



Metropolitan St. Louis Sewer District

BMP 12 – PRELIMINARY STUDIES

February 25, 2011

Revision: 0

Watershed Facility Planning - SSO Control Plan Development



Metropolitan St. Louis Sewer District

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PREFACE

Sanitary sewer overflow (SSO) control is a critical component of the Metropolitan St. Louis Sewer District (MSD) Watershed Facility Planning project. MSD has developed a multiyear SSO Control Plan Development (SSOCPD) program to outline a cost-effective approach for eliminating constructed SSO discharges into area receiving streams and mitigating other sanitary sewer capacity issues during wet weather events. To assist this effort, guidance in the form of Technical Memorandums (TMs) and Best Management Practices (BMPs) is utilized.

TMs focus on specific activities associated with SSO Control Plan Development; a series of 40 TMs have been prepared and compiled in a companion *Technical Memorandum Manual* to present the sequence of tasks, describe the approach, and outline the processes integral to accomplishing the objectives of the program. In contrast, BMPs, such as this one, have been developed to document standard procedures for major tasks associated with SSOCPD execution to enable all program participants to follow a consistent approach in performance of these tasks. As of this date, the BMPs below will be utilized in performing work associated with the following aspects of the SSOCPD program:

- *BMP 1 Alternative Solutions Evaluation*
- *BMP 2 Capacity Evaluation*
- *BMP 3 CCTV and Condition Inspections*
- *BMP 4 Cost Estimating*
- *BMP 5 Design Storm Tool*
- *BMP 6 Flow Monitoring*
- *BMP 7 Flow Monitoring Data Interpretation*
- *BMP 8 I/I Investigations*
- *BMP 9 I/I Prioritization Scope*
- *BMP 10 Modeling (XP-SWMM + HYDRA)*
- *BMP 11 MSD Design Requirements / Construction Specifications*
- *BMP 12 Preliminary Studies*
- *BMP 13 Priority Ranking System*
- *BMP 14 Project Database*
- *BMP 15 Project Definitions*
- *BMP 16 Pump Station Data*
- *BMP 17 Radar Rainfall Data*
- *BMP 18 Rehabilitation Evaluation*
- *BMP 19 Report Development Guide*
- *BMP 20 Shared Electronic Workspace*
- *BMP 21 SSO Control Master Plan Preparation*
- *BMP 22 Updating Constructed SSO Database*
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- *BMP 24 Watershed SSO Control Plan Report Preparation*
- *BMP 25 WWTF Service Area SSO Control Plan Report Preparation*

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Revision Summary

Revision	Date	Comments
0	02/25/11	Draft BMP for comment

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1.0 PURPOSE

The purpose of *BMP 12 – Preliminary Studies* is to assist in the preparation of sound preliminary engineering studies of potential MSD projects identified in its Capital Improvement and Replacement Program (CIRP). Preliminary engineering studies are performed by MSD, or its agents, to validate project needs, ready projects for final design or, in some cases, a pre-design phase, and provide reasonable budget cost estimates. The *Preliminary Studies* BMP, including the associated *Preliminary Studies Guidebook*, is intended to improve the efficiency and quality of the studies by providing: 1) a standard process and consistent presentation for preliminary studies and associated information needs, 2) a detailed description, with guidance, of the major tasks involved in the process, and 3) identification of resources associated with each of the tasks. *BMP 12* and the *Preliminary Studies Guidebook* are primarily associated with infrastructure (sanitary sewer system and combined sewer system) projects; however, much of the content is also applicable to storm water projects.

2.0 AUDIENCE

The users of this *Preliminary Studies* BMP include MSD planning engineers and MSD engineering consultants that prepare preliminary studies. Completed preliminary studies have a variety of users including MSD planning engineers, MSD design engineers, MSD design project managers, engineering consultants to MSD for project predesign and final design, SA/W Teams, and WM Teams.

3.0 RESOURCES

The *Preliminary Studies Guidebook* is the primary resource to assist in performing preliminary studies, and it is incorporated into this BMP by reference. The Table of Contents for the Guidebook, including a listing of its appendices, is provided in Appendix A; electronic files and a pdf version of the document exist on the Jacobs St. Louis Office network at the following location:

[P:\ENVIRON\PROJECTS\C5X59900 \(MSD Planning\)\800 DELIV\810 PREL\General\Guidebook](P:\ENVIRON\PROJECTS\C5X59900 (MSD Planning)\800 DELIV\810 PREL\General\Guidebook)

Paper copies of the Guidebook are located in the Jacobs Environmental Library and have been furnished to MSD and Jacobs personnel that are most directly involved with the performance of preliminary studies.

Additional resources available to users of this BMP include the following personnel:

- Karen Janson – Preliminary Studies Coordinator (MSD)
 - o E-mail: kbsnee@stlmsd.com
 - o Phone: 314-768-2777
- Steve Hornung – Preliminary Studies Manager (Jacobs)
 - o E-mail: Steven.Hornung@jacobs.com
 - o Phone: 314-335-4351

4.0 DESCRIPTION

There are seven overall tasks/steps in completing a preliminary study. The *Preliminary Studies Guidebook* provides detailed discussion of each of these major tasks, illustrated in Figure 1. Each task falls within a particular task category - Research (Information Gathering), Analysis, or Report Development - and is critical in conducting a thorough examination of any proposed project. These tasks are discussed briefly below.

Task 1, Existing Project Record Review, is the first step in performing each preliminary study. The engineer reviews MSD's existing file for the proposed project as well as project information from the relevant SKME Service Area Report. These resources will familiarize the engineer with the project and will serve as a springboard for further research. Guidelines for this task are presented in Section 2 of the Guidebook.

Task 2, Project Extent Mapping, involves the creation of project extent maps for reference and use in conducting more detailed project research. Guidelines for this task are presented in Section 3 of the Guidebook.

Task 3, Detailed Data Collection, involves an extensive review of all pertinent project information that can be discovered by means of records review internally, at the District, or from other involved parties (e.g., utilities, municipalities). Guidelines for this task are presented in Section 4 of the Guidebook.

Task 4, Site Visit, involves a visit to the proposed project site to confirm and supplement information found in the detailed records review and to identify and investigate possible alternatives and alignments for the project. Guidelines for this task are presented in Section 5 of the Guidebook.

Task 5, Alternatives Analysis, includes both alternatives development and hydraulic analysis of existing and proposed project sewers. Guidelines for this task are presented in Section 6 of the Guidebook.

Task 6, Preliminary Design, involves preliminary design (alignment, pipe sizes, lengths, slope, etc.) of the selected alternative or alternatives, and includes preparation of plan and profile drawings. Guidelines for this task are presented in Section 7 of the Guidebook.

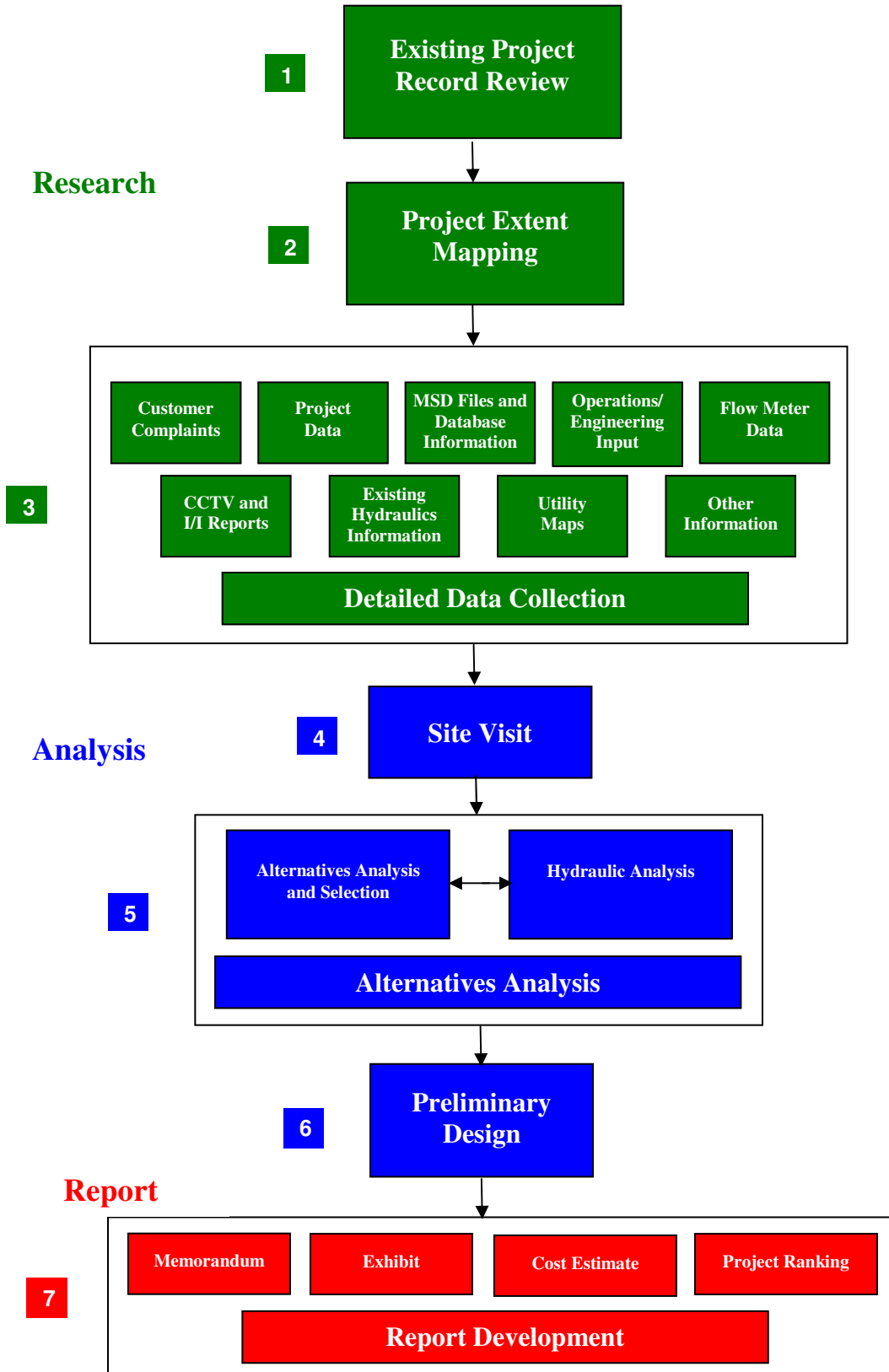
Task 7, Report Development, is the final task in preparing each preliminary study. The final report is organized into four main sections, which represent sub-tasks for this step: Memorandum (text portion), Exhibit (project map), Cost Estimate, and Project Ranking (Priority Rating). Guidelines for these sub-tasks are outlined in Section 8 of the Guidebook. Additional guidance associated with quantity take-offs for cost estimating purposes and the development of preliminary study cost estimates is included in the Preliminary Studies Cost Estimate Guidelines appended to the Guidebook.

MSD's Guidelines for Preparing Preliminary Engineering Project Studies, are included in Appendix A of the Guidebook. This document contains the District's 18-step approach to performing a preliminary engineering study, and includes specific

guidelines for preparation of the project exhibit. Much of the information contained in this document is discussed and, in most cases, expanded upon in the Guidebook.

Subsequent to the December 2006 revision, certain information in the Guidebook has become outdated. While the overall process remains unchanged, selected details (e.g., reference locations, software descriptions, personnel) are no longer current/relevant. Additionally, emphasis has been placed on more aggressively addressing infiltration and inflow reduction via preliminary studies. These changes have been communicated in various ways (weekly meetings, memoranda, e-mail, etc.) to all those responsible for performing preliminary studies. Nonetheless, the December 2006 *Preliminary Studies Guidebook* provides the basic framework for performance of preliminary studies, and should be relied upon as the starting point for understanding the requirements and procedures to be followed in preparing preliminary study reports.

Figure 1. Preliminary Study Tasks Flow Chart



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 - Mattese Main Trunk Sanitary Relief (SKME-439)

Appendix F
Cost Estimate Guidelines
(65 pages)

Preliminary Studies
Cost Estimate Guidelines

Watershed Facility Planning
Metropolitan St. Louis Sewer District

JACOBS

December 2006

Preliminary Studies: Cost Estimate Guidelines

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PRELIMINARY STUDIES: COST ESTIMATE GUIDELINES

This document presents guidelines and procedures for preparing preliminary engineering study cost estimates, with the objective of producing consistent, reasonable estimates, and appropriate and standardized backup information and documentation. These guidelines are divided into three parts. Part I provides an overview of the cost estimating process associated with preliminary studies. Part II discusses the identification of relevant construction-related line items and development of associated quantities. Part III explains the procedures associated with obtaining and using cost information to develop the Project Total cost.

I. OVERVIEW

After developing the preliminary design, including pipe sizing and plan/profile information, preparation of the cost estimate can begin. Standard approaches, spreadsheets, and unit costs have been developed and are to be utilized by the Engineer in preparing the cost estimate for preliminary studies. Preparation of the cost estimate involves the following three distinct and sequential, but interrelated, activities: 1) identification of pay items, 2) development of quantities, and 3) determination of costs. Following this brief overview of the cost estimating process, including the interrelationships among these three activities, each of the activities is described more thoroughly in Part II (pay items and quantities) and Part III (costs) of these guidelines. The common thread associated with these three activities is that all are based on a cost database called CIPRO.

A. CIPRO

CIPRO is MSD's customized cost database, a system wide Oracle-based platform. This extensive cost database is derived from MSD's history of completed projects. The usefulness and reliability of this database is enhanced by MSD's utilization of *Standard Construction Specifications* (the Gold Book) in the preparation of contract documents for the construction of sewers and drainage facilities. Since construction contractors are required to break down their bid prices into distinct Pay Items as defined in the Gold Book, MSD is able to regularly enhance and update unit costs for Pay Items in CIPRO based on actual bid price data from recent MSD construction projects in the St. Louis area. In addition to tracking bid price data and identifying unit costs, the CIPRO database also includes cost estimates associated with preliminary study projects and final design projects.

B. COST ESTIMATE PROCESS

As discussed in Part II of these Cost Estimate Guidelines, the CIPRO database includes over a thousand Pay Items, classified into nineteen construction work Pay Item categories. However, typically well under fifty construction Pay Items are utilized in a preliminary study cost estimate, and most of these are usually associated with a relatively small pool of commonly used Pay Items. Selection of appropriate Pay Items and development of the *Cost*

**Preliminary Studies:
Cost Estimate Guidelines (continued)**

Estimate Backup spreadsheet (Attachment 1) is the first step in the cost estimate process. Quantities for the various Pay Items associated with the preliminary study project are developed and documented directly on this spreadsheet; occasionally the associated Pay Item cost is also calculated on the spreadsheet. If necessary, a companion *Earthwork* spreadsheet (Attachment 2) is employed to calculate quantities for selected items where extensive tabulations are warranted. These two spreadsheets are referred to collectively as the “quantities spreadsheets”.

Once construction Pay Items and quantities are determined, costs are developed as described in Part III of these Cost Estimate Guidelines. The cost estimate for a preliminary study includes two components: the *Pre-CIPRO¹: Engineer’s Cost Estimate* spreadsheet (Attachment 3) and the *Engineering Cost Breakdown* spreadsheet (Attachment 4). These two spreadsheets are referred to collectively as the “cost spreadsheets”. To initiate the costing process, the Pay Items and associated quantities from the quantities spreadsheets are entered into the *Engineer’s Cost Estimate* spreadsheet program, together with the appropriate CIPRO unit prices. Engineering and other ancillary, non-construction costs are estimated using the *Engineering Cost Breakdown* spreadsheet. Templates for all four Excel spreadsheets introduced above can be found electronically in the *Forms, Templates, and Tools* folder on the Jacobs network at the following location:

 [P:\ENVIRON\PROJECTS\C5X59900 \(MSD Planning\)\800DELIV\810PREL\General\](P:\ENVIRON\PROJECTS\C5X59900 (MSD Planning)\800DELIV\810PREL\General\).

II. PAY ITEMS AND QUANTITIES

This portion of the Cost Estimate Guidelines focuses on providing guidance and direction for identifying the various cost estimate line items (Pay Items) that contribute to a project’s total construction cost, and developing associated quantities. Following an introduction to the CIPRO Pay Item Database, use of the two quantities spreadsheets is discussed.

A. PAY ITEMS

The MSD CIPRO database includes over a thousand Pay Items; typically only a fraction of these are applicable to most preliminary studies. An alphabetical listing of available CIPRO Pay Items is presented in *CIPRO Pay Items - Alphabetical Listing.doc*; this tabulation is appended to these Cost Estimate Guidelines as Attachment 5, and can be found electronically in the *References* folder on the Jacobs network at the following location:

 [P:\ENVIRON\PROJECTS\C5X59900 \(MSD Planning\)\800DELIV\810PREL\General\](P:\ENVIRON\PROJECTS\C5X59900 (MSD Planning)\800DELIV\810PREL\General\).

MSD has divided these construction work Pay Items into nineteen categories that reflect major components of sanitary and stormwater sewer construction projects. These nineteen Pay Item categories are presented below on Table 1, CIPRO Categories and Common Pay Items, together with some typically utilized Pay Items. These more common Pay Items as listed in Table 1 are also described in the Cost Estimate Backup discussion that follows.

¹ The ‘*Pre-CIPRO: Engineer’s Cost Estimate*’, hereinafter referred to as the ‘*Engineer’s Cost Estimate*’, utilizes Pay Items and costs **from** the CIPRO database. It is referred to as “Pre-CIPRO” to alert MSD and other users that data presented on the *Engineer’s Cost Estimate* has not yet been entered into the CIPRO database.

