 711	Format	June, 1969
G 712	Drawing Orientation	June, 1968
G 713	Drafting Standards	"
G 713.1	Scales	June, 1969
G 713.2	Line Convention	"
G 713.3	Lettering	"
G 713.4	Legends and Abbreviations	"
G 720	<b>TITLE SHEET</b>	"
G 721	Title Block	"
G 722	Key Map	"
G 723	Index to Sheets	"
G 724	Notice to Contractors	"
G 725	Standard plans	"
G 726	References and Microfilm Log	"
G 727	Survey Information and Bench Marks	"
G 730	<b>PLAN AND PROFILE SHEETS</b>	"
G 731	Title Block	"
G 732	Plans	"
G 732.1	Survey Ties	"
G 733	Profile	"
G 734	Cross Section	"
G 735	Checking	"
G 740	<b>DETAIL SHEETS</b>	June, 1968
G 741	Plan Details	June, 1969
G 742	Catch Basin Profiles	"
G 743	Cross Sections	"
G 744	Test Borings	"
G 745	Miscellaneous Details	"
G 750	<b>PLAN PROCESSING AND CONSTRUCTION</b>	"
G 751	Final Check and Plan Coordination	"
G 752	Division/District Engineer Approval	"
G 753	City Engineer Approval	"
G 754	Contract and Construction	"
G 755	Revisions	"
G 756	"As Built" Corrections	"

June, 1969

## LIST OF FIGURES

<b>NUMBER</b>	<b>TITLE</b>	<b>DATE</b>
<b>G 713.2</b>	<b>Line Convention-All Plans</b>	<b>June, 1969</b>
<b>G 713.2A</b>	<b>Line Convention-Storm Drain Plans</b>	<b>"</b>
<b>*G 713.3</b>	<b>Lettering Angle</b>	<b>June, 1968</b>
<b>G 713.4</b>	<b>Substructure Legend</b>	<b>June, 1969</b>
<b>G 713.4A</b>	<b>Typical Test Borings</b>	<b>"</b>
<b>G 720</b>	<b>Sample Title Sheet</b>	<b>"</b>
<b>G 730</b>	<b>Sample Plan and Profile Sheet</b>	<b>"</b>
<b>G 735A</b>	<b>Plan Check List</b>	<b>"</b>
<b>G 735B</b>	<b>Profile and Cross-Section Check List</b>	<b>"</b>
<b>G 743</b>	<b>Cross Sections</b>	<b>"</b>
<b>G 750</b>	<b>Flow Chart of Processing and Construction-C.I.P.</b>	<b>"</b>

Figures preceded by asterisks are in text. All others are at ends of chapters.

## **G 700 PLAN PREPARATION**

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 conflicting instructions. A well prepared, neat construction plan reflects credit upon the engineer and the City.

The purpose of this chapter is to standardize the preparation of storm drain plans in all design offices of this bureau. To this end, standards are established, their applications are explained, and examples are shown. It is impractical, unfortunately, to show examples of all possible types of storm drain plans. The examples chosen apply to the most common type of City storm drain construction, the pressure flow gravity storm drain.

### **G 710 STANDARDS**

#### **G 711 FORMAT**

Storm drain plans shall be prepared on standard size sheets in accordance with the standard plans *Plan and/or Profile First Sheet* and *Plan and/or Profile Except First Sheet*. The plans shall be drawn to scale in black drafting ink on original tracings. The general sequence of sheets is as follows:

1. Title Sheets
3. Plan and Profile Sheets
3. Intersections and Enlargements
4. Catch Basin Connection Profiles
5. Structural Details
6. Sewer and Street Reconstruction Details
7. Excavation and Fill Cross-sections
8. Log of Test Borings

Only large projects will require the use of all these types of sheets. For most City projects, only the first four types are required.

Storm drains (excluding catch basin connections) are stationed upstream along the centerline of the main line and lateral conduits. Where the main line outlets into an improved storm drain, the stationing begins at the centerline intersection of the existing and proposed drains. Where the main line outlets in an unimproved watercourse, the stationing begins at the outlet. For laterals, the stationing begins at the centerline intersection of the main line and lateral. If an existing storm drain is extended upstream, the stationing of the existing drain is not continued. Whenever a proposed drain joins an existing drain or a lateral joins a main line, an equation giving the station of both Lines is used as follows:

$$6 + 48.27 \text{ Existing} = 0 + 00 \text{ Line A or } 2 + 36.05 \\ \text{Line 1} = 0 + 00 \text{ Line 2}$$

Laterals may be named either numerically or alphabetically beginning with the most downstream lateral. All laterals must be called out on the main line plan and on the lateral plan and profile when more than one lateral is shown on one sheet.