**Preliminary Studies:
Cost Estimate Guidelines (continued)**

TABLE 1. CIPRO CATEGORIES AND COMMON PAY ITEMS

CATEGORIES	PAY ITEMS COMMONLY USED IN PRELIMINARY STUDY ESTIMATES ^{1,2,3}
Category 1: Excavation, Fill, and Backfill	<u>Excavation, Fill, and Backfill</u> <ul style="list-style-type: none"> • Excavation Class “A” (9 – CY) • Excavation Class “C” (7 – CY) <u>Streets, Roads, Curbs, and Other Paved Areas</u> <ul style="list-style-type: none"> • Granular Backfill (127 – CY)
Category 2: Corrugated Metal Pipe	-
Category 3: Ductile Iron Pipe Sewer	<u>Creek Crossing</u> <ul style="list-style-type: none"> • Ductile Iron Pipe Sewer [various diameters and classes] (varies – LF)
Category 4: PVC and VCP Pipe	<ul style="list-style-type: none"> • Pipe Sewer [various diameters] (Sanitary /Combined) (varies – LF)
Category 5: Reinforced Concrete Pipe Sewer	<ul style="list-style-type: none"> • Reinforced Concrete Pipe Sewer [various diameters and classes] (varies – LF)
Category 6: Pipe in Tunnel Sewer	<ul style="list-style-type: none"> • Pipe in Tunnel [various diameters] (varies – LF)
Category 7: Fittings, Concrete Collars, and Connections	<ul style="list-style-type: none"> • Connection to Existing Manhole (8” thru 24” Pipe) (99 – PL)) • Foulwater Drop - [various diameters] (varies – EA) • Wye 06 Inch on 08 Inch Pipe (110 – EA)
Category 8: Concrete Channel Construction	<u>Concrete Channels</u> <ul style="list-style-type: none"> • Channel Reinforced Concrete Bottom [various thicknesses] (varies – SY) • Channel Reinforced Concrete Vertical Sides [various thicknesses] (varies – SY)
Category 9: Connections to Channel Construction	-
Category 10: Miscellaneous Channel Construction	-
Category 11: Box Culverts	-
Category 12: Manholes and Inlets	<u>Junction Chambers</u> <ul style="list-style-type: none"> • Junction Chamber – Reinforced Concrete - [various sizes] (varies – EA) <u>Manholes and Inlets</u> <ul style="list-style-type: none"> • Bottom Section of Manhole – [$>$ or = 27INCH PIPE] (varies – EA) • Manhole - Standard Construction (52 – LF) • Manhole Cover Seals (1759 – EA) • Manhole Frame Seals (1760 – EA)

**Preliminary Studies:
Cost Estimate Guidelines (continued)**

Category 13: Pavements and Sidewalks	<u>Streets, Roads, Curbs, and Other Paved Areas</u> <ul style="list-style-type: none"> • Curb and Gutter – Concrete Removal and Replacement (137 – LF) • Sidewalks & Driveways Concrete – Rem. and Rep. (133 – SY) • Street Pavement – Asphaltic Concrete Rem. and Rep. (134 – SY) • Street Pavement – Concrete Rem. and Rep. (131 – SY)
Category 14: Site Restoration	<ul style="list-style-type: none"> • Abandonment – Pipe Fill (122 – CY) • Abandonment – Structure (123 – EA) <u>Creek Crossing</u> <ul style="list-style-type: none"> • Rip Rap (2546 – SY) • Rock Blanket (130 – SY) <u>Seeding and Sodding</u> <ul style="list-style-type: none"> • Seeding (142 – SY) • Sodding – <i>[various grass types]</i> (varies – SY)
Category 15: Special Pay Items	<ul style="list-style-type: none"> • Bypass Pumping (1351 – LS) • Clearing (1763 – LS) • Downspout Disconnection (2717 – EA)⁴ • Sanitary Sewer Cleanout (1862 – EA)⁴ • Sewer Separation / Driveway Disconnect (2653 – EA)⁴
Category 16: Percentage of Cost Items	-
Category 17: Sewer Rehabilitation	<u>Sewer Rehabilitation</u> <ul style="list-style-type: none"> • CIPP Liner – <i>[various diameters and thicknesses]</i> (varies – LF)⁴ • Manhole Rehabilitation (1699 – LF)⁴
Category 18: Low Pressure Force Main Systems	-
Category 19: Construction	<ul style="list-style-type: none"> • Cleaning and TV <i>[various diameters]</i> (varies – LF)⁴ • Sanitary Lateral, 6" (2056 – LF)

1. Underlined headings represent a descriptive grouping used for convenience in Cost Estimate Guidelines and/or Cost Estimate Back-Up spreadsheet.
2. Associated CIPRO Pay Item number and pay unit follow in parentheses.
3. Bracketed italics indicate multiple variations of Pay Item. This usually occurs when specific Pay Item to be used is dependent on dimension of Pay Item.
4. Pay Item pertains to CSO & I/I removal projects in particular. References for unit costs associated with this item may include the following: 2005 bid costs from the University City Pilot Program for Private Property Separation (“U City”); 2003 to 2005 bids to MSD for CIPP and for CCTV and Physical Inspection (including sewer cleaning); and an 8/4/05 MSD/Jacobs meeting on cost estimating.

**Preliminary Studies:
Cost Estimate Guidelines (continued)**

B. COST ESTIMATE BACKUP SPREADSHEET

The *Cost Estimate Backup* spreadsheet is prepared by the Engineer to provide details associated with each of the various Pay Items². This spreadsheet identifies Pay Items and calculates quantities, and occasionally costs, for these Pay Items. Each Pay Item listed on the *Cost Estimate Backup* spreadsheet is subsequently presented on the *Engineer's Cost Estimate* spreadsheet. A *Cost Estimate Backup* spreadsheet that includes examples of the most common Pay Items, including formulas for many of the calculations, is included as Attachment 1. This example is available electronically in the aforementioned *Forms, Templates, and Tools* folder on the Jacobs network and can be used as a starting template. The Engineer should copy this spreadsheet, or a completed spreadsheet from a similar preliminary study that employs the format of Attachment 1, into the study project's 810.##### ANALYSIS folder as the initial step in the cost estimating process.

The *Cost Estimate Backup* spreadsheet consists of three sections. Section 1, Items Contributing to 'Preceding Pay Items Total', comprises the bulk of the spreadsheet; the actual Pay Items presented in Section 1 are selected by the Engineer to accomplish construction of the project proposed by the preliminary study. Section 2, Additional Items Contributing to 'MSD Construction Estimate' Total, presents information associated with three specific elements of the construction project – 'Mobilization', 'Utility Relocation', and 'Protection and Restoration of Site'. Finally, Section 3, Additional Items Contributing to 'Project Total', summarizes information associated with the 'Contingencies' and 'MSD Engineering, Legal, and Administrative' aspects of the project. Each of these three *Cost Estimate Backup* spreadsheet sections is discussed in turn below; some of the guidance presented below, particularly with respect to determination of quantities, is also included at respective locations in the body of the spreadsheet.

1. Section 1 – Items Contributing to 'Preceding Pay Items Total'³

Section 1 is the portion of the *Cost Estimate Backup* spreadsheet where, with the exception of 'Mobilization', 'Utility Relocation', and 'Protection and Restoration of Site', all construction Pay Items associated with the project's MSD Construction Estimate are developed. Pay Items required for the project, including cost estimate Line Item Number and associated MSD Pay Item Number, are to be listed alphabetically on the spreadsheet. In developing the list of Pay Items to be included in Section 1, the Engineer should examine the requirements of the preliminary design in conjunction with the following:

- Pay Items employed previously for similar projects
- Commonly used Pay Items presented in Table 1
- Alphabetical listing of available CIPRO Pay Items in Attachment 5.

² For clarity, individual Pay Items or line items employed on the various spreadsheets are identified in the discussion below through the use of 'single quotation marks'.

³ ('Preceding Pay Items Total' is included on the *Engineer's Cost Estimate* spreadsheet and is a summation of costs for all Section 1 Pay Items associated with the estimate.)

**Preliminary Studies:
Cost Estimate Guidelines (continued)**

Generally the information presented in Section 1 for each Pay Item includes a listing of quantities, performance of limited computations, and documentation of pertinent notes and assumptions. Additionally, for Pay Items where the Unit Price in the subsequent *Engineer's Cost Estimate* differs from the current CIPRO unit prices, the *Cost Estimate Backup* also identifies the unit cost to be used for the Pay Item, including any relevant assumptions or documentation. However, while unit prices may be adjusted up or down to reflect project specific conditions, for instance highly-confined versus wide-open construction conditions, such adjustments typically are more applicable to final design estimates than preliminary study estimates.

As noted above, the Pay Items generally correlate to specific components of the work as described in MSD's *Standard Construction Specifications for Sewers and Drainage Facilities*; the 2000 Revision is the current version of this document. The information presented therein includes standard details of sewer construction in addition to Pay Item definitions and should be referred to as necessary to supplement the discussion below. Information and considerations associated with the most commonly used Pay Items and descriptive groupings, correlating to listings presented in Table 1, is presented alphabetically below.

Abandonment

- 'Abandonment – Pipe Fill' is grout fill. This should be used under paved areas (cost per cu yd). For abandonment of pipe in open areas, the pipe should be plugged. The plugging is negligible in cost and is not included in the preliminary cost estimate.
- 'Abandonment – Structure' is a unit cost (Each) that covers granular backfill of a manhole after knocking down the manhole 2 to 3 ft below grade. For estimating purposes, a junction chamber is considered equivalent to three manhole structures.

Bypass Pumping

- Lump sum cost development based on construction duration calendar days and daily cost for pump and operation.
- To determine construction duration calendar days, use 75 to 100 ft of pipe installed per work day for smaller pipe sizes, and 50 to 75 ft per day for larger pipe sizes, and multiply the resulting number of work days by 1.6.
- Estimate $1.6 \times$ number of work days = calendar days.
- Daily cost for pump and operation, including labor and piping, depends on size of pump and sewer; use \$400 per day for large sewers of 48-inch diameter or more; \$350 per day for medium size sewers (18-inch to 42-inch); and \$300 to \$350 per day for smaller sewers (less than 18-inch diameter); use calendar days (not work days).
- Consider standby pump requirement as included in above.
- Bypass pumping for sewer rehabilitation may be different than sewer replacement. An assumption of ft of pipe rehabilitated per day must be made. This can be dependent on the diameter of the lining.

Connection to Existing Manhole

- 'Connection to Existing Manhole (8" thru 24" Pipe)' is applicable for 8 to 24-inch pipe connections where manhole is not replaced.

**Preliminary Studies:
Cost Estimate Guidelines (continued)**

Concrete Channels

- Determine square yards for construction or replacement of reinforce concrete bottoms and sides. If thickness unknown, use typical concrete slab and wall thickness of 12-inch for drainage channels and similar structures.

Cleaning and TV

- This Pay Item provides for CCTV and Physical Inspection.
- Identify segment(s), including pipe diameter, and length of sewer proposed for CCTV. Generally assume light cleaning and utilize latest CIPRO unit costs. If heavy cleaning is deemed to be required, state basis for assumption and adjust unit cost accordingly. Similarly increase unit cost if, as part of the project, CCTV is only proposed for a relatively short amount of sewer.
- For sewer separation projects, if the former combined sewer is proposed for use as the sanitary sewer, need to include CCTV inspection of the sewer with the cost estimate.

Clearing

- Lump sum cost typically developed based on acreage.
- Typical corridor width of 20 to 50 ft, depending on trench depth. Assume clearing width equals two times the sewer depth, with a minimum width of 20 ft.
- Typical cost per acre from \$10,000 up to \$20,000; say \$10,000 on larger projects with a large amount of clearing.

Creek Crossings

- Use ductile iron pipe (DIP) for creek crossings with less than 3 ft of cover instead of concrete encasement; extend DIP 10 feet beyond top of bank on each side of the creek. DIP appropriate for up to 60-inch diameter.
- Extend ductile iron pipe to a manhole if reasonably close (e.g. within 20 ft); transition to regular sewer pipe can be made without a manhole.
- Use the heaviest class of DIP if in doubt.
- Rock blanket for creek crossings, from top of each bank; rock blanket ~10 ft wide for pipe up to 54 inch, and 15 ft wide for pipe over 54 inch; (grouted rock blanket no longer used – not allowed by Corps of Engineers, MDNR).
- Rip rap, rather than rock blanket, is applicable for larger streams with high velocities.
- Consider depth under creek bed; provide 3 ft over top of pipe if feasible.

Downspout Disconnection

- Use defects map - code / house color and amount of flow - to determine downspout disconnect defects. On the defects map, where properties are shown to have a suspected defect, particularly where defect flow is high, downspouts can usually be assumed as the suspected defect.
- For each street where downspout disconnection is to be performed as part of the proposed solution, identify the number of properties proposed for downspout disconnection.
- Assume 4 downspout disconnections per property proposed for downspout disconnection if most residential properties in the project area are small (0.25acre);

**Preliminary Studies:
Cost Estimate Guidelines (continued)**

otherwise assume 8 downspout disconnections per property. If downspout disconnections are required at institutions (e.g. schools) or businesses, estimate downspout disconnections for these locations on a case-by-case basis.

- Use latest CIPRO unit cost for straightforward downspout disconnections. For properties where downspout disconnections are expected to require ancillary activities to be performed (e.g. gutter flow direction changes, downspout location changes, piping to curb or grade with possible need to cut sidewalk and curb and/or perform repaving, etc.) adjust unit costs per downspout disconnection and document adjusted unit cost on *Cost Estimate Backup* spreadsheet. As guidance in determining adjusted unit cost, typically downspout disconnection efforts requiring moderate to extensive ancillary activities to be performed are approximately \$5,000 per property for non-copper construction and \$9,000 per property for existing copper construction.

Excavation, Fill, and Backfill

- Use Class C excavation for all material that is not rock.
- Generally use Class A excavation for all material that is rock.
- Class B only applies for special types of rock material. It is usually not used at the preliminary study level. However, removal of concrete encased pipe can be considered Class B excavation.
- Obtain rock elevations from “As-Builts” for the project sewer or sewer nearby.
- North of Hwy 40 there tends to be less rock; south of Hwy 40 more rock.
- At ~25 ft or more depth, pipe in tunnel is typically cheaper than open cut.
- Excavation unit cost includes backfill except where granular backfill or compacted backfill is required.
- ‘Compacted Backfill (Trench)’ is seldom used. One example of use is a trench between two houses, only about 12 ft apart, and compacted backfill was used, in 12-inch lifts, for structural considerations. ‘Compacted Backfill (Trench)’ is not applicable for typical excavation in the front yards of homes.
- Excavation unit cost includes trench dewatering until pipe installed.
- Coordinate with *Earthwork* spreadsheet.

Foulwater Drop

- Pipes less than 15-inch diameter are allowed up to a 2 ft drop within a manhole, without an outside ‘Foulwater Drop’. Drops of more than 2 feet require an outside foulwater drop.

Junction Chamber

- Use ‘Junction Chamber – Large’ for 54-inch or larger pipes.
- Increase unit price if >20 ft deep.

Manholes and Inlets

- Raise manholes 3 ft in areas within the 100-year floodplain. Do not raise the manholes when objectionable, such as in residential yards.
- Replace existing lampholes with manholes.

**Preliminary Studies:
Cost Estimate Guidelines (continued)**

- Costs of connecting existing lateral sewers to a new manhole are included in new manhole unit costs.
- Length between top and bottom section is calculated as ‘Standard Manhole Construction’.
- Include ‘Manhole Bottom Section’ unit cost for manholes connected to 27-inch and larger pipes.
- Coordinate ‘Standard Manhole Construction’ and ‘Manhole Bottom Section’ with *Earthwork* spreadsheet.
- 15-inch and larger pipes cannot be dropped; must enter at the manhole flow line
- In calculating inlet manhole depths and determining when to use ‘Inlet Manhole Top Sections’, refer to pages 67 & 68 of the “Gold Book” (MSD’s Standard Construction Specifications for Sewers and Drainage Facilities, 2000). ‘Inlet Manhole Top Sections’ are used whenever there is an inlet with an incoming pipe.
- ‘Manhole Frame Seals’ and ‘Manhole Cover Seals’ are used for manholes located in the floodplain or subject to conditions of overland flooding.

Pipe in Tunnel

- ‘Pipe in Tunnel’ includes casing pipe, carrier pipe, and Class C excavation.
- Additional cost for Class A excavation is based on a minimum 48-inch diameter tunnel.
- Coordinate with *Earthwork* spreadsheet.

Pipe Sewer (Sanitary/Combined)

- For preliminary studies, calculate the pipe lengths based on the distance from manhole center to center for all types of projects – infrastructure (sanitary and combined sewers) and storm sewer projects.
- Use ‘Reinforced Concrete Pipe Sewer’ Pay Item for sewers larger than 27 inches in diameter.

Reinforced Concrete Pipe Sewer

- Use if the sewer is larger than 27 inches in diameter. Use Class III pipe.
- Coordinate with *Earthwork* spreadsheet.

Sanitary Lateral

- For lateral extensions, use ‘Sanitary Lateral, 6”’ (CIPRO Pay Item No. 2056).
- A variety of other CIPRO Pay Items exist for defects and repairs associated with sanitary laterals; for code yellow or worse lateral defect problem, use ‘Lateral Replacement’ (CIPRO Pay Item No. 2047). These Pay Items may have particular applicability to CSO & I/I removal projects.
- Since the I/I survey and associated defect maps, based on smoke testing, do not show some defects (because of trapped lines and other conditions), apply a reasonable factor to adjust the number of defects in preparing the preliminary study cost estimate.

**Preliminary Studies:
Cost Estimate Guidelines (continued)**

Sanitary Sewer Cleanout

- ‘Sanitary Sewer Cleanout’ could apply to either a house lateral or small sewer (<12-inches).
- Identify the location (e.g. address, intersection, or structure) of each sanitary sewer cleanout to be either raised and capped or replaced.
- Based on MSD experience, use \$500 per cleanout identified as a defect in lieu of CIPRO unit cost.

Seeding and Sodding

- 20 ft payline width for both sodding and seeding.
- Seeding in any area that has been cleared.
- Sodding only for built-up areas with lawns and other similarly maintained areas.
- Zoysia or bluegrass sod based on field visit.

Sewer Rehabilitation

- CIPP liner rehabilitation extent should be based on CCTV, if available. Additionally, the type of pipe should be considered. Typically all concrete sanitary sewer pipe will need to be lined. The extent of clay pipe rehabilitation depends on condition, as indicated by defects/CCTV map color code.
- Identify segment(s), including liner diameter, and length of sewer proposed for receiving CIPP liner. Identify manholes targeted for rehabilitation and associated manhole length.
- In selecting appropriate CIPRO Pay Item, use thickest liner available for a given diameter.
- For projects that involve less than 2,000 feet of CIPP liner rehabilitation, increase the CIPRO unit cost(s) by a factor of 1.5. Similarly, if the average distance between manholes for the entire lining effort is less than 150 feet, increase CIPRO unit cost(s) by a factor of 1.5. If both of the foregoing factors exist, increase the CIPRO unit cost(s) by a factor of 2.0.
- Cost for CIPP liner includes CCTV and lateral reconnection; separate Pay Items are not required for these activities.
- Various Pay Items exist for installing/modifying/repairing/upgrading laterals. If significant work on laterals other than lateral reconnection is required as part of the project, include appropriate Pay Items to account for this activity.
- Removal of trapped inlets is applicable when separation projects convert combined sewers to storm sewers. A new inlet is not required.
- For CSO projects, rehabilitate sanitary sewers upstream of sanitary and combined sewers, or combined sewers that become sanitary sewers.

Sewer Separation / Driveway Disconnect

- Used for driveway or area drain installation or rerouting.
- Deep storm sewer system may be an applicable alternative; avoid pump systems if possible.
- Identify the address of each required sewer separation/driveway disconnect.

**Preliminary Studies:
Cost Estimate Guidelines (continued)**

Streets, Roads, Curbs, and Other Paved Areas

- Granular backfill for road crossings; no concrete encasement.
- Concrete pavement replacement, replace entire slab joint to joint - say ~13 to 15 ft wide x 12 to 20 ft long typical; concrete subdivision streets typically have two 13-ft wide slabs, including the rolled concrete curb; sometimes pipe alignment is near the joint between slabs and two slabs need to be replaced - based on field visit.
- Asphalt paving, payline width plus 2 ft on each side.
- For large quantities of asphalt – streets, driveways, parking lots, unit cost may be reduced \$5 to \$10 per sq yd.
- Note higher unit cost for asphalt over rigid base, such as concrete or cobblestone streets overlaid with asphalt; look for this during field visits.
- A single driveway is typically 8 to 10 ft wide, and a double driveway about 16 ft wide.
- Unit cost for concrete curb includes vertical curbs and concrete curbs used with asphalt streets.
- Use granular backfill under all paved areas, including streets, sidewalks, patios, driveways, parking lots.
- St. Louis County requires flowable fill (CIPRO Pay Item No. 2422) for backfill in the top five feet under paved areas of County roads and highways; this would be same volume as what would otherwise be occupied by granular backfill.
- Use the ‘Driveways – Asphaltic Concrete’ unit cost for asphalt parking lots.
- Use ‘Sidewalks & Driveways Concrete – Rem. and Rep.’ unit cost per sq yd.
- ‘Curb and Gutter – Concrete Removal and Replace’ should be used with asphalt street pavement remove and replace, if the curb area of street is impacted.

Wyes (for Lateral Connections)

- Use 6-inch wye for house connections; the unit cost includes excavation.
- Use 6-inch or 8-inch for apartments and commercial customers.
- The unit cost for 6-inch pipe lateral includes excavation; ignore pipe lengths of short lateral connections, say 5 to 10 ft, at the preliminaries stage.

2. Section 2 – Additional Items Contributing to ‘MSD Construction Estimate’ Total

Section 2, Additional Items Contributing to ‘MSD Construction Estimate Total’, presents information associated with three specific facets of the construction project – ‘Mobilization’, ‘Utility Relocation’, and ‘Protection and Restoration of Site’. These three elements of the work are typically developed as lump sum Pay Items, and development of these lump sum costs is presented in Section 2 of the *Cost Estimate Backup* spreadsheet. Two of these items, ‘Mobilization’ and ‘Protection and Restoration of Site’, are not usually quantified for preliminary study cost estimates; instead the lump sum value for these two items is developed by using a percentage of the total cost associated with Section 1 Pay Items⁴. As

⁴ The total cost associated with Section 1 Pay Items is referred to as ‘Preceding Pay Items Total’ on the *Pre-CIPRO Engineer's Cost Estimate*.