The plan and profile sheets shall be in the following sequence:

1. The entire length of the main line starting from its outlet.
2. The entire length of the laterals starting at the most downstream lateral.

A short lateral may be shown in plan and profile on the main line sheet, provided the entire length of the lateral is shown thereon. Two laterals may be shown on the same sheet, provided the plan and profile station limits agree. However, long laterals should be shown on a separate sheet and should be cross-referenced to the main line.

#### **G 712 DRAWING ORIENTATION**

The designer must plan his sheet layouts so that the pertinent design data (other than structural and special details) which apply to that sheet may be shown thereon. Space on the sheet can be provided for this data by allotting the length of alignment to be drawn on each sheet. Generally, the plan layout should not exceed ten stations (1000 feet) per sheet on 1" = 40' scale or five stations (500 feet) on 1" = 20' scale. In general, the profile stationing should be aligned vertically with the plan stationing.

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. The major portion of the alignment on the plan will establish the direction of the stationing on the profile whether from left to right or right to left. One direction of profile stationing must be maintained on all profile sheets, even if the north arrow criteria must be violated to do so. The major portion of the street or R/W along the alignment should be placed horizontally on the plan. Should this be impractical, the plan continuity may be broken and the match lines joined by a leader and the word IDENTICAL. The north arrow shall be placed on each portion of the plan where the orientation of the portions varies. In combined projects where storm drain plans are part of another plans the alignment of the originating design office should be followed (if practical) to maintain the same orientation.

The street or right of way cross section on the plan and profile sheet shall always be taken looking upstream of the storm drain conduit. The Key Map on the title sheet shall have the north arrow oriented within the same range specified for the plan on the Plan and Profile Sheet. An enlargement or other plan detail should be oriented in the same direction as the plan orientation from which it was taken.

### G 713 DRAFTING STANDARDS

The drafting standards applicable to all storm drain plans are the scales, the line convention, the lettering, and the legends and abbreviations. Other drafting procedures may vary according to their need and application.

**G 713.1 Scales:** The standard scales are as follows:

KEY MAP: 1" = 400'

PLAN: 1" = 40' or 1" = 20'

PLAN DETAIL: 1" = 20' or 1" = 10'

PROFILE: Horizontal-1" = 40' or 1" = 20' to agree with the PLAN.

Vertical -- 1" = 4', except that 1" = 8' may be used when depth or grade is excessive.

CROSS SECTIONS: Horizontal-1" = 10', Vertical-1" = 4'

C.B. PROFILES: Horizontal-1" = 20', Vertical-1" = 4'

STRUCTURAL DETAILS: 1/4" = 1'-0", 3/8"=1'-0", 1/2"= 1'-0", 3/4" = 1'-0".

LOG OF TEST BORINGS: Vertical-1" = 4' or Profile Scale

The scales should be placed directly below the word PLAN, PROFILE, and other titles. The scale used on the plan and profile sheets should be consistent throughout the plan and profile, using enlarged details only when required. Should the vertical scale 1" = 8' be used in the profile, the scales shall be underlined with heavy double lines. When a grade suddenly steepens so that it falls beyond the profile grid, the profile continuity may be broken and joined by a leader between the two equal invert elevations and the word IDENTICAL. For a detail not drawn to scale, the words NO SCALE are placed below the detail title

**G 713.2 Line Convention:** The line convention standards are delineated on Figures G 713.2, G 713.2A, and G 713.4. An illustration of the uses of the line convention is shown on the SAMPLE PLAN AND PROFILE SHEET. The use of different drafting instruments by different personnel may result in variations of line width. It is therefore recommended that the line width be tested prior to use on the final plans.

**G 713.3 Lettering:** The standard freehand lettering style is Reinhardt and the standard mechanical lettering is Leroy. The lettering should be viewed from the bottom or the right end of the sheet, as indicated in Figure G 713.3. Each man is required to become proficient in freehand lettering.

The lettering on storm drain plans shall conform to the following standards:

1. All lettering on title sheets shall be vertical in LEROY according to the standard plan *Plan and/or Profile First Sheet* and as shown on the SAMPLE TITLE SHEET. Exception is made for title sheets containing a plan and profile, where the title portion of the sheet shall comply with the title sheet standards and the plan and profile portion of the sheet shall comply with the plan and profile standards. For notes under *Notice to Contractors*, Prestype, freehand lettering, Varityper, and photo-reproduced typing may be used.