**Preliminary Studies:
Cost Estimate Guidelines (continued)**

further discussed below, development of the lump sum cost for 'Utility Relocation' generally first involves quantity determinations.

Mobilization

- 'Mobilization' costs are typically 4% of the 'Preceding Pay Items Total'.
- 'Mobilization' is included in cost estimates for preliminary studies except for projects where the 'MSD Construction Estimate', exclusive of 'Mobilization', is less than \$75,000.

Utility Relocation

- \$5,500 default minimum in CIPRO, even if no specific relocations or impacts are identified.
- See unit prices for costs of utility crossings and power pole relocations at the end of 2005 CIPRO Pay Items spreadsheet. Use these costs to develop a lump sum cost for 'Utility Relocation' to be used in the Engineer's Cost Estimate. The development of this lump sum cost and each of the utility crossings should be identified on the Cost Estimate Backup Spreadsheet.
- Jacobs will estimate costs of replacement for preliminaries; standard unit costs for replacement are not in CIPRO; replacement costs are usually provided by the other utilities during final design.
- In the event that actual utility impacts cannot be determined, used 1% to 2% of 'Preceding Pay Items Total' for larger projects and projects in wide open areas, and 3 to 4% for smaller projects or projects with substantial utility impacts.
- Electrical and telephone utility impacts and costs in same easement; consider revised or new easements; consider power pole relocation; may be able to work around or under buried electrical and phone cables without replacement.
- Cast iron gas mains are potentially present in City of St. Louis areas such as Chambers, Dakota, Glaise & Rock Creek, and older areas of St. Louis County, such as Maplewood, Jennings, and Shrewsbury; the zone of influence is a 45 degree angle from the bottom side of the trench. Check with Laclede Gas personnel familiar with the area to determine if cast iron gas mains are present. Replacement may be a major expense.
- On AmerenUE maps, solid lines generally designate above ground utilities and dashed lines designate buried utilities.
- Impacts to other MSD improvement For infrastructure projects, storm water facilities crossings and relocations are normally included in the Pay Item for 'Protection and Restoration of Site', not the Pay Item for Utility Relocation; and, similarly, for storm water projects, sewer infrastructure facilities crossings and relocations are normally included in the Pay Item for 'Protection and Restoration of Site'.

Protection and Restoration of Site

- 14% standard for 'Protection and Restoration of Site', but adjustable; may cut this item to as low as 5 to 6% for large, simple jobs. (Standard increased from 11% to 14% in late 2005 or early 2006.)
- Items covered – safety, barricades, erosion control, landscaping restoration, traffic control, temporary access, fences.

**Preliminary Studies:
Cost Estimate Guidelines (continued)**

- Do not show ‘Fence’ as a line item for preliminary study estimates; instead, as noted above, it is included in ‘Protection and Restoration of Site’.
- For infrastructure projects, storm water facilities crossings and relocations are normally included in the Pay Item for ‘Protection and Restoration of Site’, not the Pay Item for ‘Utility Relocation’; and, similarly, for storm water projects, infrastructure facilities crossings and relocations are normally included in the Pay Item for ‘Protection and Restoration of Site’.
- Depending on project size, round off resultant ‘MSD Construction’ estimate to nearest \$500, \$1,000, \$5,000 or \$10,000 by adjusting the ‘Protection and Restoration of Site’ Pay Item.

3. Section 3 – Additional Items Contributing to ‘Project Total’

Whereas Sections 1 and 2 of the *Cost Estimate Backup* spreadsheet are concerned with individual CIPRO Pay Items and are developed early in the cost estimating process, Section 3 does not directly involve CIPRO Pay Items. Consequently, completion of Section 3 of the *Cost Estimate Backup* spreadsheet is one of the last activities performed. Section 3 documents costs associated with two project expenses that are added to the ‘MSD Construction Estimate’ to obtain the ‘Project Total’ cost. The first of these expenses, ‘Contingencies’, is basically a cost “safety factor” included in the ‘Project Total’ cost, typically 10 percent of the ‘MSD Construction Estimate’ total. The second of these expenses, ‘MSD Engineering, Legal, and Administration’, is calculated separately on the *Engineering Cost Breakdown* spreadsheet (see Part III of these guidelines). Any supporting information or calculations relative to information presented on the *Engineering Cost Breakdown* spreadsheet should be documented in Section 3 of the *Cost Estimate Backup* spreadsheet.

C. EARTHWORK SPREADSHEET

Some of the Pay Item quantities that are presented on the *Cost Estimate Backup* spreadsheet typically utilize more extensive tabulations than afforded by that spreadsheet. For these generally more detailed computations that are based on numerous stationing and profile values along the project alignment, the quantities presented in the *Cost Estimate Backup* spreadsheet are supported by the *Earthwork* spreadsheet. The *Earthwork* spreadsheet is prepared by the Engineer to develop quantities such as linear feet of manhole and cubic yards of excavation, backfill, or encasement. An *Earthwork* spreadsheet example is included as Attachment 2⁵. This example is available electronically in the aforementioned *Forms, Templates, and Tools* folder on the Jacobs network and can be used as a starting template. The Engineer should copy this spreadsheet, or a completed spreadsheet from a similar preliminary study that employs the format of Attachment 2, into the study project’s 810.##### ANALYSIS folder in conjunction with the associated *Cost Estimate Backup* spreadsheet.

⁵ As in a real preliminary study cost estimate, the example *Earthwork* spreadsheet included in these guidelines as Attachment 2 is the basis for certain of the Pay Item quantities presented in the example *Cost Estimate Backup* spreadsheet, i.e. Attachment 1.

**Preliminary Studies:
Cost Estimate Guidelines (continued)**

The *Earthwork* spreadsheet is utilized in cost estimates for open trench sewer replacement projects, but may not be necessary for projects that do not involve extensive excavation or manhole construction. The *Earthwork* spreadsheet consists of six different worksheets: Earthwork Quantities, Manhole Quantities, Profile Data, Pipe Quantities, Payline Width, and Profile Plot. Each of these worksheets is discussed in turn below.

Earthwork Quantities

- The Earthwork Quantities worksheet looks up values on the Profile Data, Pipe Quantities, and Payline Width worksheets to determine volumes of excavation, encasement, granular backfill, and/or compacted backfill that are required for the sewer construction.
- The Engineer needs to input proposed manhole station information and intermediate stationing as desired.
- Engineer needs to revise header information.

Manhole Quantities

- The Manhole Quantities worksheet looks up values on the Profile Data and Pipe Quantities spreadsheets to determine the length of manhole to be constructed for the project.
- The Engineer needs to input proposed manhole station information and any top elevations that differ from associated ground line elevation.
- Engineer needs to revise header information.

Profile Data

- The Profile Data worksheet contains five separate tables: Proposed Sewer, Ground Line, Class A Rock Line, Class B Rock Line, and Existing Invert.
- The Profile Data worksheet is where the Engineer inputs proposed invert, existing invert, existing ground line, and existing rock line elevations into the spreadsheet at associated proposed sewer manhole stations.
- Rock line tables entries are only required if rock excavation will be required to enable construction of proposed sewer
- Existing invert information is only used to prepare Profile Plot. If alignments of existing and proposed sewer are similar, but have different manhole stations, enter existing manhole stations and associated inverts into Existing Invert table. If proposed sewer alignment is significantly different than existing alignment, do not input information into Existing Invert Table.
- Engineer needs to revise header information.

Pipe Quantities

- The Pipe Quantities worksheet is the location where the Engineer inputs the pipe size. It is only necessary to input the pipe size at Station 0+00, any station where the pipe size changes, and the upstream station.
- Engineer needs to revise header information.

**Preliminary Studies:
Cost Estimate Guidelines (continued)**

Payline Width

- No input required by Engineer, except for Header information.
- Provides reference information for payline width and concrete encasement at various pipe sizes for use in other worksheets.

Profile Plot

- The Profile Plot is a graph of the information in the Profile Data worksheet.
- Engineer needs to complete Chart Title.

III. COSTS

This portion of the Cost Estimate Guidelines focuses on providing guidance and direction for development and use of the various cost elements that contribute to the Project Total cost. The bulk of the discussion focuses on the use of the *Engineer's Cost Estimate* spreadsheet and the *Engineering Cost Breakdown* spreadsheet. Following a description of these two cost spreadsheets below, additional considerations associated with cost estimates for I/I removal are reviewed.

A. PRE-CIPRO: ENGINEER'S COST ESTIMATE SPREADSHEET

The *Engineer's Cost Estimate* spreadsheet is prepared by the Engineer to summarize all of the cost items associated with the preliminary study. Each cost item receives a single line, and is numbered sequentially. Attachment 3 presents an example *Engineer's Cost Estimate* spreadsheet that utilizes the same Pay Items and values associated with the representative quantities spreadsheets referenced in Part II. This example is available electronically in the aforementioned *Forms, Templates, and Tools* folder on the Jacobs network and can be used as a starting template. As with the quantities spreadsheets, the Engineer should copy this spreadsheet, or a completed spreadsheet from a similar preliminary study that employs the format of Attachment 3, into the study project's 810.##### ANALYSIS folder to facilitate presentation of the cost estimate.

The *Engineer's Cost Estimate* spreadsheet consists of three aspects: (1) a brief heading, (2) a listing of Pay Items applicable to the engineering study project, and (3) standard additional cost elements. The heading summarizes key information about the project (name, number, and watershed) and cost estimate process (estimator, checker, and associated dates). The listing of Pay Items corresponds directly to the Pay Items presented in Section 1 of the *Cost Estimate Backup* spreadsheet; in addition to the line number, additional information for each Pay Item includes Pay Item name, estimated quantity, unit of measure, unit price (see following paragraph), and extended price. Below the listing of Pay Items, the following standard additional cost elements are common to the *Engineer's Cost Estimate* spreadsheets for all projects. The spreadsheet sums the extended price for the listed Pay Items to produce a 'Preceding Pay Items Total' that is employed in Section 2 of the *Cost Estimate Backup* spreadsheet to develop 'Mobilization' and 'Protection and Restoration of Site' costs.

**Preliminary Studies:
Cost Estimate Guidelines (continued)**

'Mobilization' is added to the 'Preceding Pay Items Total' to develop the 'Subtotal' cost; 'Utility Relocation' and 'Protection and Restoration of Site' costs are added to the 'Subtotal' to obtain the 'MSD Construction Estimate' cost. Finally 'Contingencies' and 'MSD Engineering, Legal, and Administrative' costs, as discussed in Section 3 of the *Cost Estimate Backup* spreadsheet are added to the 'MSD Construction Estimate' cost to obtain the 'Project Total' cost. Once the cost estimate is finalized, the 'Project Total' from the *Engineer's Cost Estimate* spreadsheet needs to be included in the discussion at the Proposed Solution portion of the report Memorandum.

While most of the information on the *Engineer's Cost Estimate* is pulled from the *Cost Estimate Backup* spreadsheet, unit prices, with only a few exceptions as noted earlier, are obtained from MSD CIPRO tabulations. Presently there are two separate tabulations that the Engineer needs to access to obtain current unit prices for CIPRO Pay Items. The first tabulation that should be looked at is called *CIPRO Pay Items 2006.xls*; arranged alphabetically, it contains recently updated unit costs for approximate one third of the 1,000-plus Pay Items in the CIPRO database. Unit prices for the remaining 680 or so Pay Items are found in *CIPRO Pay Items 2005.xls*; this tabulation is arranged by Category rather than alphabetically. Both tabulations can be found electronically in the *References* folder on the Jacobs network at the following location:

 [P:\ENVIRON\PROJECTS\C5X59900 \(MSD Planning\)\800 DELIV\810 PREL\General](P:\ENVIRON\PROJECTS\C5X59900 (MSD Planning)\800 DELIV\810 PREL\General).

These tabulations include unit prices for use in preliminary study cost estimates and more detailed final design cost estimates; for a given Pay Item, typically the unit price presented for final design cost estimates is slightly lower than the unit price presented for preliminary study cost estimates.⁶ Consequently, in obtaining unit prices for preliminary study cost estimates, the Engineer should use the 'New Preliminary Cost' column for the *CIPRO Pay Items 2006.xls* tabulation and the 'PRE_COST' column for the *CIPRO Pay Items 2005.xls* tabulation.

B. ENGINEERING COST BREAKDOWN SPREADSHEET

The *Engineering Cost Breakdown* spreadsheet is prepared by the Engineer to capture all of the non-constructions costs associated with the proposed project that will be incurred by MSD. Attachment 4 presents an example *Engineering Cost Breakdown* spreadsheet that, where relevant, utilizes information and values associated with the previously described spreadsheets appended as Attachments 1 through 3; in particular, as noted above, Section 3 of the *Cost Estimate Backup* spreadsheet should be used to develop and document any supporting information or calculations associated with results presented on the *Engineering Cost Breakdown* spreadsheet. The *Engineering Cost Breakdown* example is available electronically in the aforementioned *Forms, Templates, and Tools* folder on the Jacobs network and can be used as a starting template. As with previously described spreadsheets, the Engineer should copy this spreadsheet, or a completed spreadsheet from a similar preliminary study that employs the format of Attachment 4, into the study project's *810.##### ANALYSIS* folder to facilitate presentation of the cost estimate.

⁶ The lower unit prices generally associated with final design cost estimates correlate to a lower degree of uncertainty relative to information developed in preliminary engineering studies.

Preliminary Studies: Cost Estimate Guidelines (continued)

The principal purpose of the *Engineering Cost Breakdown* spreadsheet is to determine the 'MSD Engineering, Legal, and Administration' cost. This is accomplished by systematically examining various non-construction expenses common to nearly all projects and identifying additional non-construction costs specific to the proposed project. Consequently, the *Engineering Cost Breakdown* spreadsheet is comprised of four aspects: (1) a brief heading, (2) a listing of common activities/expenses, (3) a listing of project-specific activities/expenses, and (4) standard additional cost elements. The heading summarizes key information about the project (e.g. name, project number, size, estimated construction cost, property impacts, etc.). The listing of common activities and expenses consists of the following six items: 'Strip Map', 'Survey', 'Easements and Legal Preparation', 'Geotechnical', 'Engineering', and 'Construction Services'. The listing of project-specific activities and expenses is grouped on the spreadsheet under the heading 'Other' and may include any of a variety of requirements. The standard additional elements common to the last few rows of the *Engineering Cost Breakdown* spreadsheet for all projects are 'Subtotal', 'Contingencies', 'Total', and 'MSD Engineering, Legal, and Administration Use' costs. Each of these four aspects of the *Engineering Cost Breakdown* spreadsheet is briefly discussed below.

Heading (Project Information)

- The 'MSD Construction Estimate & Contingencies' cost is obtained by summing the 'MSD Construction Estimate' and 'Contingencies' costs presented on the *Engineer's Cost Estimate* spreadsheet.
- The 'Easements Required' is the number of parcels which will require a new easement for the sewer construction. The 'Working Room Required' is the number of parcels which will require additional working room beyond the existing or new easements. The 'Number of Parcels' is a count of the parcels that the new sewer construction will cross through.
- The 'Linear Feet of Working Room/Easements' generally correlates closely to the length of new sewer being installed, as areas where above ground construction are anticipated will require working room or easements.

Common Activities/Expenses (Strip Map, Survey, Easements/Legal, Geotech., Eng'g., & Const. Serv.)

- Strip Map, including easement search (Use survey graph + actual number of parcels impacted @ \$250 each for easement search).
- Survey: Highest of 2.5% of construction cost, or \$4.50 per L.F. Survey costs are impacted by the degree of wooded and brushy areas; for wooded areas, increase by 50%.
- Easements and Legal Preparation: Highest of \$600 per easement, or \$10 per L.F.
- Geotechnical: Assume 1 bore per 250 feet and at least 2 bores per tunnel. The cost is determined by the lengths of normal and difficult access. To determine this consider such factors as trees and fences. Normal access costs \$1,800 per bore. Difficult access costs \$2,000 per bore. Boring usually goes to 10 feet below sewer depth, but the depth of bore is not factored into the cost.
- Engineering: Calculated as a percentage of 'MSD Construction Estimate & Contingencies'. The percentage is determined by the "Lookup Table" worksheet in

**Preliminary Studies:
Cost Estimate Guidelines (continued)**

the Engineering Cost Breakdown spreadsheet, and decreases with increasing project size.

- Construction Services: Use 4% of the ‘MSD Construction Estimate & Contingencies’.

Project-Specific Activities/Expenses (Other)

- Significant non-construction expenses associated with the project that are not captured elsewhere on the cost estimate are to be individually listed under ‘Other’ on the *Engineering Cost Breakdown* spreadsheet.
- If there are no anticipated project-specific, non-construction expenses associated with completing the project, enter “NONE” under other, with an associated cost of \$0.
- Examples of possible project-specific, non-construction requirements that may be associated with the project include the following: flood plain study; private I/I reduction report; pump station design report; U.S. Army Corps of Engineers permit; railroad permit; environmental assessment; archaeological studies; etc.
- Flood plain studies are generally not required for sanitary relief projects, particularly if the work only involves stream crossing(s) with pipe sewer. If improvements involve significant alterations to stream banks or placing fill in the floodplain, then a study may be needed. A typical cost for a flood plain study is \$10,000 to \$15,000.
- For projects where private I/I reduction reports will need to be produced (e.g. for private property I/I control including CSO disconnects), use a unit engineering cost of \$2,000 per any house with defects to allow for preparation of private I/I reduction report and bidding/construction phase activities.
- If a standard pump station design report is needed or recommended prior to project construction, assume \$10,000 as a typical cost.
- If a U.S. Army Corps of Engineers permit will be required to perform certain construction activities, assume \$2,000 as a typical cost.
- If a railroad permit will be required to enable project construction, assume \$5,000 as a typical cost.
- If property acquisition is necessary for completion of the proposed project, particularly in commercial/industrial areas, an environmental site assessment report may be applicable to investigate potential presence of contaminated conditions; associated cost is dependent upon extent of effort anticipated.
- Archaeological studies might be applicable for some projects, and should be costed on a case-by-case basis.
- Three potential activities that are not included in the cost estimate are flow metering, CCTV, and I/I studies (except for the aforementioned private I/I reduction reports). Although recommendations for flow metering, CCTV investigations, and I/I identification may be included in the preliminary study report, MSD has existing contracts that allow for these three services, so the associated expenses are not allocated to individual projects. Nonetheless, as a reminder, any recommendations presented in the report for flow metering, CCTV, and I/I investigations should be coordinated with Josh Hallsten (flow metering) or Steve McConnachie (CCTV and I/I).

**Preliminary Studies:
Cost Estimate Guidelines (continued)**

Standard Additional Cost Elements

- Standard additional cost elements at the bottom of each *Engineering Cost Breakdown* spreadsheet include ‘Subtotal’, ‘Contingencies’, ‘Total’, and ‘MSD Engineering, Legal, and Administration’.
- ‘Subtotal’ is obtained by summing the costs of the seven items (‘Strip Map’, ‘Survey’, ‘Easements and Legal Preparation’, ‘Geotechnical’, ‘Engineering’, ‘Construction Services’, and ‘Other’) described above.
- ‘Contingencies’ is entered as 10% of ‘Subtotal’ and added to ‘Subtotal’ to obtain ‘Total’.
- The final entry is the cost to be used for ‘MSD Engineering, Legal, and Administration’ on the *Engineer’s Cost Estimate* spreadsheet, and should be entered as the ‘Total’ rounded to the nearest \$1,000.