2. The lettering on plan and profile sheets shall be both LEROY and freehand lettering as shown on the SAMPLE PLAN AND PROFILE SHEET. Freehand lettering shall be lower case, either ver-

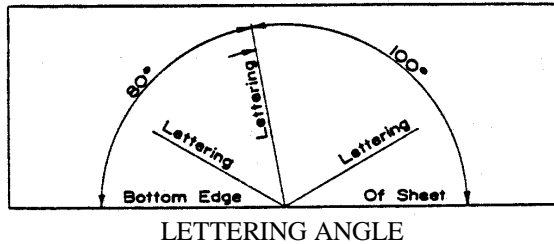


Figure G 713.3

tical or slanted. Mixed vertical or slant lettering shall not be used. The minimum size freehand lettering shall be 1/8 inch. For those drawings which are to be reduced, the minimum size lettering shall be 5/32 inch.

3. The lettering on the remaining sheets (enlarged details, catch basin connector profiles,

structural details, and log of borings) shall also be both LEROY and freehand lettering. Sheet and job titles, plan, profile, or detail titles and scales, and test boring numbers and stations shall be in LEROY vertical capital letters. All other lettering shall be freehand, vertical or slanted. Mixed vertical and slanted lettering shall not be used.

**G 713.4 Legends and Abbreviations:** The legends used on storm drain plans are shown on the standard plan Standard Symbols, the Substructure Legend (Figure G 713.4) and the Typical Test Borings (Figure G 713.4A). The standard abbreviations to be used on storm drain plans are those listed in Section 1-3 of the Standard Specifications for Public Works Construction and on the Standard Plan *Standard Abbreviations*.

## G 720 TITLE SHEET

The title sheet is the first sheet of the construction plans and is an introduction to the project. The Index to Sheets and Key Map show the extent of the project and where in the plans the construction data are found. The Notice to Contractors gives general instructions to the contractor. The SAMPLE TITLE SHEET (Figure G 720) illustrates title sheet layout and other standard title sheet practices.

### G 721 TITLE BLOCK

There is only one title normally required on a title sheet: the work order title and number (lower right corner above signature block). But on small projects which show a plan and profile on the title sheet, the plan and profile sheet title is shown above the work order title.

The work order title is used to identify the project. For Capital Improvement projects, the Work Order number is used with the title. For Assessment Projects, the A'11 or S'41 number is used. For "B" permit projects, the "BD" number is used for design or checking and the "B" number is used for design, checking, and construction.

For the signatures required under Approvals in the title block, see Section G 752. For instructions on Revisions in the title block, see Section G 755. The Index Number (plan number) is acquired from Index: to Records and shown in the title block.

### G 722 KEY MAP

The Key Map shows the general alignment of the storm drain project, the reference to sheet numbers, and the resurfacing schedule as shown on the SAMPLE TITLE SHEET. The key map is usually located in the lower right corner of the title sheet.

The key map shall be oriented with the north arrow pointing to the top or to the right of the title sheet and shall consist of the following:

1. The title Key Map and Resurfacing Schedule, north arrow, and scale.
2. The street and alley property lines, right of way lines, and street names.
3. The storm drain conduit alignment and LINE reference.
4. Existing storm drains and reference LACFCD project number or City plan number.
5. The sheet limits and number.
6. The class of resurfacing over the conduit.

### G 723 INDEX TO SHEETS

The Index to Sheets indicates the number, contents, and limits of each sheet in the plans as shown on the SAMPLE TITLE SHEET.

The Index to Sheets shall always be located in the upper right corner of the title sheet except for one-sheet projects, where the Index to Sheets is omitted. The sequence of sheets shown in the Index to Sheets is given in Section G 711.

The Index to Sheets describes the location of the storm drain by the use of street names. Each street, alley, or right of way storm drain location for the whole alignment is designated with limits. The limits are generally taken in sequence along the alignment.

The four basic types of location descriptions. (street, alley, right of way, and right of way in street produced) used in the Index to Sheets are shown on the SAMPLE TITLE SHEET. A comparison of the descriptions and the Key Map illustrates the derivation and the sequence of the descriptions. Note that an alley and a right of way are both designated by the name of the closest parallel street, but only a right of way gives the distance to that street. Note also that if a right of way has no parallel street, the right of way is designated by the name of the street (or alley) from which it extends.

#### **G 724 NOTICE TO CONTRACTORS**

Under Notice to Contractors, all general requirements and special notices are called to the Contractor's attention. Some notes supplement or supersede the Standard Specifications or the Standard Plans, some state special provisions of the project, and others provide general data.

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

The notes shown on the SAMPLE TITLE SHEET are typical for most projects. Only notes applicable to the project are used. The designer should check the standard plan Notice to Contractors-Comprehensive to avoid duplication.

The first two notices should always be the specification notes as shown on the SAMPLE TITLE SHEET. However, if the project requires special provisions, the following note must replace note 2 thereon:

"All work detailed on these plans to be performed under contract shall be constructed in accordance with the project specifications therefor and, except as otherwise stated or provided for hereon or in the project specifications, with the Standard Specifications."

Note 3 is used only for work under the same contract. Note 5 is for work in Los Angeles County Flood Control District easements (Section G 127); for work in State highways, see Section G 128. For projects of estimated construction cost of \$75,000 or more, field offices are required for agency personnel. (See Section 8 of *Standard Specifications for Public Works Construction*.)

#### **G 725 STANDARD PLANS**

The Standard Plans used to delineate the construction of a project are listed on the title sheet under Standard Plans as shown on the SAMPLE TITLE SHEET. Only those applicable to the project should be listed. Standard Plans or Drawings of other agencies may be incorporated with the final plans, provided copies are furnished with the plans by the City.

#### **G 726 REFERENCES AND MICROFILM LOG**

The References called for on the title sheet are only those applicable to the storm drain project delineated on that plan. All the numbers of the District Maps and Drainage Maps into which the project extends must be shown. The plan numbers superseded by this project are listed at Supersedes Plan No. The R/W No. is the number used for R/W acquisition shown on the R/W map. At Div., the Division number of the City's Index to Records is given. All the Division numbers into which the project extends must be shown. The data under Project Disposition and Microfilm Log are not entered by the designer at this time.

#### **G 727 SURVEY INFORMATION AND BENCH MARKS**

Under Survey Information, profile and centerline survey field books used in the project are listed by field book number and date the survey was taken, as shown on the SAMPLE TITLE SHEET.

The bench marks required for a project are taken from the Storm Drain Profile Survey (see Survey Manual and Section G 322) and are given on the title sheet as shown on the SAMPLE TITLE SHEET. A bench mark is required at each end of construction. Those bench marks subject to removal or damage by the construction should not be taken.

***G 730 PLAN AND PROFILE SHEET***

The plan and profile sheet delineates the construction of the project as shown on the SAMPLE PLAN AND PROFILE SHEET (Figure G 730). The plan shows the horizontal alignment and ties, stations, and the type and size of each structure. The profile shows the vertical alignment and length of the main line conduit. The cross section shows the location of the main line conduit relative to existing substructures and street or right of way improvements.

**G 731 TITLE BLOCK**

The work order title and number and the sheet description title are delineated as shown on the SAMPLE PLAN AND PROFILE SHEET. The Index Number and Revision Description are explained in Section G 721. The Scales shown are those used on the plan and profile sheet. The limits of the drain shown are not in the sheet title block. Only a brief description of the type of information shown on the sheet will be used. Examples are:

- Plan and Profile-Line B
- Plan Details
- Catch Basin Profiles
- Cross-Sections
- Structural Details, etc.

The titles such as PLAN, PROFILE, and CROSS-SECTION used in the body of the plan and profile sheet shall be Leroy 240-3. The scale under these titles shall be Leroy 120-0. The station under CROSS-SECTION shall be Leroy 175-2.

**G 732 PLAN**

The plan portion of this sheet is the key to a well organized and legible drawing. The preliminary plan and profile should be sufficiently complete to determine the optimum length of alignment to lay out on each sheet in order to provide sufficient space for the legible arrangement of callout notes. Consideration should also be given to the space needed for the profile and cross section. (See Section G 712, Drawing Orientation.)

The recommended procedure for preparing the plan is as follows:

1. The street and right of way centerlines and property lines are plotted from the centerline survey. All streets and rights of way are dimensioned and their curve data (if any) are delineated.

2. All surface improvements and existing culture are plotted from the storm drain profile survey. On plans of separate storm drain projects, existing curb lines are shown. Where no curbs exist or for remodeling details, proposed or future curb lines are shown. The standard symbols shown on the Standard Plan should be used where applicable.

3. All existing substructures are plotted and labeled (with ties) as shown in Figure G 713.4.

4. The storm drain centerline is plotted from the calculations; Then storm drain conduits, catch basins, and structures are drawn. Centerline ties, curve B.C., P.R.C., and E.C., match lines, and even-station lines are drawn.

5. All construction notes, stations, curve data, street names, and notes should be drawn in this order (see check lists, Figures G 735A and B).