C. PUBLIC AND PRIVATE I/I REMOVAL WORK (SPECIALTY ESTIMATES)

Occasionally, particularly for projects with a separate I/I or rehabilitation component, additional breakdown of costs for specialty portions of the project scope are warranted. These situations require the creation of multiple cost spreadsheets. Preparation of cost estimates for projects where specialty work is required as a component of the overall project is summarized below:

- Specialty portions of the overall project may include 1) public I/I removal work (sewer line rehabilitation work, including CIPP liner and manhole rehabilitation) and 2) private property I/I removal work. The public I/I removal work cost estimate may apply to rehabilitation components of preliminary studies. While specialty work components may apply to any project, they are most typically associated with CSO preliminaries. For a cost estimate that includes specialty work components, see CSO – Claytonia in Appendix H of the Preliminary Studies Guidebook.
- Specialty work requires creation of three or four *Engineer’s Cost Estimate* spreadsheets, specifically an overall project cost estimate⁷, a main sewer contract cost estimate, and one or two specialty work cost estimates⁸. The ‘Project Total’ cost on the overall cost estimate is equal to the sum of the ‘Project Total’ costs on the constituent (i.e. main sewer and specialty) cost estimates.
- In lieu of an *Engineering Cost Breakdown* spreadsheet for the overall project cost estimate, separate *Engineering Cost Breakdown* spreadsheets are prepared for the respective constituent cost estimates. The *Engineering Cost Breakdown* spreadsheets for specialty work are abbreviated versions of the standard *Engineering Cost Breakdown* spreadsheet. Respective ‘MSD, Engineering, Legal, and Administrative’ costs are then summed for inclusion at the associated line on the overall *Engineer’s Cost Estimate* spreadsheet.
- Regardless of the number of cost spreadsheets developed, only one *Cost Estimate Backup* spreadsheet and one *Earthwork* spreadsheet are prepared; information

⁷ For cost estimates that include supporting specialty estimates, only the overall cost estimate will subsequently be entered into the CIPRO database by MSD.

⁸ A separate *Engineer’s Cost Estimate* spreadsheet is provided as necessary for each of the specialty work areas (e.g. a public I/I removal work estimate, a private property I/I removal work estimate, etc.).

**Preliminary Studies:
Cost Estimate Guidelines (continued)**

- presented on these quantities spreadsheets correlates to information presented on the overall *Engineer's Cost Estimate* spreadsheet.
- In developing costs on the constituent estimates for activities such as 'Protection and Restoration of Site', 'MSD, Engineering, Legal, and Administrative', and similar, consider design, bid, and construction phases in determining whether and how to prorate these items.
 - When one or more specialty estimates are prepared, their respective 'Project Total'(s) need to be included in the body of the preliminary study Memorandum report together with the overall 'Project Total' estimate and the main sewer contract 'Project Total' estimate.

Attachment 1

Cost Estimate Backup Spreadsheet

(Example/Template – 14 pages)

Xxx Project Name Xxx
MSD Project Number 200####
Cost Estimate Backup

Line # Pav Item # Pav Item Description

Calculation/Back-Up

4 1351 BYPASS PUMPING

<u>Pipe Size</u>	<u>Length</u>	<u>Installation Rate</u>	<u>Construction Duration (work days)</u>	<u>Calendar Days</u>	<u>Cost/Day</u>	<u>Total Cost</u>
21-inch	970	75 ft/day	12.93	20.69	\$350.00	\$7,243
				rounded	→	\$7,250

Notes: - Assume calendar days = 1.6 * construction duration to account for weekends and weather delays
 - ADD AS NECESSARY TO FURTHER EXPLAIN BACK-UP

(If no notes added, delete this line)
 (If no notes added, delete this line)

Estimating Notes: - Assume installation rate of 50-75 ft/work day for large pipe, depending on conditions and 75-100 ft/work day for small pipe, depending on conditions
 - Cost per day for pump and operation, including labor and piping, depends on size of pipe and sewer. Use \$400/day for 48-inch and larger sewers, \$350/day for medium size sewers (18-42-inch), and \$300/day for small sewers (< 18-inch)
 - Consider standby pump requirement included in above.

→ Delete Estimating Notes When Finished

See Below See Below CHANNEL REINFORCED CONCRETE BOTTOM

5 185 CHANNEL REINFORCED CONCRETE BOTTOM -12 INCH

Assume replacing portion of 18 ft wide channel to 20J4-001S. Say 10' x 10'.
 Assume replacing portion of 18 ft wide channel @ 20J1-147S. Say 6' x 10'.
 16 X 10 = 160 sq. ft. 160/9 = 18 SY. **Say 20 SY**

Estimating Notes: - If thicknes is unknown, use typical concrete slab and wall thickness of 12-inch for drainage channels and similar structures.

→ Delete Estimating Notes When Finished

See Below See Below CHANNEL REINFORCED CONCRETE VERTICAL SIDES

6 82 CHANNEL REINFORCED CONCRETE VERTICAL SIDES -12 INCH

Two sides, each at 10' x 7' high. = 140 sq. ft = approximately 16 SY. **Say 20 SY**

Estimating Notes: - If thicknes is unknown, use typical concrete slab and wall thickness of 12-inch for drainage channels and similar structures.

→ Delete Estimating Notes When Finished

Xxx Project Name Xxx
MSD Project Number 200####
Cost Estimate Backup

<u>Line #</u>	<u>Pay Item #</u>	<u>Pay Item Description</u>	<u>Calculation/Back-Up</u>		
See Below	See Below	CIPP LINER			
			<u>FROM</u>	<u>TO</u>	<u>LENGTH (FT)</u>
7	2467	CIPP LINER - 08 INCH DIAMETER - 06 MM	18L3-043S	18L3-046S	55
			18L3-046S	18L3-044S	80
			18L3-044S	18L3-107S	90
			18L3-032S	18L3-047S	75
			18L3-047S	18L3-040S	235
			18L3-040S	NEW SEWER	260
					795
					SAY 800
			Estimating Notes: <ul style="list-style-type: none"> - CIPP liner rehabilitation extent should be based on CCTV, if available. Additionally, the type of pipe should be considered. Typically all concrete sanitary sewer pipe will need to be lined. The extent of clay pipe rehabilitation depends on condition, as indicated by defects/CCTV map color code. - Identify segment(s), including liner diameter, and length of sewer proposed for receiving CIPP liner. Identify manholes targeted for rehabilitation and associated manhole length. - In selecting appropriate CIPRO Pay Item, use thickest liner available for a given diameter. - For projects that involve less than 2,000 feet of CIPP liner rehabilitation, increase the CIPRO unit cost(s) by a factor of 1.5. Similarly, if the average distance between manholes for the entire lining effort is less than 150 feet, increase CIPRO unit cost(s) by a factor of 1.5. If both of the foregoing factors exist, increase the CIPRO unit cost(s) by a factor of 2.0. - Cost for CIPP liner includes CCTV and lateral reconnection; separate Pay Items are not required for these activities. 		

Delete Estimating Notes
When Finished

See Below	See Below	CLEANING AND TV			
			<u>FROM</u>	<u>TO</u>	<u>LENGTH (FT)</u>
8	2384	CLEANING AND TV 6" - 12" DIAMETER	08J1-123S	08J4-456S	1000
			Estimating Notes: <ul style="list-style-type: none"> - This Pay Item provides for CCTV and Physical Inspection. - Identify segment(s), including pipe diameter, and length of sewer proposed for CCTV. Generally assume light cleaning and utilize latest CIPRO unit costs. If heavy cleaning is deemed to be required, state basis for assumption and adjust unit cost accordingly. Similarly increase unit cost if, as part of the project, CCTV is only proposed for a relatively short amount of sewer. - For sewer separation projects, if the former combined sewer is proposed for use as the sanitary sewer, need to include CCTV inspection of the sewer with the cost estimate. 		

Delete Estimating Notes
When Finished

Xxx Project Name Xxx
MSD Project Number 200####
Cost Estimate Backup

Line # Pav Item # Pav Item Description

Calculation/Back-Up

9 1763 CLEARING

<u>Area Description</u>	<u>Length (ft)</u>	<u>Avg Sewer Depth (ft)</u>	<u>Clearing Width (ft)</u>	<u># of Acres</u>	<u>Cost per Acre</u>	<u>Total Cost</u>
S of Clayton to Litzinger	1000	10	20	0.46	\$10,000	\$4,600
S of Litzinger to Two-Mile Creek	500	15	30	0.34	\$10,000	\$3,400
						\$8,000

Notes: - Assume clearing width equals 2 * Sewer Depth, or a minimum of 20 ft (If no notes added, delete this line)
 - ADD AS NECESSARY TO FURTHER EXPLAIN BACK-UP (If no notes added, delete this line)

Estimating Notes: - Typical corridor width of 20-50 ft, depending on trench depth
 - Typical cost per acre from \$10,000 up to \$20,000, say \$10,000 on larger projects

Delete Estimating Notes When Finished

10 99 CONNECTION TO EXISTING MANHOLE (8" thru 24" Pipe)

<u>MSD Structure No.</u>	<u>Location</u>	<u>Size of Connection</u>
08J1-123S	5 Ranger Road	12-inch

Notes: ADD AS NECESSARY TO FURTHER EXPLAIN BACK-UP (If no notes added, delete this line)

Estimating Notes: Applicable for 8 to 24-inch pipe connections where manhole is not replaced

Delete Estimating Notes When Finished

11 137 CURB AND GUTTER - CONCRETE-REMOVAL AND REPLACEMENT

<u>Area Description</u>	<u>Lineal Feet</u>
Southern Side of Ladue Road between Conwood Dr. and Westwood Dr.	400

Estimating Notes: - Use with asphalt street pavement remove and replace, if curb area of street impacted

Delete Estimating Notes When Finished

Xxx Project Name Xxx
MSD Project Number 200####
Cost Estimate Backup

<u>Line #</u>	<u>Pay Item #</u>	<u>Pay Item Description</u>	<u>Calculation/Back-Up</u>
12	2717	DOWNSPOUT DISCONNECTION	

<u>Street</u>	<u>Houses</u>	<u>Number of Connections</u>
Burr Oak	6	30
Wild Plum	6	30
Peachtree	3	15
Wild Cherry	1	5
Total:		80

Note: Assumes five (5) downspouts connected per house. (If no notes added, delete this line)
Downspout / Area drain connections were based on RJN (I/T consultant) figure. (If no notes added, delete this line)

Estimating Notes:

- Use defects map to determine downspout disconnect defects. On the defects map, where properties are shown to have a suspected defect, particularly where defect flow is high, downspouts can usually be assumed as the suspected defect.
- For each street where downspout disconnection is to be performed as part of the proposed solution, identify the number of properties proposed for downspout disconnection.
- Assume 4 downspout disconnections per property proposed for downspout disconnection if most residential properties in the project area are small (0.25acre); otherwise assume 8 downspout disconnections per property. If downspout disconnections are required at institutions (e.g. schools) or businesses, estimate downspout disconnections for these locations on a case-by-case basis.
- Use latest CIPRO unit cost for straightforward downspout disconnections. For properties where downspout disconnections are expected to require ancillary activities to be performed (e.g. gutter flow direction changes, downspout location changes, piping to curb or grade with possible need to cut sidewalk and curb and/or perform repaving, etc.) adjust unit costs per downspout disconnection and document adjusted unit cost on Cost Estimate Backup spreadsheet. As guidance in determining adjusted unit cost, typically downspout disconnection efforts requiring moderate to extensive ancillary activities to be performed are approximately \$5,000 per property for non-copper construction and \$9,000 per property for existing copper construction.

Delete Estimating Notes
When Finished

See Below	See Below	DUCTILE IRON PIPE	
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



<u>Line #</u>	<u>Pay Item #</u>	<u>Pay Item Description</u>	<u>Calculation/Back-Up</u>										
13	197	DUCTILE IRON PIPE SEWER 24 INCH CLASS 52	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;"><u>Creek Name</u></th> <th style="text-align: center;"><u>Pipe Size</u></th> <th colspan="2" style="text-align: center;"><u>Approximate Station to Station</u></th> <th style="text-align: center;"><u>Length (ft)</u></th> </tr> </thead> <tbody> <tr> <td>Deer</td> <td style="text-align: center;">24-inch</td> <td style="text-align: center;">7+66</td> <td style="text-align: center;">8+65</td> <td style="text-align: center;">99</td> </tr> </tbody> </table> <p>Notes: Used 24-inch DIP in cost estimate, because 21-inch was not available in CIPRO Pay Items. (If no notes added, delete this line) ADD AS NECESSARY TO FURTHER EXPLAIN BACK-UP (If no notes added, delete this line)</p>	<u>Creek Name</u>	<u>Pipe Size</u>	<u>Approximate Station to Station</u>		<u>Length (ft)</u>	Deer	24-inch	7+66	8+65	99
<u>Creek Name</u>	<u>Pipe Size</u>	<u>Approximate Station to Station</u>		<u>Length (ft)</u>									
Deer	24-inch	7+66	8+65	99									

Estimating Notes:

- Use DIP for creek crossings with less than 3 ft of cover, not concrete encasement
- Can use DIP up to 60-inch for crossings, extend DIP 10 ft beyond top of creek bank on each side of creek.
- If a manhole or other structure is within an additional 20 ft, then ductile iron pipe shall be extended to the manhole or structure
- When in doubt, use heaviest class of DIP

Delete Estimating Notes
When Finished

Xxx Project Name Xxx
MSD Project Number 200####
Cost Estimate Backup

<u>Line #</u>	<u>Pav Item #</u>	<u>Pav Item Description</u>	<u>Calculation/Back-Up</u>	
14	9	EXCAVATION CLASS "A"		
			Volume: 676.1 CY	Refer to attached Earthwork spreadsheet
			Notes: ADD AS NECESSARY TO FURTHER EXPLAIN BACK-UP	(If no notes added, delete this line)
			Estimating Notes: - When encountering or assuming rock, use Class "A" unless good basis for Class "B" - North of Highway 40 there tends to be less rock, south of 40 more rock	 Delete Estimating Notes When Finished
15	7	EXCAVATION CLASS "C"		
			Volume: 1064.9 CY	Refer to attached Earthwork spreadsheet
			Notes: ADD AS NECESSARY TO FURTHER EXPLAIN BACK-UP	(If no notes added, delete this line)
			Estimating Notes: - At 25 feet or more depth, pipe in tunnel typically considered cheaper than open cut	 Delete Estimating Notes When Finished
See Below	See Below	FOULWATER DROP		
16	107	FOULWATER DROP - 08 INCH PIPE	<u>MSD Structure No.</u> 08J1-654S	<u>Size of Pipe</u> 8
			Notes: ADD AS NECESSARY TO FURTHER EXPLAIN BACK-UP	(If no notes added, delete this line)
			Estimating Notes: - 15-inch and larger pipes cannot be dropped - Pipes less than 15-inch are allowed up to 2 ft drop within a manhole. Drops of more than 2 ft are not allowed and require an outside foulwater drop	 Delete Estimating Notes When Finished
17	127	GRANULAR BACKFILL		
			Volume: 828.2 CY	Refer to attached Earthwork spreadsheet
			Notes: ADD AS NECESSARY TO FURTHER EXPLAIN BACK-UP	(If no notes added, delete this line)
			Estimating Notes: - Granular backfill for road crossings; no concrete encasment - Use granular backfill under all paved areas, including streets, sidewalks, patios, driveways, and parking lots	 Delete Estimating Notes When Finished
See Below	See Below	JUNCTION CHAMBER - REINFORCED CONCRETE		
18	75	JUNCTION CHAMBER - REINFORCED CONCRETE - SMALL	<u>No.</u> 1	<u>Location</u> Intersection of Deer Creek and Two-Mile Creek Trunk Sewers
			Notes: ADD AS NECESSARY TO FURTHER EXPLAIN BACK-UP	(If no notes added, delete this line)
			Estimating Notes: - Use Junction Chamber - Large for 54-inch or larger pipes - Increase unit price if sewer > 20 ft deep	 Delete Estimating Notes When Finished

Xxx Project Name Xxx
MSD Project Number 200####
Cost Estimate Backup

<u>Line #</u>	<u>Pav Item #</u>	<u>Pav Item Description</u>	<u>Calculation/Back-Up</u>																			
19	1759	MANHOLE COVER SEALS																				
			<table border="0"> <tr> <td style="text-align: center;"><u>Description</u></td> <td style="text-align: center;"><u>Number of Cover Seals</u></td> </tr> <tr> <td>Between STA 2+01 and STA 3+31</td> <td style="text-align: center;">2</td> </tr> </table>	<u>Description</u>	<u>Number of Cover Seals</u>	Between STA 2+01 and STA 3+31	2															
<u>Description</u>	<u>Number of Cover Seals</u>																					
Between STA 2+01 and STA 3+31	2																					
		Estimating Notes:	- Include "Manhole Cover Seal" cost item for manholes located in the floodplain or subject to conditions of overland flooding. This is in addition to raising the manholes 3 feet above grade in flood-prone areas.	Delete Estimating Notes When Finished																		
20	1760	MANHOLE FRAME SEALS																				
			<table border="0"> <tr> <td style="text-align: center;"><u>Description</u></td> <td style="text-align: center;"><u>Number of Frame Seals</u></td> </tr> <tr> <td>Between STA 2+01 and STA 3+31</td> <td style="text-align: center;">2</td> </tr> </table>	<u>Description</u>	<u>Number of Frame Seals</u>	Between STA 2+01 and STA 3+31	2															
<u>Description</u>	<u>Number of Frame Seals</u>																					
Between STA 2+01 and STA 3+31	2																					
		Estimating Notes:	- Include "Manhole Frame Seal" cost item for manholes located in the floodplain or subject to conditions of overland flooding. This is in addition to raising the manholes 3 feet above grade in flood-prone areas.	Delete Estimating Notes When Finished																		
21	1699	MANHOLE REHABILITATION																				
			<table border="0"> <thead> <tr> <th style="text-align: left;"><u>Manhole</u></th> <th style="text-align: left;"><u>Depth (ft)</u></th> </tr> </thead> <tbody> <tr> <td>18L3-043S</td> <td>10.2</td> </tr> <tr> <td>18L3-046S</td> <td>15.6</td> </tr> <tr> <td>18L3-044S</td> <td>14.5</td> </tr> <tr> <td>18L3-032S</td> <td>14.2</td> </tr> <tr> <td>18L3-047S</td> <td>14.5</td> </tr> <tr> <td>18L3-040S</td> <td>12.3</td> </tr> <tr> <td>Total Depth (ft)</td> <td>81.3</td> </tr> <tr> <td>Use:</td> <td>80</td> </tr> </tbody> </table>	<u>Manhole</u>	<u>Depth (ft)</u>	18L3-043S	10.2	18L3-046S	15.6	18L3-044S	14.5	18L3-032S	14.2	18L3-047S	14.5	18L3-040S	12.3	Total Depth (ft)	81.3	Use:	80	
<u>Manhole</u>	<u>Depth (ft)</u>																					
18L3-043S	10.2																					
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18L3-047S	14.5																					
18L3-040S	12.3																					
Total Depth (ft)	81.3																					
Use:	80																					
		Estimating Notes:	- Identify manholes targeted for rehabilitation and associated manhole length.	Delete Estimating Notes When Finished																		
22	52	MANHOLE STANDARD CONSTRUCTION																				
			<table border="0"> <tr> <td>Total Linear Feet:</td> <td>116.6</td> <td>Refer to attached Earthwork spreadsheet</td> </tr> <tr> <td>USE</td> <td>120</td> <td></td> </tr> </table>	Total Linear Feet:	116.6	Refer to attached Earthwork spreadsheet	USE	120														
Total Linear Feet:	116.6	Refer to attached Earthwork spreadsheet																				
USE	120																					
		Notes:	ADD AS NECESSARY TO FURTHER EXPLAIN BACK-UP	(If no notes added, delete this line)																		
		Estimating Notes:	<ul style="list-style-type: none"> - Enter total linear feet of manholes from Earthwork spreadsheet - Replace existing lampholes with manholes. - Raise manholes 3 feet in areas subject to flooding, as practical (e.g., not in a backyard) - Costs of connecting existing lateral sewers to a new manhole are included in new manhole unit costs. Up to a 2 ft drop is allowed within a manhole, without an outside foulwater drop. 15-inch and larger pipes cannot be dropped. 	Delete Estimating Notes When Finished																		