All construction, substructure, and curve data callouts should be horizontal. Street names shall be parallel to the street property line and just above or below the street in an area clear of callout notes. B.C., P.R.C., and E.C. stations are drawn along the radius lines (or their extensions). Match line station and sheet reference are drawn along the match line. The street or right of way area should be kept clear of callout notes. Only ties, dimensions, and stations should be placed in that area. If curve data cannot be placed near their respective curves, a delta with a number subscript ( $t_2$ ) may be placed both inside the B.C. and E.C. lines of each curve and in the curve data to cross-reference them. Main line conduits should be tied to established street centerlines. Catch basins should be tied to street curb returns at intersections and to main line stationing between intersections. Substructure ties in the street area should be avoided. Construction notes specifically applicable to a sheet should be placed on that sheet. If space is available, details specifically applicable to a sheet may be placed on that sheet. (For lettering, see Subsection G 713.3.)

A note should be placed near its structure to avoid a long, sinuous leader. Two separate notes to the same structure should never be used. Straight lines are preferred over curved lines for note leaders. Leader arrows should point to the location where the work is intended. Leaders to

Existing substructures shown as a single line do not need arrows but should touch the substructure line. Leaders should not be drawn through notes or structures, nor should leaders cross each other. In short, the location of notes and leaders must be planned for each sheet before they are drawn on the final plan.

**G 732.1 Survey Ties:** To facilitate construction layout, the designer will provide sufficient ties from the street centerline or control line to the storm drain centerline-. Every point of change in direction of storm drain alignment should have a distance tie which is perpendicular or radial to a point of survey record and be at a distance along the street centerline or control line from a point of survey record; i.e. street centerline intersections. Street curve B.C.'s or E.C.'s, etc.

### **G 733 PROFILE**

The data needed to draw the profile are taken from the preliminary plan and profile. The profile stationing should be aligned with the plan stationing as discussed in [Section G 712](#). Grid line stations are given every 100 feet and are placed just below the grid. Grid line elevations are given at every even 10-foot interval and are shown at both ends of the grid. The lowest invert and highest ground line elevations, together with dimensions and callouts, must lie entirely within the profile grid. The grid vertical scale may be doubled (20 feet in lieu of 10 feet) to avoid breaking the profile continuity. Should the profile grade be steep and require a break, both grid elevations are given at the break and a leader with the word IDENTICAL connecting the two inverts must be used at the break (see [Subsection G 713.1](#), Scales).

The recommended procedure for preparing the profile is as follows:

1. The ground line over centerline of storm drain is drawn from the storm drain profile survey.
2. All existing substructures crossing or parallel to the storm drain (as defined in [Subsection G 333.3](#)) are drawn.
3. The storm drain invert is plotted to grade and the conduit and structures are drawn therefrom. (See [Section G 345.](#))
4. All callout notes of structures, stations, elevations, slopes, match lines, substructures, test boring logs, top of fill lines, and conduit dimensions and descriptions are drawn.

All stationing notes on the profile are vertical except for catch basin inlets into the storm drain conduit. Inlet notes may be either vertical or horizontal. Callout notes of curves and structures are vertical. The slope of the storm drain conduit is placed along its invert. A match line reference is perpendicular to centerline stationing. Substructure, ground line, and elevation callout notes may be either vertical or horizontal. Conduit dimensions and descriptions are horizontal. Conduit length shown is the true length on slope.

Except for the invert slope and elevations, all callouts should be placed outside of the storm drain conduit. Substructure callout notes in the profile do not show ownership, only size and type. Structural detail references should be noted below the conduit dimension line. The general instructions which control the placement of notes and leaders given in [Section G 732](#) apply to the profile.

### **G 734 CROSS-SECTION**

The cross-section is usually located to the right of the profile. One cross-section is shown for each street or right of way in which the main line conduit centerline tie is the same, but usually not more than one per sheet. The cross-section data are taken from the plan and profile at a location which is typical for the street or right of way. The cross-section is plotted facing upstream. Surface improvements and substructures are noted and dimensioned. (See [Figure G 730.](#))

### **G 735 CHECKING**

Checking should be limited to those features of the design that require numerical accuracy and sufficiency of data. IT IS NOT THE FUNCTION OF THE CHECKER TO REVIEW THE ENTIRE DESIGN AND TO DUPLICATE THE WORK OF THE DESIGNER, provided, however, that the development of the design has had proper supervision. The fundamental requirements should have already been determined during design by discussion between the designer and the Project Engineer. This can be accomplished as follows:

1. Check the final plan against the preliminary plan for accuracy, and
2. Check the final plan against the check list for sufficiency of data.

Obvious defects in the design, if discovered by the checker, should be called to the attention of the designer. In general, the final plan should be

Submitted for check at the time the design has advanced to the point where only the accuracy and sufficiency of data are in question.

The title sheet should be checked against the

SAMPLE TITLE SHEET. The plan and profile sheets, plan details, and catch basin profiles should be checked, using the check lists shown on [Figures G 735A](#) and [G 735B](#).

### ***G 740 DETAIL SHEETS***

The details generally used in storm drain work are plan enlargements, structural plans, street or sewer reconstruction plans, catch basin profiles, cross sections, and log of test borings. Most City projects seldom require all these details. The storm drain designer decides which details are needed and on which sheets they should be shown. All details are designed by the storm drain designer except the structural, street, and sewer plans, which are designed by their respective design division or section.

#### **G 741 PLAN DETAILS**

Whenever construction or existing facilities cannot be clearly delineated on the plan portion of the plan and profile sheet, an enlarged plan detail must be drawn. A note calls attention to the area to be enlarged and makes reference to a detail and sheet number. Typical uses of a plan detail are to locate crowded substructures at an intersection, to show the grading at an inlet or outlet structure, to delineate a detour plan, and to clarify the construction of structures not detailed by a standard plan. These details are drawn essentially in the same manner as the plan on the plan and profile sheet. Each plan detail must have a title and scale. A typical sheet title is OUTLET DETAIL, INTERSECTION DETAIL, DETOURS, etc.

#### **G 742 CATCH BASIN PROFILES**

A profile of every catch basin connector pipe is required on storm drain plans. Each profile is continuous through all catch basins in series. If two connector pipes outlet into the same catch basin, an additional profile must be provided. These profiles are drawn similar to the main line profile. Each profile must be identified by a number in a circle or a parallelogram (see [Figure G 713.2A](#)). Catch basin profiles may be drawn on the plan and profile sheet (if space is available) or on a separate profile sheet. See the catch basin profile on the SAMPLE PLAN AND PROFILE SHEET. The title for a separate sheet is CATCH BASIN PROFILES.

For catch basin connector pipes less than 25 feet long, no slope is required; only elevations are

shown at each end. If the pipe grade is changed, a tie to the change and the elevation at the change are shown at the catch basin profile.

#### **G 743 CROSS SECTIONS**

Covered conduits or open channels in a right of way require cross sections to indicate the limits of cut and fill. If a sand and gravel blanket is required, it is also shown on the cross sections. The scale for cross sections is 1" = 10' natural scale. The sections are stationed upstream starting at the lower left corner of the sheet and progressing upward in columns. Each cross section must be identified by station (and line) as shown on [Figure G 743](#). The sheet title is CROSS SECTIONS.

Cross sections are generally taken at 100-foot intervals or closer at ground line breaks. Particular care must be taken that the cross sections are plotted accurately and to scale.

#### **G 744 TEST BORINGS**

On large storm drain projects or projects requiring numerous test borings, their logs are plotted on a separate sheet (or sheets) instead of on the profile. The method of plotting, the titles, and other data required are illustrated in [Figure G 713.4A](#). The logs of test borings are plotted on a plain sheet in rows by station, increasing upstream. The sheet title is TEST BORINGS. The vertical scale is 1" = 4', but no scale is shown on the sheet.

#### **G 745 MISCELLANEOUS DETAILS**

All other details, such as street reconstruction at catch basins, modifications of structures, subdrains, etc., may be drawn on this sheet titled MISCELLANEOUS DETAILS. Each detail must be properly titled and cross referenced to the plan and profile sheet. [Figure G 624](#), Street Reconstruction at Catch Basins, together with a schedule, delineates the details required for warped gutters. The catch basin callout on the plan is cross referenced to the schedule by R.P. No. (Reconstruction Plan Number) if a schedule is used.

The structural details are delineated by the Bridge and Structural Design Division and the sheet title is STRUCTURAL DETAILS

### ***G 750 PLAN PROCESSING AND CONSTRUCTION***

The processing of plans from completion of final plans to award of contract and the construction to the closing of the project work order are covered in detail in the Operations and Control Manual for Capital Improvement, Assessment, and "B" Permit Projects. The design office is responsible for its projects from the issuance of the work order to the approval of the plans by the Division/ District Engineer. Although the design office loses direct control over the project after the Division/ District Engineer has signed the plans, that office should maintain accurate and current knowledge of the progress of projects which have been designed by that office. If, at any time, the design office feels that any of its projects is not making satisfactory progress, contact should be made with the responsible division to determine the cause of the delay and what steps, if any, can be taken to expedite the project. For this reason, a condensed flow chart of the procedures and offices involved in the processing of plans and construction to the completion of a project is shown in [Figure G 750](#). The functions of the Division or District design office in this procedure are discussed in the following sections and in Section G 013.