Xxx Project Name Xxx
MSD Project Number 200####
Cost Estimate Backup

<u>Line #</u>	<u>Pav Item #</u>	<u>Pav Item Description</u>	<u>Calculation/Back-Up</u>			
<u>See Below</u>	<u>See Below</u>	PIPE IN TUNNEL				
23	178	PIPE IN TUNNEL 21 INCH	<u>Pipe Size</u> 21-inch	<u>Length (ft)</u> 56	<u>(Station to Station)</u> 2+75 3+31	<u>Location</u> Clayton Road crossing
			Notes: ADD AS NECESSARY TO FURTHER EXPLAIN BACK-UP		(If no notes added, delete this line)	
			Estimating Notes: - Pipe in Tunnel includes Class "C" excavation - Additional cost for class "A" or "B" excavation is based on minimum 48-inch tunnel		Delete Estimating Notes When Finished	
<u>See Below</u>	<u>See Below</u>	PIPE SEWER (SANITARY/COMBINED)				
24	38	PIPE SEWER 21 INCH (SANITARY/COMBINED)	<u>Pipe Size</u> 21-inch	<u>Length (ft)</u> 610	Refer to attached Earthwork spreadsheet	
			Notes: ADD AS NECESSARY TO FURTHER EXPLAIN BACK-UP		(If no notes added, delete this line)	
			Estimating Notes: - Add pipe sizes as needed for project. - For preliminaries, use pipe length from manhole centers; (not reduced for manhole diameter)		Delete Estimating Notes When Finished	
<u>See Below</u>	<u>See Below</u>	REINFORCED CONCRETE PIPE SEWER				
25	16	REINFORCED CONCRETE PIPE SEWER 30 INCH CLASS III	<u>Pipe Size</u> 30-inch Use	<u>Length (ft)</u> 201 200	Refer to attached Earthwork spreadsheet	
			Notes: ADD AS NECESSARY TO FURTHER EXPLAIN BACK-UP		(If no notes added, delete this line)	
			Estimating Notes: - Add pipe sizes as needed for project. - Use Class III pipe		Delete Estimating Notes When Finished	
26	2546	RIP RAP				
			<u>Creek Name</u> Deer Creek	<u>Crossing Location</u> Ladue High School	<u>Pipe Size</u> 21-inch	<u>Length (ft)</u> 50
					<u>Width (ft)</u> 10	<u>Area (SY)</u> 55.6
					Total	55.6
					USE: 60	
			Notes: ADD AS NECESSARY TO FURTHER EXPLAIN BACK-UP		(If no notes added, delete this line)	
			Estimating Notes: - Use rock blanket for creek crossings, from top of each bank; rock blanket ~ 10 feet wide for pipe up to 54-inch, and 15 ft wide for over 54-inch; (grouted rock blanket no longer used) - Rip rap, rather than rock blanket, is applicable for larger streams with high velocities		Delete Estimating Notes When Finished	

Xxx Project Name Xxx
MSD Project Number 200####
Cost Estimate Backup

Line # Pav Item # Pav Item Description

Calculation/Back-Up

30 142 SEEDING

<u>Area Description</u>	<u>Length (ft)</u>	<u>Width (ft)</u>	<u>Area (SY)</u>
Along Creek by Wayside Park	500	20	1111
Cleared area behind Ridgeview Subdivision	300	20	667
			1778
			SAY: 1780

Notes: ADD AS NECESSARY TO FURTHER EXPLAIN BACK-UP

(If no notes added, delete this line)

Estimating Notes: - Seeding in any area that has been cleared. Assume 20 ft payline width

→ [Delete Estimating Notes](#)
[Delete Estimating Notes](#)

31 2653 SEWER SEPARATION / DRIVEWAY DISCONNECT

<u>Address</u>
7730 Burr Oak Ln
7745 Burr Oak Ln
7746 Wild Plum Ln
3 Properties

Notes: ADD AS NECESSARY TO FURTHER EXPLAIN BACK-UP

(If no notes added, delete this line)

Estimating Notes: - Used for driveway or area drain installation or rerouting.
- Identify the address of each required sewer separation/driveway disconnect.

→ [Delete Estimating Notes](#)
[Delete Estimating Notes](#)

32 133 SIDEWALKS & DRIVEWAYS CONCRETE - REMOVE AND REPLACE

<u>Area Description</u>	<u>Width</u>	<u>Length</u>	<u>Area (SY)</u>
Driveway at 2337 Arban	10	12	13.3
Driveway at 2443 Arban	10	12	13.3
			26.6
			SAY: 30

Notes: ADD AS NECESSARY TO FURTHER EXPLAIN BACK-UP

(If no notes added, delete this line)

Estimating Notes: - A single driveway is typically 8-10 ft wide, a double driveway about 16 ft wide
- Replace entire concrete slab
- Assume sidewalk is 4 ft wide

→ [Delete Estimating Notes](#)
[When Finished](#)

Xxx Project Name Xxx
MSD Project Number 200####
Cost Estimate Backup

Line # Pav Item # Pav Item Description

Calculation/Back-Up

33 140 SODDING

Blue Grass... <u>Area Description</u>	<u>Length (ft)</u>	<u>Width (ft)</u>	<u>Area (SY)</u>
Teaberry Drive between Arban and Lodge Pole	500	20	1111
Between homes at 1233 and 1235 Lodge Pole	75	20	167
			1278

SAY: 1280

Notes: ADD AS NECESSARY TO FURTHER EXPLAIN BACK-UP

(If no notes added, delete this line)

Estimating Notes: - Assume 20 ft payline width
 - Sodding only for built-up areas with lawns
 - Zoysia or blue grass based on field visit

→ Delete Estimating Notes
 When Finished

34 134 STREET PAVEMENT - ASPHALTIC CONCRETE REMOVE AND REPLACE

Asphalt... <u>Location</u>	<u>Pipe Size</u>	<u>Payline Width (ft)</u>	<u>Estimate Width (ft)</u>	<u>Length (ft)</u>	<u>Area (SY)</u>
Teaberry Dr. from Arban to Lodge Pole	21-inch	3.25	7.25	400	322.2
Driveway at 2345 Lodge Pole	21-inch	3.25	7.25	30	24.2
					346.4

USE: 350

Notes: ADD AS NECESSARY TO FURTHER EXPLAIN BACK-UP

(If no notes added, delete this line)

Estimating Notes: - Asphalt paving, use payline width plus 2 ft on each side
 - For large quantities of asphalt - streets, driveways, parking lots - unit cost may be reduced by \$5-10/SY
 - Note higher unit cost for asphalt over rigid base, such as concrete or cobblestone streets

→ Delete Estimating Notes
 When Finished

35 131 STREET PAVEMENT - CONCRETE REMOVE AND REPLACE

<u>Area Description</u>	<u>Slab Length (ft)</u>	<u>Slab Width (ft)</u>	<u>Slab Area (SY)</u>	<u>Number of Slabs</u>	<u>Total Area (SY)</u>
Arban from Nancy Anne to Teaberry	15	13	21.7	10	217
Nancy Anne from Lodge Pole to Arban	15	13	21.7	8	173.6
ADD AS NEEDED					0
					390.6

SAY: 390

Notes: ADD AS NECESSARY TO FURTHER EXPLAIN BACK-UP

(If no notes added, delete this line)

Estimating Notes: - Replace entire slabs, joint to joint - say 13-15 ft wide and 12-20 ft long typical
 - Concrete subdivision streets typically have two 13 ft wide slabs, including the rolled curb. If pipe near joints, may have to replace both slabs.

→ Delete Estimating Notes
 When Finished

Xxx Project Name Xxx
MSD Project Number 200####
Cost Estimate Backup

<u>Line #</u>	<u>Pay Item #</u>	<u>Pay Item Description</u>	<u>Calculation/Back-Up</u>			
See Below	See Below	WYES				
			<u>Pipe Size</u>	<u>Street Name/Description</u>	<u>Addresses with Connections</u>	<u>Total Connections</u>
36	179	WYE 06 INCH ON 21 INCH PIPE	21-inch	Arban	2745, 2747, 2751, 2755	4
			21-inch	Teaberry	2333, 2335, 2337, 2339, 2341, 2343	6
				ADD AS NEEDED		<hr/>
						10
37	1969	WYE 06 INCH ON 30 INCH PIPE	30-inch	Lodge Pole	2357, 2359	2
				ADD AS NEEDED		<hr/>
						2

Notes: ADD AS NECESSARY TO FURTHER EXPLAIN BACK-UP

(If no notes added, delete this line)

- Estimating Notes:
- Use 6-inch wye for house connections, the unit cost includes excavation
 - Use 6 or 8-inch for apartments and commercial customers
 - Ignore pipe lengths for short lateral connections (5-10 ft) at prelim stage

→ Delete Estimating Notes
When Finished

END OF PRECEDING PAY ITEMS TOTAL SECTION

- DELETE ITEMS LISTED BUT NOT APPLICABLE TO PROJECT
- INSERT ADDITIONAL PAY ITEMS ALPHABETICALLY AS NEEDED
- NUMBER PAY ITEMS TO CORRESPOND TO CIPRO COST SPREADSHEET

→ Delete this text after making necessary adjustments

Xxx Project Name Xxx
MSD Project Number 200####
Cost Estimate Backup

Line # Pay Item # Pay Item Description

Calculation/Back-Up

SECTION 3 ADDITIONAL ITEMS CONTRIBUTING TO PROJECT TOTAL COST
(PROJECT TOTAL = MSD CONSTRUCTION ESTIMATE TOTAL+CONTINGENCIES + MSD ENGINEERING, LEGAL, AND ADMINISTRATION)

CONTINGENCIES

10% of MSD Construction Estimate Total

Estimating Notes: Standard MSD % for Preliminaries

→ Delete Estimating Notes
When Finished

MSD ENGINEERING, LEGAL, AND ADMINISTRATION

See Engineering Cost Breakdown Spreadsheet

Private I/I Reduction Report

<u># of Homes</u>	<u>Hr./Home</u>	<u>\$/Hr.</u>	<u>Total</u>
29	20	\$100	\$58,000

Estimating Notes: - MSD will prepare further breakdown as needed.
 - Flood Plain Studies Included in this Item

→ Delete Estimating Notes
When Finished

Attachment 2

Earthwork Spreadsheet
(Example/Template – 6 pages)

SEWER DATA		PROFILE DATA				EXCAVATION			CONCRETE ENCASE- MENT	GRANULAR BACKFILL	COMPACTED BACKFILL
STATION	UPSTREAM PIPE SIZE	PROPOSED INVERT ELEVATION	GROUND LINE ELEVATION	CLASS A ROCK ELEVATION	CLASS B ROCK ELEVATION	CLASS A	CLASS B	CLASS C	VOLUME	VOLUME	VOLUME
(FEET)	(INCHES)	(FEET)	(FEET)	(FEET)	(FEET)	(CU. YD.)	(CU. YD.)	(CU. YD.)	(CU. YD.)	(CU. YD.)	(CU. YD.)
0+00	30	532.51	543.98	537.50							
1+20	30	533.43	546.36	537.50		93.6		139.2			
2+01	21	534.06	548.13	537.50		48.3		106.1		115.6	
2+40	21	534.17	548.24	537.20		17.8		50.9		54.4	
2+70	21	534.26	548.33	536.97		12.4		40.4			
2+75	21	534.28	548.34	536.93		2.0		6.9		7.0	
Pipe In Tunnel											
3+31	21	534.45	548.50	536.50							
5+59	21	535.13	548.83	539.00		96.7		299.6		312.8	
6+59	21	535.43	550.39	539.97		57.4		121.9		142.6	
7+66	21	535.75	552.05	541.00		70.3		138.3			
8+65	21	536.05	553.30	549.00		115.2		91.5			
9+66	21	536.35	556.27	549.00		162.5		70.3		195.8	
TOTALS						676.1	0.0	1064.9	0.0	828.2	0.0

STATION	DOWNSTREAM PIPE SIZE	PROPOSED INVERT ELEVATION	TOP ELEVATION	TOP OF BOTTOM SECTION	LENGTH OF MANHOLE
(FEET)	(INCHES)	(FEET)	(FEET)	(FEET)	(FEET)
0+00	30	532.51	543.98	536.01	8.0
1+20	30	533.43	546.36	536.93	9.4
2+01	30	534.06	552.00	537.56	14.4
3+31	21	534.45	552.00		17.6
5+59	21	535.13	548.83		13.7
7+66	21	535.75	552.05		16.3
8+65	21	536.05	553.30		17.3
9+66	21	536.35	556.27		19.9
				TOTAL	116.6

Manholes Raised 3 feet in flood areas.

PROPOSED SEWER		
MANHOLE STATION	INVERT ELEVATION	SLOPE
0+00	532.51	0.007711443
1+20	533.43	0.007711443
2+01	534.06	0.003
3+31	534.45	0.003
5+59	535.13	0.003
7+66	535.75	0.003
8+65	536.05	0.003
9+66	536.35	

EXISTING INVERT	
Station	Elevation
0+00	532.51
1+20	533.47
2+01	534.2
4+96	534.86
5+63	534.9
7+70	535.43
8+69	535.65
9+70	536.35

GROUND LINE		
STATION	GROUND LINE ELEVATION	SLOPE
0+00	543.98	0.019833333
1+20	546.36	0.021851852
2+01	548.13	0.002846154
3+31	548.50	0.001447368
5+59	548.83	0.015555556
7+66	552.05	0.012626263
8+65	553.30	0.029405941
9+66	556.27	

CLASS A ROCK LINE		
STATION	ROCK LINE ELEVATION	SLOPE
0+00	537.5	0
1+20	537.5	0
2+01	537.5	-0.007692308
3+31	536.5	0.010964912
5+59	539	0.009661836
7+66	541	0.080808081
8+65	549	0
9+66	549	

Rock line elevations taken from "As-Builts" for City of Glendale Sanitary Sewer System, February 1936.

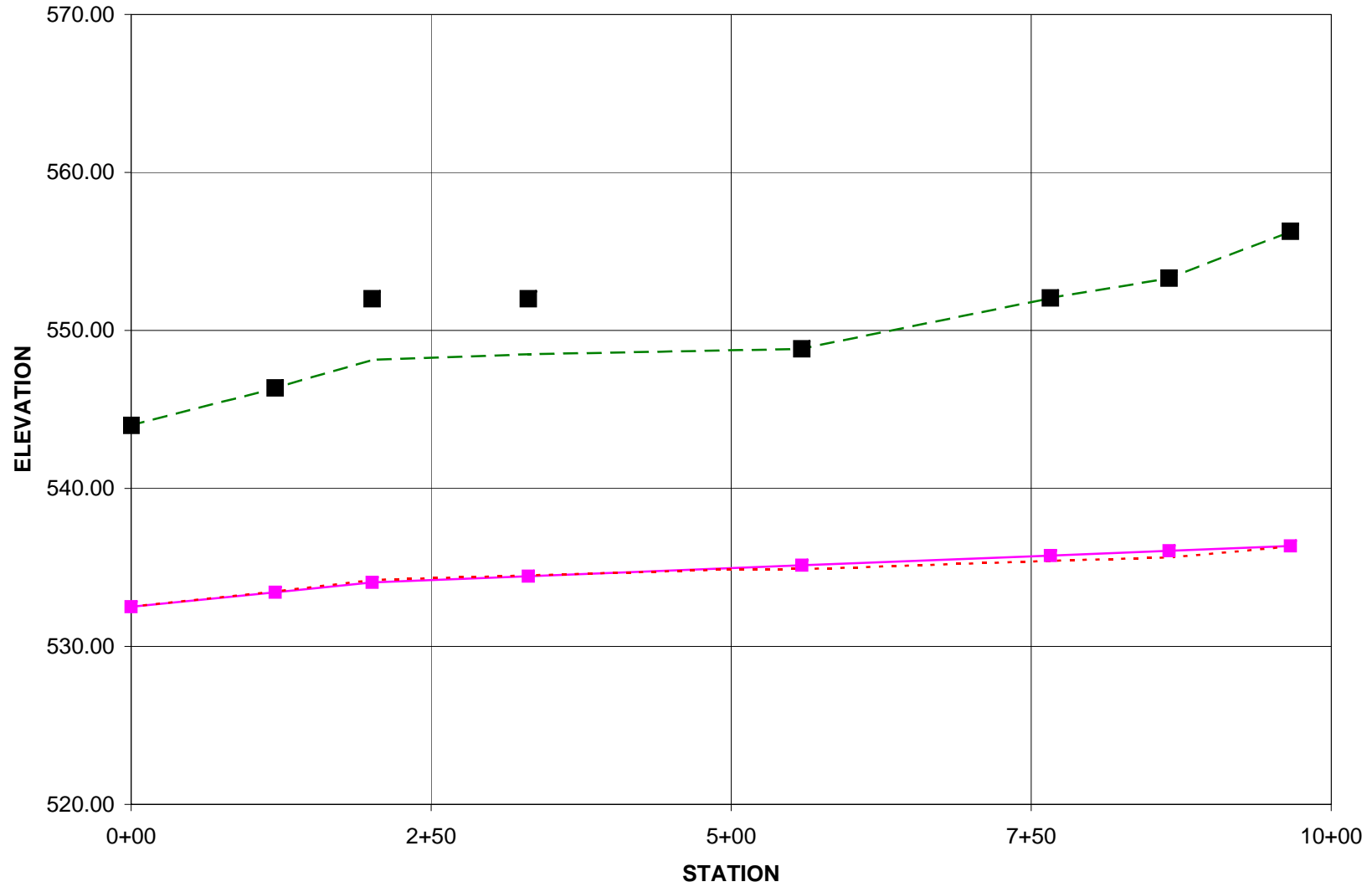
CLASS B ROCK LINE		
STATION	ROCK LINE ELEVATION	SLOPE
0		

PIPE SIZES	
STATION (FEET)	UPSTREAM PIPE SIZE (INCHES)
0+00	30
2+01	21
9+66	21

21-inch Pipe-in-Tunnel from 2+75 to 3+31
21-inch DIP from 7+66 to 8+65
30-inch RCP Sewer from 0+00 to 2+01

Pipe Type	Length (ft)
21-inch Pipe Sewer	610
21-inch DIP	99
21-inch Pipe in Tunnel	56
30-inch RCP	201

PIPE SIZE	PAYLINE WIDTH	CONCRETE ENCASEMENT
4	2.50	3.28
6	2.50	3.59
8	2.50	3.87
10	2.50	4.09
12	2.50	4.25
15	3.00	5.55
18	3.00	5.77
21	3.25	6.61
24	3.50	7.39
27	3.75	8.18
30	4.08	9.30
33	4.42	10.53
36	4.67	11.43
42	5.25	13.38
48	5.83	15.68
54	6.42	18.13
60	7.00	20.73
66	7.58	23.47
72	8.17	26.36
78	8.75	29.39
84	9.33	32.57
90	9.92	35.90
96	10.50	39.37
102	11.08	42.99
108	11.67	46.75
114	12.25	50.66
120	12.83	54.72
126	13.42	58.92
132	14.00	63.27
144	15.17	72.40



--- GROUND LINE —■— PROPOSED INVERT ■ MH TOPS -.-.- EXISTING INVERT

Attachment 3

Pre-CIPRO: Engineer's Cost Estimate Spreadsheet
(Example/Template – 1 page)

Pre-CIPRO: Engineer's Cost Estimate

Project: Xxx Project Number Xxx	Watershed: Xxx Watershed Name Xxx
Number: 200####	Date: Month ##, 200#
Estimated By: Jacobs	Date:
Checked By:	