#### **G 751 FINAL CHECK AND PLAN COORDINATION**

After the storm drain plans have been completed and the plans from other offices have been received (such as sewer relocation and structural plans), the design office combines all the plans for the project into one set of plans. These plans must be reviewed and coordinated before the plans are submitted to the Project Engineer for review, then to the Division/District Engineer for approval.

The final check consists of the following:

1. Check the project file to ascertain that all design processing is complete (reports, R/W request, etc.),
2. Check overall design for constructability,
3. Check plans from other offices for design conflicts with the storm drain design,
4. Check the design in the field for compatibility with existing field conditions.

If any errors, conflicts, or changes in field conditions are found, the plans should be corrected before being submitted for approval. Signed plans

from other offices must not be corrected without their approval. If the designer has kept other design offices informed of all changes during the design, there should be no need for any last-minute plan changes.

The coordination of the plans to be combined consists of the following:

1. The addition of sequential sheet numbers on all unnumbered sheets,
2. The completion of Index to Sheets on the title sheet,
3. The addition of standard plans or general notes on the title sheet as required from the plans from other offices,
4. The completion of sheet numbers, detail titles, and other references in all cross-reference callout notes (all sheets),
5. The acquisition of all signatures of approval as required by the District or Division Engineer.

#### **G 752 DIVISION/DISTRICT ENGINEER APPROVAL**

Before a plan is submitted to the District or Division Engineer for approval, the designer must determine which approvals are required and add the proper permit notes and approval blocks on the plans.

Copies of preliminary plans are usually transmitted to all agencies involved in the proposed construction for their review and comment (see Section G 362). This procedure allows the designer to meet the agencies' requirements and expedites the acquisition of permits and approvals upon completion of design.

Approvals from other City Divisions, Bureaus, or Departments are indicated on the plans in the APPROVALS block (lower right corner of title sheet). The City agencies not affected by the construction are crossed out in pencil City agencies which are not shown therein and whose approvals are required are added in ink. Certain City Departments (such as Harbor, Airport, Recreation and Parks, Art) may require approval from the Board of Commissioners. For these, a signature block on the title sheet is required.

Approvals from other governmental agencies may be acquired either by permit or by signature on the plans. For encroachment on State property

or connection to LACFCD facilities within the City, a permit is usually sufficient (see Sections G 127 and G 128). This is indicated under Notice to Contractors on the title sheet ([Section G 724](#)). However, for reconstruction or relocation of another agency's facilities (such as the County Sanitation District's sewer line) a signature block for that agency is required on the title sheet and on other sheets where the work is delineated. Examples of the proper signature blocks used and their location on the plans are shown on the SAMPLE TITLE SHEET and on the Standard Plan *Plan and/or Profile First Sheet*.

The only other data required before approval by the Division/District Engineer are the Designed By and the Reviewed For portions of the block at the top right margin of the title sheet. The Designed By portion is signed by the design personnel designated thereon by name, not initials. The Reviewed For portion designates the distribution of plans for review to the various design sections. This is for District Office use only. After a general review and approval, the project engineer then submits the plans to the District/Division Engineer for signature and transmittal for processing.

#### **G 753 CITY ENGINEER APPROVAL**

After approval of the plans by the Division or District Engineer, the plans are transmitted for City Engineer approval. For Capital Improvement Projects, the original tracings and a blueprint request are transmitted by memo to the Plan Processing Section of the Opening and Widening Division. For Assessment Projects, the original tracings, "A" Map, and Council File are transmitted by memo to the Assessment Section of the Coordinating Division for assessment processing. They in turn will transmit the tracings with a blueprint request to the Plan Processing Section. For "B" Permit Projects, the private engineer acquires all necessary approvals except the City's, affixes his signature and "RCE No." on the plans (see Sample Title Sheet), and submits the original tracings to the Division or District Engineer for signature. The design office then transmits the tracings and a blueprint request by memo to the Plan Processing Section of the Street Opening and Widening Division. For the number of prints required in the blueprint request, refer to the Operations and Control Manual.

All approvals required on the plans must be acquired before the City Engineer signs the plans. This is the function of the Plan Processing Section of the Opening and Widening Division. The original tracings are circulated to all City offices indicated on the title sheet APPROVAL block and to the outside agencies indicated by the signature blocks. This section also reviews the plan approvals for adequacy and completeness. After all approvals have been acquired, the original tracings are transmitted to the Engineer of Design for review and approval, who in turn submits the tracings to the City Engineer for his signature. The tracings are returned to the Plan Processing Section, which transmits the tracings and blueprint request to the Blueprint Section of Administration Division for copies. Copies to city agencies are distributed by the Blueprint Section and copies to outside agencies are distributed by the Plan Processing Section.

#### **G 754 CONTRACT AND CONSTRUCTION**

After the City Engineer has approved the plans, the construction contract is prepared. The Utility and Estimating Division prepares the bid proposal while the Coordinating Division checks that all project requirements are fulfilled as indicated on [Figure G 750](#). The Board of Public Works advertises for and awards the contract, the project is constructed and inspected, and the work is accepted. The design office responsible for the acceptance of a construction project will send a memorandum to the Coordinating Division recommending acceptance of assessment, cash, and other authorized projects. To avoid delays, all memorandums recommending acceptance shall be forwarded on the day of the joint final inspection or upon completion of corrections affecting the design, regardless of outstanding change orders previously submitted by the design office or being transmitted with the project acceptance memorandum. The last steps taken by the design office are to initiate closing the project work order and file and to make the as built corrections. For the engineer's responsibilities during construction, see [Chapter G 800](#).

#### **G 755 REVISIONS**

A revision is a change of plan after the approval by the City Engineer. In order to clarify and standardize procedure for making changes in pre-

viously approved drawings, all design offices shall conform to the following:

1. Whenever any changes are made on a drawing previously approved by or for the City Engineer, the revision will be placed on the drawing with symbol (as shown on SAMPLE TITLE SHEET) and the description of the change and the necessary approvals indicated in the space provided in the Revision Description block. No changes in the date, or other alterations, will be made in original approvals on the drawing.

2. Where several sheets are included in the drawings for any particular project, revision blocks and approvals will be indicated on each drawing on which any changes have been made.

3. It will not be necessary to secure new approvals on "B" Permit plans which have been revised solely by the addition of the construction permit number.

4. No changes will be made in plans for Assessment projects after approval by the City Engineer without prior concurrence by the Coordinating Division. Tracings must be ordered through the Coordinating Division and not directly from the vault. No changes whatever will be made in such plans after the adoption of the Ordinance of Intention unless the Coordinating Division takes steps to repeal this ordinance and institute the necessary hearings required for a new Ordinance of Intention based on the revised plans.

5. When a new sheet is added to a set of approved plans, the revision block shall be placed on sheet one only, stating that sheet (indicate number) has been added. The district or division engineer shall date and sign the sheet in the space provided thereon.

6. If revisions are extensive and it is impractical to note them in the space provided in a revision block, Cronaflex or duplicate tracings shall be made. Revisions will then be made on the duplicate tracings deleting all original approvals, revisions, and index numbers. They shall then be submitted as a new project. If it would appear to be more economical, draw new tracings. In any event, the originally approved tracings shall be placed in the vault and a note stating that "these plans have been superseded by Plan No ....." indicated thereon.

7. When revised plans are sent in for approval by the City Engineer, copies shall be ordered for

both the Utility and Estimating and the Coordinating Divisions.

8. Plans for cash contracts shall not be revised subsequent to advertising for bids unless approved by the City Engineer and unless notice of the change has been given in advance to the Coordinating Division.

9. It is to be understood, however, that as built corrections may be made on any tracings affected after the completion of the contract and acceptance of the work by the Board of Public Works.

Before starting any redesign work that will require more than five man days of design time, a memorandum shall be submitted to the Board of Public Works explaining the contemplated plan revision and the reasons for the change, the estimated savings, if any, and the estimated time the project will be delayed. If any plan revision, initially thought to be minor, develops beyond five man days, the originating office shall follow the same procedure outlined above. This procedure is to be followed in the case of all City projects to be constructed by contract. For the purposes of this procedure, red esign is defined as any additional design that must be done on plans after they have been signed by the Division/District Engineer.

#### **G 756 "AS BUILT" CORRECTIONS**

After completion of the construction contract and acceptance of the work by the Board of Public Works, as built corrections shall be made on the plan tracings by the personnel who designed the project. The tracings are recalled from the vault and the project change orders are drawn from the project file.

The as built corrections are made in carmine ink on the tracings without obliterating existing drawings and notes except for a single red line to delete obsolete data. No erasing of existing data is allowed. If the changes affect other divisions, they must be so informed. No revision block or signatures are required for these corrections.

After the corrections have been completed, the change orders may be discarded, a new microfilm of the tracings is ordered, and the tracings are returned to the vault.