Line #	Pay-Item Description	Estimated Quantity	Unit	Unit Price	Extended Price
1	ABANDONMENT - PIPE FILL	60	CY	\$205	\$12,300
2	ABANDONMENT - STRUCTURE	4	EA	\$1,200	\$4,800
3	BOTTOM SECT. OF MANHOLE-27" PIPE - 36" PIPE	3	EA	\$1,800	\$5,400
4	BYPASS PUMPING	1	LS	\$7,250	\$7,250
5	CHANNEL REINFORCED CONCRETE BOTTOM 12 INCH	20	SY	\$130	\$2,600
6	CHANNEL REINFORCED CONCRETE VERTICAL SIDES 12 INC	20	SY	\$215	\$4,300
7	CIPP LINER - 08 INCH DIAMETER - 06 MM	800	LF	\$40	\$32,000
8	CLEANING AND TV 6" - 12" DIA.	1000	LF	\$3	\$3,000
9	CLEARING	1	LS	\$8,000	\$8,000
10	CONNECTION TO EXISTING MANHOLE (8" THRU 24" PIPE)	1	PL	\$950	\$950
11	CURB AND GUTTER - CONCRETE - REM. & REPL.	400	LF	\$45	\$18,000
12	DOWNSPOUT DISCONNECTION	80	EA	\$225	\$18,000
13	DUCTILE IRON PIPE SEWER 24 INCH CLASS 52	99	LF	\$270	\$26,730
14	EXCAVATION CLASS "A"	676	CY	\$180	\$121,680
15	EXCAVATION CLASS "C"	1065	CY	\$16	\$17,040
16	FOULWATER DROP - 08 INCH PIPE	1	EA	\$1,000	\$1,000
17	GRANULAR BACKFILL	828	CY	\$39	\$32,292
18	JUNCTION CHAMBER - REINFORCED CONCRETE - SMALL	1	EA	\$9,200	\$9,200
19	MANHOLE COVER SEALS	2	EA	\$155	\$310
20	MANHOLE FRAME SEALS	2	EA	\$385	\$770
21	MANHOLE REHABILITATION	80	LF	\$290	\$23,200
22	MANHOLE - STANDARD CONSTRUCTION	120	LF	\$210	\$25,200
23	PIPE IN TUNNEL 21 INCH	56	LF	\$850	\$47,600
24	PIPE SEWER 21 INCH (SANITARY/COMBINED)	610	LF	\$120	\$73,200
25	REINFORCED CONCRETE PIPE SEWER 30 INCH CLASS III	200	LF	\$91	\$18,200
26	RIP RAP	60	SY	\$50	\$3,000
27	ROCK BLANKET	55	SY	\$56	\$3,080
28	SANITARY LATERAL, 6"	150	LF	\$55	\$8,250
29	SANITARY SEWER CLEANOUT	4	EA	\$265	\$1,060
30	SEEDING	1780	SY	\$2	\$3,560
31	SEWER SEPARATION / DRIVEWAY DISCONNECT	3	EA	\$15,000	\$45,000
32	SIDEWALKS & DRIVEWAYS CONCRETE- REM. AND REP.	30	SY	\$67	\$2,010
33	SODDING - BLUEGRASS	1280	SY	\$8	\$10,240
34	STREET PAVEMENT - ASPHALTIC CONCRETE - REM. & REP.	350	SY	\$72	\$25,200
35	STREET PAVEMENT - CONCRETE - REM. & REP.	390	SY	\$73	\$28,470
36	WYE 06 INCH ON 21 INCH PIPE	10	EA	\$800	\$8,000
37	WYE 06 INCH ON 30 INCH PIPE	2	EA	\$800	\$1,600
38	Preceding Pay Items Total:				\$652,492
39	MOBILIZATION	1	LS	\$26,100	\$26,100
40	Subtotal:				\$678,592
41	UTILITY RELOCATION				\$75,500
42	PROTECTION AND RESTORATION OF SITE				\$91,908
43	MSD Construction Estimate:				\$846,000
44	Contingencies				\$84,600
45	MSD Engineering, Legal, And Administration				\$267,000
	Project Total:				<u>\$1,198,000</u>

MSD CONSTRUCTION ESTIMATE & CONTINGENCIES: \$930,600

Attachment 4

Engineering Cost Breakdown Spreadsheet

(Example/Template – 1 page)

XXXPROJECT NAME XXX
MSD PROJECT 200####
ENGINEERING COST BREAKDOWN

MSD CONSTRUCTION ESTIMATE & CONTINGENCIES:	\$930,600	
TOTAL FOOTAGE:	966	
EASEMENTS REQUIRED:	1	
WORKING ROOM REQUIRED:	10	
NUMBER OF PARCELS:	10	
LINEAR FEET OF WORKING ROOM/EASEMENTS:	966	
STRIP MAP		\$10,048
COST FROM SURVEY GRAPH:	\$7,547.94	
EASEMENT SEARCH:	\$2,500.00	
COST PER PARCEL:	\$250.00	
SURVEY		\$23,265
PER CONSTRUCTION COST:	\$23,264.99	
PERCENTAGE:	2.50%	
PER PROJECT LENGTH:	\$4,347.00	
COST PER FOOT:	\$4.50	
EASEMENTS AND LEGAL PREPARATION		\$9,660
PER EASEMENT:	\$6,600.00	
COST PER EASEMENT:	\$600.00	
PER PROJECT LENGTH:	\$9,660.00	
COST PER ESMT. FOOT:	\$10.00	
GEOTECHNICAL		\$9,600
FEET PER BORING:	250	
NORMAL ACCESS:	\$3,600.00	
LENGTH OF NORMAL ACCESS:	616	
COST PER BORING:	\$1,800.00	
TUNNELS:	0	
DIFFICULT ACCESS:	\$6,000.00	
LENGTH OF DIFFICULT ACCESS:	350	
COST PER BORING:	\$2,000.00	
TUNNELS:	1	
ENGINEERING		\$95,213
PERCENTAGE OF CONSTRUCTION COST:	10.23%	
CONSTRUCTION SERVICES		\$37,224
PERCENTAGE OF CONSTRUCTION COST:	4.00%	
OTHER		\$58,000
PRIVATE I/I REDUCTION REPORT:	\$58,000	
SUBTOTAL		\$243,010
CONTINGENCIES		\$24,301
PERCENTAGE OF SUBTOTAL:	10.00%	
TOTAL		\$267,311

MSD ENGINEERING, LEGAL, AND ADMINISTRATION	USE:	\$267,000
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Attachment 5

Alphabetical Listing of CIPRO Pay Items
(16 pages)

ALPHABETICAL LISTING OF CIPRO PAY ITEMS

PAY ITEM #	Category	Description	Unit
1998	19	06 INCH HOUSE LATERAL	LF
2272	19	10" DIA. * 6 MM 500' +	LF
2269	19	10" DIA. * 6 MM LESS 149'	LF
2270	19	10" DIA. * 6 MM LESS 299'	LF
2271	19	10" DIA. * 6 MM LESS 499'	LF
2276	19	10" DIA. * 7.5 MM 500' +	LF
2273	19	10" DIA. * 7.5 MM LESS 149'	LF
2274	19	10" DIA. * 7.5 MM LESS 299'	LF
2275	19	10" DIA. * 7.5 MM LESS 499'	LF
1905	15	10'W GRAVEL ACCESS DRIVE (2" OF 2"MINUS ON 6" OF 2" CLEAN)	SY
2465	15	12 HR STORAGE	LS
2280	19	12" DIA. * 6 MM 500' +	LF
2277	19	12" DIA. * 6 MM LESS 149'	LF
2278	19	12" DIA. * 6 MM LESS 299'	LF
2279	19	12" DIA. * 6 MM LESS 499'	LF
2284	19	12" DIA. * 7.5 MM 500' +	LF
2281	19	12" DIA. * 7.5 MM LESS 149'	LF
2282	19	12" DIA. * 7.5 MM LESS 299'	LF
2283	19	12" DIA. * 7.5 MM LESS 499'	LF
2296	19	15" DIA. * 10.5 MM 500' +	LF
2293	19	15" DIA. * 10.5 MM LESS 149'	LF
2294	19	15" DIA. * 10.5 MM LESS 299'	LF
2295	19	15" DIA. * 10.5 MM LESS 499'	LF
2288	19	15" DIA. * 7.5 MM 500' +	LF
2285	19	15" DIA. * 7.5 MM LESS 149'	LF
2286	19	15" DIA. * 7.5 MM LESS 299'	LF
2287	19	15" DIA. * 7.5 MM LESS 499'	LF
2292	19	15" DIA. * 9 MM 500' +	LF
2289	19	15" DIA. * 9 MM LESS 149'	LF
2290	19	15" DIA. * 9 MM LESS 299'	LF
2291	19	15" DIA. * 9 MM LESS 499'	LF
2304	19	18" DIA. * 10.5 MM 500' +	LF
2301	19	18" DIA. * 10.5 MM LESS 149'	LF
2302	19	18" DIA. * 10.5 MM LESS 299'	LF
2303	19	18" DIA. * 10.5 MM LESS 499'	LF
2308	19	18" DIA. * 12 MM 500' +	LF
2305	19	18" DIA. * 12 MM LESS 149'	LF
2306	19	18" DIA. * 12 MM LESS 299'	LF
2307	19	18" DIA. * 12 MM LESS 499'	LF
2300	19	18" DIA. * 9 MM 500' +	LF
2297	19	18" DIA. * 9 MM LESS 149'	LF
2298	19	18" DIA. * 9 MM LESS 299'	LF
2299	19	18" DIA. * 9 MM LESS 499'	LF
2372	19	2' X 3' BRICK *12 MM 500' +	LF
2370	19	2' X 3' BRICK *12 MM LESS 299'	LF
2369	19	2' X 3' BRICK *12MM LESS 149'	LF
2371	19	2' X 3' BRICK *12MM LESS 499'	LF
2376	19	2' X 3' BRICK *15 MM 500' +	LF
2373	19	2' X 3' BRICK *15 MM LESS 149'	LF
2374	19	2' X 3' BRICK *15 MM LESS 299'	LF
2375	19	2' X 3' BRICK *15 MM LESS 499'	LF
2380	19	2' X 3' BRICK *18 MM 500' +	LF
2377	19	2' X 3' BRICK *18 MM LESS 149'	LF
2378	19	2' X 3' BRICK *18 MM LESS 299'	LF
2379	19	2' X 3' BRICK *18 MM LESS 499'	LF
2316	19	21" DIA. * 10.5 MM 500' +	LF
2314	19	21" DIA. * 10.5 MM LESS 299'	LF
2315	19	21" DIA. * 10.5 MM LESS 499'	LF
2320	19	21" DIA. * 12 MM 500' +	LF
2317	19	21" DIA. * 12 MM LESS 149'	LF
2318	19	21" DIA. * 12 MM LESS 299'	LF
2319	19	21" DIA. * 12 MM LESS 499'	LF

ALPHABETICAL LISTING OF CIPRO PAY ITEMS

PAY_ ITEM #	Cate-gory	Description	Unit
2312	19	21" DIA. * 9 MM 500' +	LF
2309	19	21" DIA. * 9 MM LESS 149'	LF
2313	19	21" DIA. * 9 MM LESS 149'	LF
2310	19	21" DIA. * 9 MM LESS 299'	LF
2311	19	21" DIA. * 9 MM LESS 499'	LF
2103	15	24 HR STORAGE	LS
2328	19	24" DIA. * 10.5 MM 500' +	LF
2325	19	24" DIA. * 10.5 MM LESS 149'	LF
2326	19	24" DIA. * 10.5 MM LESS 299'	LF
2327	19	24" DIA. * 10.5 MM LESS 499'	LF
2332	19	24" DIA. * 12 MM 500'+	LF
2329	19	24" DIA. * 12 MM LESS 149'	LF
2330	19	24" DIA. * 12 MM LESS 299'	LF
2331	19	24" DIA. * 12 MM LESS 499'	LF
2324	19	24" DIA. * 9 MM 500' +	LF
2321	19	24" DIA. * 9 MM LESS 149'	LF
2322	19	24" DIA. * 9 MM LESS 299'	LF
2323	19	24" DIA. * 9 MM LESS 499'	LF
2336	19	27" DIA. * 10.5 MM 500' +	LF
2333	19	27" DIA. * 10.5 MM LESS 149'	LF
2334	19	27" DIA. * 10.5 MM LESS 299'	LF
2335	19	27" DIA. * 10.5 MM LESS 499'	LF
2340	19	27" DIA. * 12 MM 500' +	LF
2337	19	27" DIA. * 12 MM LESS 149'	LF
2338	19	27" DIA. * 12 MM LESS 299'	LF
2339	19	27" DIA. * 12 MM LESS 499'	LF
2344	19	27" DIA. * 15 MM 500' +	LF
2341	19	27" DIA. * 15 MM LESS 149'	LF
2342	19	27" DIA. * 15 MM LESS 299'	LF
2343	19	27" DIA. * 15 MM LESS 499'	LF
2348	19	30" DIA. * 12 MM 500' +	LF
2345	19	30" DIA. * 12 MM LESS 149'	LF
2346	19	30" DIA. * 12 MM LESS 299'	LF
2347	19	30" DIA. * 12 MM LESS 499'	LF
2352	19	30" DIA. * 15 MM 500' +	LF
2349	19	30" DIA. * 15 MM LESS 149'	LF
2350	19	30" DIA. * 15 MM LESS 299'	LF
2351	19	30" DIA. * 15 MM LESS 499'	LF
2356	19	30" DIA. * 18 MM 500' +	LF
2353	19	30" DIA. * 18 MM LESS 149'	LF
2354	19	30" DIA. * 18 MM LESS 299'	LF
2355	19	30" DIA. * 18 MM LESS 499'	LF
2357	19	36" DIA. * 15 MM LESS 149'	LF
2358	19	36" DIA. * 15 MM LESS 299'	LF
2360	19	36" DIA. *15 MM 500' +	LF
2359	19	36" DIA. *15 MM LESS 499'	LF
2364	19	36" DIA. *18 MM 500' +	LF
2361	19	36" DIA. *18 MM LESS 149'	LF
2362	19	36" DIA. *18 MM LESS 299'	LF
2363	19	36" DIA. *18 MM LESS 499'	LF
2368	19	36" DIA. *21 MM 500' +	LF
2365	19	36" DIA. *21 MM LESS 149'	LF
2366	19	36" DIA. *21 MM LESS 299'	LF
2367	19	36" DIA. *21 MM LESS 499'	LF
2158	17	48 INCH DIVERSION SEWER	LS
2471	15	6 HR STORAGE	LS
2257	19	6" DIA. *4.5 MM LESS 149'	LF
2258	19	6" DIA. *4.5 MM LESS 299'	LF
2259	19	6" DIA. *4.5 MM LESS 499'	LF
2260	19	6" DIA. * 4.5 MM 500' +	LF
2016	19	6" LATERAL EXTENSION	LF
2442	19	6" SEWER LATERAL	LF
2264	19	8" DIA. * 6 MM 500' +	LF
2263	19	8" DIA. * 6 MM LESS 499'	LF

ALPHABETICAL LISTING OF CIPRO PAY ITEMS

PAY_ ITEM #	Category	Description	Unit
2268	19	8" DIA. * 7.5 MM 500' +	LF
2265	19	8" DIA. * 7.5 MM LESS 149'	LF
2266	19	8" DIA. * 7.5 MM LESS 299'	LF
2267	19	8" DIA. * 7.5 MM LESS 499'	LF
2261	19	8" DIA. *6 MM LESS 149'	LF
2262	19	8" DIA. *6 MM LESS 299'	LF
122	14	ABANDONMENT - PIPE FILL	CY
1769	15	ABANDONMENT - PUMP STATION	EA
1707	15	ABANDONMENT - SEPTIC TANK	EA
123	14	ABANDONMENT - STRUCTURE	EA
1868	15	ABANDONMENT - WASTEWATER TREATMENT PLANT	LS
1889	15	ABANDONMENT OF 6" PVC AND YARD DRAIN	LS
2487	17	ABANDONMENT OF LATERALS (TYPE "LA" REPAIR)	EA
2249	17	ABNER AT ST LOUIS	EA
2433	17	ACCESS STRUCTURE	LS
124	01	ADDITIONAL FILL	CY
2444	17	ADJUST TO GRADE	EA
2630	15	AERIAL CROSSING/TUBE STEEL ASSEMBLY	LS
1959	07	AIR RELEASE VALVE	EA
2674	10	AJAX - 24" (INSTALLED)	EA
2667	08	ANCHORED CHANNEL SLAB (TYPE I)	SY
2668	08	ANCHORED CHANNEL SLAB (TYPE II)	SY
2250	17	ARLINGTON SOUTH OF ST LOUIS AVE	EA
1930	13	ASPHALTIC CONCRETE	SY
2490	10	BANK PROTECTION - BIOSTABILIZATION	SY
2504	13	BASE COURSE	SY
2255	17	BELT AVE NORTH OF ASHLAND	EA
2252	17	BELT AVE SOUTH OF ST LOUIS AVE	EA
2141	15	BENTONITE PLUG	PL
2126	19	BERM	LS
2430	17	BONDING AGENT	SF
2654	12	BOTTOM SECT. MANHOLE - 90 INCH PIPE	EA
2636	12	BOTTOM SECT. OF MANHOLE - 144 INCH PIPE	EA
54	12	BOTTOM SECT. OF MANHOLE-27" PIPE - 36" PIPE	EA
55	12	BOTTOM SECT. OF MANHOLE-42 INCH PIPE	EA
56	12	BOTTOM SECT. OF MANHOLE-48 INCH PIPE	EA
57	12	BOTTOM SECT. OF MANHOLE-54 INCH PIPE	EA
58	12	BOTTOM SECT. OF MANHOLE-60 INCH PIPE	EA
59	12	BOTTOM SECT. OF MANHOLE-66 INCH PIPE	EA
60	12	BOTTOM SECT. OF MANHOLE-72 INCH PIPE	EA
61	12	BOTTOM SECT. OF MANHOLE-78 INCH PIPE	EA
62	12	BOTTOM SECT. OF MANHOLE-84 INCH PIPE	EA
2712	12	BOTTOM SECT. OF MANHOLE-90 INCH PIPE	LF
177	11	BOX CULVERT - REINF. CONCRETE 03 FT. X 03 FT.	LF
176	11	BOX CULVERT - REINF. CONCRETE 04 FT. X 03 FT.	LF
187	11	BOX CULVERT - REINF. CONCRETE 04 FT. X 04 FT.	LF
182	11	BOX CULVERT - REINF. CONCRETE 05 FT. X 03 FT.	LF
74	11	BOX CULVERT - REINF. CONCRETE 05 FT. X 04 FT.	LF
245	11	BOX CULVERT - REINF. CONCRETE 05 FT. X 05 FT.	LF
213	11	BOX CULVERT - REINF. CONCRETE 06 FT. X 03 FT.	LF
189	11	BOX CULVERT - REINF. CONCRETE 06 FT. X 04 FT.	LF
222	11	BOX CULVERT - REINF. CONCRETE 06 FT. X 05 FT.	LF
188	11	BOX CULVERT - REINF. CONCRETE 06 FT. X 06 FT.	LF
2598	11	BOX CULVERT - REINF. CONCRETE 07 FT. X 03 FT.	LF
800	11	BOX CULVERT - REINF. CONCRETE 07 FT. X 04 FT.	LF
206	11	BOX CULVERT - REINF. CONCRETE 07 FT. X 05 FT.	LF
175	11	BOX CULVERT - REINF. CONCRETE 07 FT. X 06 FT.	LF
2072	11	BOX CULVERT - REINF. CONCRETE 08 FT. X 03 FT.	LF
203	11	BOX CULVERT - REINF. CONCRETE 08 FT. X 04 FT.	LF
226	11	BOX CULVERT - REINF. CONCRETE 08 FT. X 05 FT.	LF
801	11	BOX CULVERT - REINF. CONCRETE 08 FT. X 06 FT.	LF
191	11	BOX CULVERT - REINF. CONCRETE 08 FT. X 07 FT.	LF
1988	11	BOX CULVERT - REINF. CONCRETE 08.5 FT. X 04 FT.	LF
201	11	BOX CULVERT - REINF. CONCRETE 09 FT. X 06 FT.	LF

ALPHABETICAL LISTING OF CIPRO PAY ITEMS

PAY_ ITEM #	Category	Description	Unit
215	11	BOX CULVERT - REINF. CONCRETE 09 FT. X 07 FT.	LF
2161	11	BOX CULVERT - REINF. CONCRETE 09 FT. X 08FT.	LF
2464	11	BOX CULVERT - REINF. CONCRETE 10 FT. X 04 FT.	LF
181	11	BOX CULVERT - REINF. CONCRETE 10 FT. X 05 FT.	LF
170	11	BOX CULVERT - REINF. CONCRETE 10 FT. X 06 FT.	LF
209	11	BOX CULVERT - REINF. CONCRETE 10 FT. X 07 FT.	LF
224	11	BOX CULVERT - REINF. CONCRETE 10 FT. X 08 FT.	LF
2015	11	BOX CULVERT - REINF. CONCRETE 11 FT. X 04 FT.	LF
2483	11	BOX CULVERT - REINF. CONCRETE 11 FT. X 6.5 FT.	LF
204	11	BOX CULVERT - REINF. CONCRETE 12 FT. X 04 FT.	LF
1908	11	BOX CULVERT - REINF. CONCRETE 12 FT. X 06 FT.	LF
1937	11	BOX CULVERT - REINF. CONCRETE 14 FT. X 5.25 FT.	LF
2137	11	BOX CULVERT - REINF. CONCRETE 15 FT. X 06 FT.	LF
2162	11	BOX CULVERT - REINF. CONCRETE 18 FT. X 08 FT.	LF
1981	11	BOX CULVERT - REINF. CONCRETE 28 FT. X 08 FT.	LF
2477	11	BOX CULVERT - REINF. CONCRETE DOUBLE 08 FT. X 04FT.	LF
2557	11	BOX CULVERT - REINF. CONCRETE 09 FT. X 03 FT.	LF
2635	11	BOX CULVERT - REINF. CONCRETE TRIPLE 09 FT. X 05 FT.	LF
2432	17	BRICK REPLACEMENT (TYPE BR REPAIR)	CY
2129	15	BRIDGE REMOVAL	LS
2142	15	BULKHEAD ON LARGE DIAMETER PIPE	EA
2253	17	BURD AVE SOUTH OF ST LOUIS AVE	EA
2457	15	BY-PASS CHAMBER - REINFORCED CONCRETE	LS
1351	15	BYPASS PUMPING	LS
2707	15	BYPASS PUMPING PER 1000 GPM	EA
1942	18	BYPASS PUMPING STATION	EA
2585	10	CELLULAR CONCRETE BLOCK LINING	SY
2708	17	CEMENT GROUTING OF VOIDS	CY
83	08	CHANNEL - CONCRETE EROSION CONTROL BLANKET	SY
85	08	CHANNEL REINF. CONCRETE TRANSITION SIDE 10 INCH	SY
2661	08	CHANNEL REINFORCED CONC BOTTOM 12 INCH (TYPE ?)	SY
77	08	CHANNEL REINFORCED CONCRETE BOTTOM 07 INCH	SY
78	08	CHANNEL REINFORCED CONCRETE BOTTOM 08 INCH	SY
79	08	CHANNEL REINFORCED CONCRETE BOTTOM 10 INCH	SY
185	08	CHANNEL REINFORCED CONCRETE BOTTOM 12 INCH	SY
1934	08	CHANNEL REINFORCED CONCRETE BOTTOM 13 INCH	SY
1928	08	CHANNEL REINFORCED CONCRETE BOTTOM 14 INCH	SY
2658	08	CHANNEL REINFORCED CONCRETE BOTTOM 15 INCH	SY
1935	08	CHANNEL REINFORCED CONCRETE BOTTOM 16 INCH	SY
2640	08	CHANNEL REINFORCED CONCRETE BOTTOM 18 INCH	SY
2659	08	CHANNEL REINFORCED CONCRETE BOTTOM 21 INCH	SY
2079	08	CHANNEL REINFORCED CONCRETE SLOPED SIDES	SY
81	08	CHANNEL REINFORCED CONCRETE VERTICAL SIDES 10 INCH	SY
82	08	CHANNEL REINFORCED CONCRETE VERTICAL SIDES 12 INCH	SY
1948	08	CHANNEL REINFORCED CONCRETE VERTICAL SIDES 14 INCH	SY
1936	08	CHANNEL REINFORCED CONCRETE VERTICAL SIDES 15 INCH	SY
1949	08	CHANNEL REINFORCED CONCRETE VERTICAL SIDES 16 INCH	SY
1867	15	CHECK VALVE	EA
1913	17	CHEMICAL GROUT ALLOWANCE	AL
2574	17	CHEMICAL GROUT STRUCTURE	EA
2677	17	CHEMICAL GROUTING	GL
2495	15	CHEMICAL STORAGE FACILITIES	LS
2509	06	CIP PIPE IN TUNNEL 108 INCH	LF
2698	17	CIPP LINER - 06 INCH DIAMETER - 04.5 MM	LF
2467	17	CIPP LINER - 08 INCH DIAMETER - 06 MM	LF
2468	17	CIPP LINER - 08 INCH DIAMETER - 07.5 MM	LF
2614	17	CIPP LINER - 10 INCH DIAMETER - 04.5 MM	LF
2612	17	CIPP LINER - 10 INCH DIAMETER - 05 MM	LF
2700	17	CIPP LINER - 10 INCH DIAMETER - 06 MM	LF
2699	17	CIPP LINER - 12 INCH DIAMETER - 07.5 MM	LF
2556	17	CIPP LINER - 15 INCH DIAMETER - 05.5 MM	LF
2701	17	CIPP LINER - 15 INCH DIAMETER - 07.5 MM	LF
2400	17	CIPP LINER - 18 INCH DIAMETER - 09 MM	LF
2397	17	CIPP LINER - 21 INCH DIAMETER - 09 MM	LF

ALPHABETICAL LISTING OF CIPRO PAY ITEMS

PAY_ ITEM #	Category	Description	Unit
2398	17	CIPP LINER - 24 INCH DIAMETER - 10.5 MM	LF
2702	17	CIPP LINER - 24 INCH X 36 INCH EGG - 18 MM	LF
2621	17	CIPP LINER - 24 INCH X 36 INCH EGG - 20 MM	LF
2399	17	CIPP LINER - 27 INCH DIAMETER - 10.5 MM	LF
2581	17	CIPP LINER - 28 INCH X 42 INCH EGG - 20 MM	LF
2198	17	CIPP LINER - 30 INCH DIAMETER - 12 MM	LF
2236	17	CIPP LINER - 30 INCH DIAMETER - 13.5MM	LF
2197	17	CIPP LINER - 30 INCH DIAMETER - 15 MM	LF
2199	17	CIPP LINER - 30 INCH DIAMETER - 16.5 MM	LF
2237	17	CIPP LINER - 30 INCH DIAMETER - 18 MM	LF
2582	17	CIPP LINER - 30 INCH X 42 INCH EGG - 21 MM	LF
2622	17	CIPP LINER - 33 INCH DIAMETER - 21 MM	LF
2623	17	CIPP LINER - 34 INCH DIAMETER - 22 MM	LF
2615	17	CIPP LINER - 36 INCH DIAMETER - 16 MM	LF
2613	17	CIPP LINER - 36 INCH DIAMETER - 16.5 MM	LF
2180	17	CIPP LINER - 36 INCH DIAMETER - 18 MM	LF
2179	17	CIPP LINER - 36 INCH DIAMETER - 19.5 MM	LF
2208	17	CIPP LINER - 36 INCH X 48 INCH EGG - 33 MM	LF
2238	17	CIPP LINER - 36 INCH X 56 INCH EGG - 30 MM	LF
2239	17	CIPP LINER - 42 INCH DIAMETER - 15 MM	LF
2246	17	CIPP LINER - 42 INCH DIAMETER - 18 MM	LF
2200	17	CIPP LINER - 42 INCH DIAMETER - 19.5 MM	LF
2583	17	CIPP LINER - 42 INCH DIAMETER - 20 MM	LF
2584	17	CIPP LINER - 42 INCH DIAMETER - 21 MM	LF
2201	17	CIPP LINER - 42 INCH DIAMETER - 22.5 MM	LF
2240	17	CIPP LINER - 42 INCH DIAMETER - 24 MM	LF
2195	17	CIPP LINER - 42 INCH DIAMETER - 28.5 MM	LF
2196	17	CIPP LINER - 42 INCH DIAMETER - 30 MM	LF
2242	17	CIPP LINER - 48 INCH DIAMETER - 18 MM	LF
2241	17	CIPP LINER - 48 INCH DIAMETER - 19.5 MM	LF
2243	17	CIPP LINER - 48 INCH DIAMETER - 22.5 MM	LF
2203	17	CIPP LINER - 48 INCH DIAMETER - 24 MM	LF
2206	17	CIPP LINER - 48 INCH DIAMETER - 25.5 MM	LF
2202	17	CIPP LINER - 48 INCH DIAMETER - 27 MM	LF
2244	17	CIPP LINER - 48 INCH DIAMETER - 28.5 MM	LF
2205	17	CIPP LINER - 48 INCH DIAMETER - 33 MM	LF
2204	17	CIPP LINER - 48 INCH DIAMETER - 34.5 MM	LF
2245	17	CIPP LINER - 48 INCH X 67 INCH OVAL - 30 MM	LF
2207	17	CIPP LINER - 48 INCH X 67 INCH OVAL - 34.5 MM	LF
2627	17	CIPP LINER - 50 INCH TO 68 INCH	LF
2482	17	CIPP LINER - 51 INCH DIAMETER - 24.5 MM	LF
2481	17	CIPP LINER - 60 INCH DIAMETER - 31.5MM	LF
2176	17	CIPP LINER - 63 INCH DIAMETER - 27 MM	LF
2177	17	CIPP LINER - 63 INCH DIAMETER - 30 MM	LF
2178	17	CIPP LINER - 63 INCH DIAMETER - 33 MM	LF
2480	17	CIPP LINER - 75 INCH DIAMETER - 40 MM	LF
2479	17	CIPP LINER - 78 INCH DIAMETER -38.5 MM	LF
2626	17	CIPP LINER - 80 INCH DIAMETER	LF
2478	17	CIPP LINER - 84 INCH DIAMETER - 43.5 MM	LF
2181	17	CIPP LINER - 90 INCH DIAMETER - 37.5 MM	LF
2182	17	CIPP LINER - 90 INCH DIAMETER - 52.5 MM	LF
2021	17	CIPP LINING OF 3636 BIG BEND SEWER	LS
2023	17	CIPP LINING OF ARLOE NO 5 SEWER	LS
2025	17	CIPP LINING OF CLIFTON HEIGHTS JOINT SEWER	LS
2026	17	CIPP LINING OF MACKLIND AVE SEWER - REACH 3	LS
2028	17	CIPP LINING OF MANCHESTER AVE PUBLIC RELIEF SEWER	LS
2031	17	CIPP LINING OF MANCHESTER AVE SEWER - REACH 2	LS
2022	17	CIPP LINING OF MCCAUSLAND AVE NO 1 SEWER	LS
2027	17	CIPP LINING OF TAMM AVE SEWER	LS
2396	17	CIPP LINER - 18 INCH DIAMETER - 09 MM	LF
2254	17	CLARA AVENUE AND GREER TO TERRY	EA
2151	17	CLARENDON DIVERSION STRUCTURE	LS
2474	19	CLASS "A" CONCRETE	SY
2150	17	CLASS "A" CONCRETE, PINE STREET SEWER	CY

ALPHABETICAL LISTING OF CIPRO PAY ITEMS

PAY_ ITEM #	Cate-gory	Description	Unit
2233	15	CLASS "A" REINFORCED CONCRETE CAP	LF
2092	17	CLASS "A" REINFORCED CONCRETE INVERT 06 INCH, DALE AVENUE JOINT SEWER	SY
2090	17	CLASS "B" CONCRETE, DALE AVENUE JOINT SEWER	CY
2128	19	CLAY LINER/DIRT	LS
2152	17	CLEAN AND PREPARE SEWER	LF
2385	19	CLEANING AND TV 15" DIA.	LF
2386	19	CLEANING AND TV 18" DIA.	LF
2392	19	CLEANING AND TV 2' X 3' DIA.	LF
2387	19	CLEANING AND TV 21" DIA.	LF
2388	19	CLEANING AND TV 24" DIA.	LF
2389	19	CLEANING AND TV 27" DIA.	LF
2390	19	CLEANING AND TV 30" DIA.	LF
2391	19	CLEANING AND TV 36" DIA.	LF
2384	19	CLEANING AND TV 6" - 12" DIA.	LF
2394	19	CLEANING BUCKET MACHINE	CF
1763	15	CLEARING	LS
6	10	CLEARING (CHANNEL PROJECTS)	LS
2125	19	CLEARING/MOBILIZATION	LS
2123	17	CLOSED CIRCUIT TELEVISION INSPECTION - PRECONSTRUCTION	LS
2124	17	CLOSED CIRCUIT TELEVISION INSPECTION - POST CONSTRUCTION	LS
125	01	COMPACTED BACKFILL (TRENCH)	CY
126	01	COMPACTED FILL (CHANNEL)	CY
2579	01	COMPACTION OF FILL	CY
1869	15	COMPOSITE CREEK IMPROV. MATERIALS (GEOWEB, GEOTEXT., & ROCK BLANKET)	LS
2423	10	COMPOSITE REVETMENT	SY
2140	01	CONCRETE BACKFILL	CY
2663	10	CONCRETE CHUTE	SY
2596	07	CONCRETE COLLAR 06 INCH PIPE	EA
171	07	CONCRETE COLLAR 08 INCH PIPE	EA
2597	07	CONCRETE COLLAR 10 INCH PIPE	EA
87	07	CONCRETE COLLAR 12 INCH PIPE	EA
88	07	CONCRETE COLLAR 15 INCH PIPE	EA
89	07	CONCRETE COLLAR 18 INCH PIPE	EA
184	07	CONCRETE COLLAR 21 INCH PIPE	EA
90	07	CONCRETE COLLAR 24 INCH PIPE	EA
802	07	CONCRETE COLLAR 27 INCH PIPE	EA
91	07	CONCRETE COLLAR 30 INCH PIPE	EA
803	07	CONCRETE COLLAR 33 INCH PIPE	EA
92	07	CONCRETE COLLAR 36 INCH PIPE	EA
93	07	CONCRETE COLLAR 42 INCH PIPE	EA
94	07	CONCRETE COLLAR 48 INCH PIPE	EA
241	07	CONCRETE COLLAR 54 INCH PIPE	EA
95	07	CONCRETE COLLAR 60 INCH PIPE	EA
804	07	CONCRETE COLLAR 66 INCH PIPE	EA
805	07	CONCRETE COLLAR 72 INCH PIPE	EA
806	07	CONCRETE COLLAR 78 INCH PIPE	EA
218	07	CONCRETE COLLAR 84 INCH PIPE	EA
2714	07	CONCRETE CRADLE 8 INCH PIPE	EA
2173	10	CONCRETE FILLED GEOWEB	SY
1861	15	CONCRETE SWALE	LS
1819	15	CONNECTION OF DOWN SPOUTS	LS
2075	09	CONNECTION TO CHANNEL BOX CULVERT LARGE	PL
2074	09	CONNECTION TO CHANNEL BOX CULVERT SMALL	PL
102	09	CONNECTION TO CHANNEL 12 INCH PIPE	PL
103	09	CONNECTION TO CHANNEL 15 INCH PIPE	PL
104	09	CONNECTION TO CHANNEL 18 INCH PIPE	PL
244	09	CONNECTION TO CHANNEL 21 INCH PIPE	PL
216	09	CONNECTION TO CHANNEL 24 INCH PIPE	PL
807	09	CONNECTION TO CHANNEL 27 INCH PIPE	PL
166	09	CONNECTION TO CHANNEL 30 INCH PIPE	PL
808	09	CONNECTION TO CHANNEL 33 INCH PIPE	PL
196	09	CONNECTION TO CHANNEL 36 INCH PIPE	PL
237	09	CONNECTION TO CHANNEL 42 INCH PIPE	PL
192	09	CONNECTION TO CHANNEL 48 INCH PIPE	PL

ALPHABETICAL LISTING OF CIPRO PAY ITEMS

PAY_ ITEM #	Category	Description	Unit
105	09	CONNECTION TO CHANNEL 54 INCH PIPE	PL
2073	09	CONNECTION TO CHANNEL 60 INCH PIPE	PL
2641	09	CONNECTION TO CHANNEL 90 INCH PIPE	PL
100	07	CONNECTION TO EXISTING INLET (12" THRU 24" PIPE)	PL
1886	07	CONNECTION TO EXISTING JUNCTION CHAMBER	PL
1967	07	CONNECTION TO EXISTING MANHOLE	EA
99	07	CONNECTION TO EXISTING MANHOLE (8" THRU 24" PIPE)	PL
809	07	CONNECTION TO LARGE SEWER (8" THRU 24" PIPE)	PL
2452	07	CONNECTION TO LARGE SEWER 30 INCH PIPE	PL
2119	07	CONNECTION TO LARGE SEWER 36 INCH PIPE	PL
2458	07	CONNECTION TO LARGE SEWER 48 INCH PIPE	PL
2453	07	CONNECTION TO LARGE SEWER 66 INCH PIPE	PL
2655	07	CONNECTION TO LARGE SEWER 72 INCH PIPE	PL
2561	17	CONSTRUCT MANHOLE (ORANGE BLOSSOM)	LS
2562	17	CONSTRUCT MANHOLE (TALL TREE)	LS
2575	15	CONSTRUCT NEW INTERCEPTOR	LS
2520	06	CONTACT GROUT	CY
2069	15	CONTINGENCIES	AL
2115	18	CONTROL PANEL PLATFORM	LS
2567	15	COPPER POTABLE WATER PIPE - 03 INCH DIAMETER	LF
2711	02	CORRUGATED METAL PIPE SEWER 12 INCH	LF
195	02	CORRUGATED METAL PIPE SEWER 18 INCH	LF
155	02	CORRUGATED METAL PIPE SEWER 21 INCH	LF
152	02	CORRUGATED METAL PIPE SEWER 24 INCH	LF
47	02	CORRUGATED METAL PIPE SEWER 30 INCH	LF
810	02	CORRUGATED METAL PIPE SEWER 36 INCH	LF
159	02	CORRUGATED METAL PIPE SEWER 42 INCH	LF
211	02	CORRUGATED METAL PIPE SEWER 48 INCH	LF
1997	02	CORRUGATED METAL PIPE SEWER 60 INCH	LF
128	01	CRUSHED LIMESTONE	CY
2112	19	CRUSHED LIMESTONE (PAID AS UNSUITABLE SUBRADE)	CY
2062	15	CRUSHED LIMESTONE (MSD 1)	CY
2063	15	CRUSHED LIMESTONE (MSD 5)	CY
1968	13	CRUSHED LIMESTONE BASE	SY
2018	19	CRUSHED LIMESTONE UNSUITABLE SUBGRADE	CY
2500	15	CSO TREATMENT FACILITY	LS
1904	15	CULVERT REMOVAL	LS
139	13	CURB - ASPHALTIC CONCRETE	LF
138	13	CURB - ASPHALTIC CONCRETE REM. AND REP.	LF
815	13	CURB - CONCRETE	LF
2680	13	CURB - CONCRETE REM. AND REP.	LF
1694	13	CURB - GRANITE	LF
2221	13	CURB - LIMESTONE	LF
2657	13	CURB AND GUTTER-CONCRETE	LF
137	13	CURB AND GUTTER-CONCRETE-REM. AND REP.	LF
2040	19	CURB-CONCRETE-REM. & REP.	LF
2122	17	CURED IN PLACE PIPE - 8 INCH	LF
1990	19	CUT OFF CORNER	LF
1989	19	CUT OFF SHEETS	SF
2091	17	DEBRIS AND ROCK REMOVAL, DALE AVENUE JOINT SEWER	LS
2665	10	DEBRIS REMOVAL	CY
2516	15	DEFORMATION MONITORING DEVICES	EA
2639	01	DELETERIOUS EXCAVATION	CY
2135	15	DEMOLITION	EA
2558	15	DEMOLITION AND DISPOSAL	LS
2669	15	DETENTION BASIN AND APPERTENANCES	LS
2064	15	DEWATERING	AL
2696	15	DEWATERING	LF
2116	18	DISCHARGE MANHOLE	LS
2717	15	DOWNSPOUT DISCONNECTION	EA
2521	06	DRILL HOLES FOR SHAFT GROUTING	LF
2522	06	DRILL HOLES FOR TUNNEL GROUTING	LF
2212	15	DRILLED PIER	LF
2213	15	DRILLED PIER - GEOTECHNICAL ENGINEER	AL

ALPHABETICAL LISTING OF CIPRO PAY ITEMS

PAY_ ITEM #	Category	Description	Unit
2131	15	DRILLED PIER SHAFT	LF
2523	06	DRILLED SHAFT BOTTOM	EA
2524	06	DRILLED SHAFT FLAT SLAB TOP W/FRAME & GRATE, 48"	EA
2525	06	DRILLED SHAFT RISER, PRECAST MANHOLE, 48"	LF
2517	01	DRILLED SHAFT, EXCAVATION CLASS "A"	CY
2518	01	DRILLED SHAFT, EXCAVATION CLASS "B"	CY
2519	01	DRILLED SHAFT, EXCAVATION CLASS "C"	CY
2526	06	DRILLED SHAFT, PERMANENT STEEL CASING, 114" INSIDE DIAMETER	LF
2527	06	DRILLED SHAFT, REINF CONC LID, FRAME & GRATE	EA
1892	15	DRIVEWAY REMOVAL - CONCRETE	LS
1920	15	DRIVEWAY REPLACEMENT - CONCRETE	LS
136	13	DRIVEWAYS - ASPHALTIC CONCRETE	SY
2041	19	DRIVEWAYS-ASPHALTIC CONC.-REM & REP.	SF
2036	19	DRIVEWAYS-CONCRETE-REM & REP. (FIFTY (50) SQUARE FEET AND GREATER)	SF
2035	19	DRIVEWAYS-CONCRETE-REM. & REP. (LESS THAN FIFTY (50) SQUARE FEET)	SF
2037	19	DRIVEWAYS-CONCRETE-REM. & REP. (SIX (6) INCHES THICK)	SF
2713	06	DUCTILE IRON PIPE IN TUNNEL 12 INCH CLASS 52	LF
2625	06	DUCTILE IRON PIPE IN TUNNEL 16 INCH CLASS 52	LF
2551	06	DUCTILE IRON PIPE IN TUNNEL 18 INCH CLASS 52	LF
2494	06	DUCTILE IRON PIPE IN TUNNEL 18 INCH CLASS 54	LF
2566	03	DUCTILE IRON PIPE SEWER 03 INCH CLASS 53	LF
2559	03	DUCTILE IRON PIPE SEWER 04 INCH CLASS 53	LF
2637	03	DUCTILE IRON PIPE SEWER 06 INCH CLASS 52	LF
194	03	DUCTILE IRON PIPE SEWER 06 INCH CLASS 53	LF
2595	03	DUCTILE IRON PIPE SEWER 08 INCH CLASS 52	LF
42	03	DUCTILE IRON PIPE SEWER 08 INCH CLASS 53	LF
43	03	DUCTILE IRON PIPE SEWER 10 INCH CLASS 52	LF
2599	03	DUCTILE IRON PIPE SEWER 12 INCH CLASS 52	LF
44	03	DUCTILE IRON PIPE SEWER 12 INCH CLASS 53	LF
830	03	DUCTILE IRON PIPE SEWER 14 INCH CLASS 52	LF
1926	03	DUCTILE IRON PIPE SEWER 14 INCH CLASS 53	LF
45	03	DUCTILE IRON PIPE SEWER 16 INCH CLASS 52	LF
2492	03	DUCTILE IRON PIPE SEWER 16 INCH CLASS 53	LF
46	03	DUCTILE IRON PIPE SEWER 18 INCH CLASS 52	LF
2493	03	DUCTILE IRON PIPE SEWER 18 INCH CLASS 54	LF
2695	03	DUCTILE IRON PIPE SEWER 20 INCH CLASS 52	LF
246	03	DUCTILE IRON PIPE SEWER 20 INCH CLASS 53	LF
197	03	DUCTILE IRON PIPE SEWER 24 INCH CLASS 52	LF
2174	03	DUCTILE IRON PIPE SEWER 24 INCH CLASS 53	LF
847	03	DUCTILE IRON PIPE SEWER 30 INCH CLASS 53	LF
1980	03	DUCTILE IRON PIPE SEWER 36 INCH CLASS 52	LF
2247	03	DUCTILE IRON PIPE SEWER 42 INCH	LF
2110	03	DUCTILE IRON PIPE SEWER 48 INCH	LF
2083	03	DUCTILE IRON PIPE SEWER 54 INCH CLASS 52	LF
2109	03	DUCTILE IRON PIPE SEWER 60 INCH	LF
2461	15	ELECTRICAL	LS
2496	15	ELECTRICAL BUILDING AND CONTROLS	LS
816	01	ENCASEMENT - CLASS "A" CONCRETE	CY
9	01	EXCAVATION CLASS "A"	CY
817	01	EXCAVATION CLASS "A" (CITY OF ST. LOUIS)	CY
2214	01	EXCAVATION CLASS "A" IN DRILLED PIER	CY
50	01	EXCAVATION CLASS "A" IN TUNNEL	CY
8	01	EXCAVATION CLASS "B"	CY
818	01	EXCAVATION CLASS "B" (CITY OF ST. LOUIS)	CY
51	01	EXCAVATION CLASS "B" IN TUNNEL	CY
7	01	EXCAVATION CLASS "C"	CY
2577	15	EXCAVATION CLASS "C"	LS
819	01	EXCAVATION CLASS "C" (CITY OF ST. LOUIS)	CY
2019	15	EXCAVATION CREW & EQUIPMENT	HR
2107	19	EXTENSION OF ANY 6" SANITARY SEWER LATERALS BEYOND (FIVE) 5 FEET	LF
2220	19	EXTENSION OF ANY SANITARY SEWER LATERAL BEYOND FIVE FEET	LF
2440	19	EXTENSION OF ANY SANITARY SEWER LATERALS BEYOND FIVE FEET	LF
2058	17	EXTERNAL CHEMICAL GROUTING (TYPE "ECG" REPAIR)	EA
2588	10	FASCINES	LF

ALPHABETICAL LISTING OF CIPRO PAY ITEMS

PAY_ ITEM #	Category	Description	Unit
2076	14	FENCE - 36 INCH CHAIN LINK	LF
157	14	FENCE - 42 INCH CHAIN LINK	LF
143	14	FENCE - 48 INCH CHAIN LINK	LF
1899	14	FENCE - 60 INCH CHAIN LINK	LF
145	14	FENCE - 72 INCH CHAIN LINK	LF
2547	14	FENCE - 72 INCH WROUGHT IRON	LF
2475	14	FENCE - 96 INCH CHAIN LINK	LF
1912	17	FILLING OF VOID BETWEEN LINER AND TUNNEL	CY
2172	01	FILLING OF VOIDS	CY
1900	15	FLAP GATE 6"	EA
199	07	FLARED END SECTION 12 INCH PIPE	EA
820	07	FLARED END SECTION 15 INCH PIPE	EA
70	07	FLARED END SECTION 18 INCH PIPE	EA
2219	07	FLARED END SECTION 21 INCH PIPE	EA
71	07	FLARED END SECTION 24 INCH PIPE	EA
227	07	FLARED END SECTION 27 INCH PIPE	EA
198	07	FLARED END SECTION 30 INCH PIPE	EA
2671	07	FLARED END SECTION 31 INCH X 51 INCH ARCH PIPE	EA
822	07	FLARED END SECTION 33 INCH PIPE	EA
72	07	FLARED END SECTION 36 INCH PIPE	EA
232	07	FLARED END SECTION 42 INCH PIPE	EA
202	07	FLARED END SECTION 48 INCH PIPE	EA
235	07	FLARED END SECTION 54 INCH PIPE	EA
73	07	FLARED END SECTION 60 INCH PIPE	EA
2139	07	FLARED END SECTION 66 INCH PIPE	EA
2193	15	FLOOD PROOF STRUCTURE	EA
2651	15	FLOODPROOFING #103 BALLAS RD. N.	LS
2652	15	FLOODPROOFING #107 BALLAS RD. N.	LS
2591	15	FLOODPROOFING 9350 WATSON INDUSTRIAL	LS
2592	15	FLOODPROOFING 9380 WATSON INDUSTRIAL	LS
2609	12	FLOW DIVERSION STRUCTURE A	LS
2610	12	FLOW DIVERSION STRUCTURE B	LS
2422	01	FLOWABLE FILL	CY
221	10	FOOTBRIDGE - REINFORCED CONCRETE	EA
2624	10	FOOTBRIDGE - STEEL FRAME/WOOD DECK	EA
1994	18	FORCE MAIN 01.5 INCH	LF
1940	18	FORCE MAIN 2 INCH	LF
1941	18	FORCE MAIN 3 INCH	LF
1946	18	FORCE MAIN 4 INCH	LF
1947	18	FORCE MAIN 6 INCH	LF
1953	04	FORCE MAIN PIPE 30 INCH	LF
1954	04	FORCE MAIN PIPE 36 INCH	LF
1955	04	FORCE MAIN PIPE 42 INCH	LF
107	07	FOULWATER DROP - 08 INCH PIPE	EA
108	07	FOULWATER DROP - 10 INCH PIPE	EA
109	07	FOULWATER DROP - 12 INCH PIPE	EA
2484	15	FOUNDATION PIERS	LF
2716	15	FRENCH DRAIN	LF
1095	15	GABIONS IN PLACE	CY
2628	15	GAS MAIN REPLACEMENT 4 INCH CAST IRON (ALLOWANCE)	LF
2629	15	GAS MAIN REPLACEMENT 6 INCH CAST IRON (ALLOWANCE)	LS
2476	14	GATE	EA
2012	19	GENERAL - CHEMICAL GROUT ALLOWANCE	AL
2013	19	GENERAL - INTERIOR SEALING OF MANHOLES (LABOR AND MATERIALS)	LS
2014	19	GENERAL - LATERAL DYE TESTING (NO CHARGE)	EA
2175	19	GENERATOR INSTALLATION	LS
2508	15	GEOFABRIC	SY
2594	15	GEOTECHNICAL ALLOWANCE	LS
2462	13	GEOWEB PAVING	SY
2650	15	GRADE CONTROL	SY
2459	10	GRADE CONTROL #1	SY
2460	10	GRADE CONTROL #2	SY
2424	10	GRADE CONTROL CHANNEL	CY
2425	10	GRADE CONTROL STRUCTURE	EA

ALPHABETICAL LISTING OF CIPRO PAY ITEMS

PAY_ ITEM #	Category	Description	Unit
2675	10	GRADED STONE A	CY
2676	10	GRADED STONE C	CY
127	01	GRANULAR BACKFILL	CY
2234	15	GRIT REMOVAL	TN
2434	17	GROUT ALLOWANCE	AL
2549	06	GROUT HOLE CONNECTIONS FOR SHAFT GROUTING	EA
2533	06	GROUT HOLE CONNECTIONS FOR TUNNEL GROUTING	EA
2395	17	GROUT RING - COMPLETE	EA
2428	14	GROUTED RIP-RAP	SY
2029	17	GROUTING OF MANHOLE SH-1, MACKLIND AVE SEWER - REACH 3	LS
1907	15	GUARD RAIL	LF
2426	10	GULLY REPAIR	EA
76	07	HEADWALL - REINFORCED CONCRETE	PL
2165	14	HEAVY STONE REVETMENT	SY
2235	15	HIGH RIVER DEMOBILIZATION	LS
2672	08	HIGH STRENGTH CONCRETE SLAB	SY
2133	15	HOME BUY-OUT	EA
2100	15	HY - SPAN PRECAST CONCRETE BRIDGE	LS
2505	15	IMPACTED WATER DISPOSAL	CF
2515	15	INCLINOMETERS	LF
68	12	INLET - 2 GRATE	EA
2222	12	INLET - 2 GRATE WITH SIDE INTAKE	EA
2617	12	INLET - 3 GRATE	EA
69	12	INLET - 4 GRATE	EA
65	12	INLET - AREA	EA
67	12	INLET - DOUBLE	EA
2678	12	INLET - DOUBLE (COMPLETE)	EA
66	12	INLET - MULTIPLE	EA
1938	12	INLET - SPECIAL	EA
64	12	INLET - STREET	EA
2473	19	INLET - TRAPPED	EA
2586	12	INLET - TRIPLE	EA
1874	12	INLET MANHOLE - SPECIAL	EA
63	12	INLET MANHOLE - TOP SECTION	EA
2616	12	INLET MANHOLE - TOP SECTION (DOUBLE)	EA
2472	19	INLET-SINGLE AREA	EA
2450	17	INSTALL CEMENTITIOUS LINER	LF
2451	17	INSTALL EPOXY LINER	LF
2573	12	INSTALL MANHOLE COVERS (ONLY)	EA
2572	12	INSTALL MANHOLE FRAMES (ONLY)	EA
2445	17	INSTALL URETHANE COATING	EA
2602	12	INTERCEPTOR / OUTFALL STRUCTURE - COMPLETE	LS
2078	15	INTERCONNECT NEW AND EXISTING FORCE MAIN	PL
1944	15	INTERIOR PLUMBING 4 INCH PIPE	LF
1986	17	INTERIOR SEALING OF MANHOLES	LS
2183	17	INTERIOR SEALING OF MANHOLES	SF
2534	06	JET GROUTING	LF
2589	10	JOINT STAKING	SY
1925	12	JUNCTION CHAMBER - REINFORCED CONCRETE - LARGE	EA
75	12	JUNCTION CHAMBER - REINFORCED CONCRETE - SMALL	EA
1927	12	JUNCTION CHAMBER "C" - REINFORCED CONCRETE	EA
1888	15	JUNCTION CHAMBER 110 - REINFORCED CONCRETE	EA
2580	14	LANDSCAPING ALLOWANCE	AL
2098	15	LATERAL DYE TESTING	EA
1966	19	LATERAL EXTENSION BEYOND 5 FEET	LF
2439	15	LATERAL LOCATION	LF
2154	17	LATERAL PATCH (TYPE "LP" REPAIR)	EA
2099	19	LATERAL RECONNECTION	LF
2704	17	LATERAL REPAIR - NON-PERSON ENTRY	EA
2703	17	LATERAL REPAIR - PERSON ENTRY	EA
2644	15	LATERAL REPAIR (CIPP)	EA
2643	15	LATERAL REPAIR (EXCAVATION - PAVEMENT)	EA
2642	15	LATERAL REPAIR (EXCAVATION - YARD/SIDEWALK)	EA
2431	17	LATERAL REPAIR (TYPRE LR REPAIR)	LF

ALPHABETICAL LISTING OF CIPRO PAY ITEMS

PAY_ ITEM #	Category	Description	Unit
2047	19	LATERAL REPLACEMENT	LF
1833	15	LIFT STATION	LS
2564	10	LIVE CRIB WALL	CY
2647	10	LOG CRIB WALL - BASE CONNECTED TO BEDROCK	LF
2646	10	LOG CRIB WALL - BASE SECTION	LF
2645	10	LOG CRIB WALL - TOP SECTION	LF
2603	15	LUMP SUM CONSTRUCTION	LS
53	12	MANHOLE - SPECIAL	EA
2118	12	MANHOLE - SPECIAL 60 INCH DIAMETER	EA
2555	12	MANHOLE - SPECIAL 60 INCH DIAMETER	LF
2441	12	MANHOLE - SPECIAL 72 INCH DIAMETER	EA
2554	12	MANHOLE - SPECIAL 72 INCH DIAMETER	LF
52	12	MANHOLE - STANDARD CONSTRUCTION	LF
2210	17	MANHOLE 21-13 REMOVE AND REPLACE - OAKLAND AVE PUBLIC SEWER & BRANCH	LS
2184	17	MANHOLE 6-2 REMOVE AND REPLACE - KINGSHIGHWAY/LAKE SEWER	LS
2185	17	MANHOLE 6-3 REMOVE AND REPLACE - KINGSHIGHWAY/LAKE SEWER	LS
2186	17	MANHOLE 6-4 REMOVE AND REPLACE - KINGSHIGHWAY/LAKE SEWER	LS
2187	17	MANHOLE 6-6 REMOVE AND REPLACE - KINGSHIGHWAY/LAKE SEWER	LS
2148	17	MANHOLE BS-2 REPLACEMENT, BLACKSTONE PUBLIC SEWER	LS
1759	12	MANHOLE COVER SEALS	EA
2032	19	MANHOLE FRAME & COVER ADJUSTMENT (INCLUDES FIRST FOOT OF NEW MASONRY)	EA
2436	17	MANHOLE FRAME AND COVER REMOVE AND REPLACE	EA
1760	12	MANHOLE FRAME SEALS	EA
1800	12	MANHOLE INSERTS	PL
2033	19	MANHOLE MASONRY (GREATER THAN ONE (1) FOOT)	LF
2188	17	MANHOLE MH 059 REMOVE AND REPLACE - O'FALLON COMBINED SEWER	LS
2189	17	MANHOLE MH 107 REMOVE AND REPLACE - O'FALLON COMBINED SEWER	LS
2437	17	MANHOLE PIPE CONNECTIONS REHABILITATION	EA
1699	17	MANHOLE REHABILITATION	LF
2209	17	MANHOLE REMOVE AND REPLACE - FOREST PARK FW SEWER & CONN TO RDP (LOWER REACH)	EA
2149	17	MANHOLE REPLACEMENT, EXTENSION OF LINDELL SEWER	EA
2190	17	MANHOLE TG-1 REMOVE AND REPLACE - TOWER GROVE PARK SEWER	LS
2191	17	MANHOLE TG-2 REMOVE AND REPLACE - TOWER GROVE PARK SEWER	LS
2192	17	MANHOLE TG-3A - TOWER GROVE PARK SEWER	LS
2455	12	MANHOLE TOP SECTIONS	EA
1945	15	MASTER TRAP 6 INCH	EA
2570	07	MISCELLANEOUS CONNECTIONS	EA
2550	06	MIXING AND PLACING GROUT FOR SHAFTS	CY
2535	06	MIXING AND PLACING GROUT FOR TUNNEL	CY
5	16	MOBILIZATION (projects over \$75,000)	LS
2706	17	MOBILIZATION OF BUCKET MACHINE PER LOCATION	EA
2381	19	MOBILIZATION PER LOCATION	EA
2393	19	MOBILIZATION, EMERGENCY	EA
2435	10	MODULAR BLOCK WALL	SF
2134	15	MOVING EXPENSES	EA
2102	15	NEW 8 INCH PIPING W/ EXCAVATION	LS
2513	15	OBSERVATION WELLS	LF
1914	17	OPENING AND RESTORATION OF EXISTING ACCESS SHAFTS	LS
1939	15	OUTLET STRUCTURE	LS
2497	15	OVERBROOK DR. #22	LS
2498	15	OVERBROOK DR. #29	LS
2673	07	PERFORATED PIPE 6 INCH (INCLUDES ROCK, FABRIC)	LF
172	07	PERFORATED PIPE 8 INCH (INCLUDES ROCK, FABRIC)	LF
2057	19	PERMIT REIMBURSEMENT	LS
2065	15	PILE AUGERCAST	LF
2532	06	PIPE IN SHAFT 84 INCH	LF
2215	06	PIPE IN TUNNEL 06 INCH	LF
48	06	PIPE IN TUNNEL 08 INCH	LF
168	06	PIPE IN TUNNEL 10 INCH	LF
2506	06	PIPE IN TUNNEL 108 INCH	LF
167	06	PIPE IN TUNNEL 12 INCH	LF

ALPHABETICAL LISTING OF CIPRO PAY ITEMS

PAY_ ITEM #	Category	Description	Unit
2634	06	PIPE IN TUNNEL 144 INCH	LF
823	06	PIPE IN TUNNEL 15 INCH	LF
156	06	PIPE IN TUNNEL 18 INCH	LF
178	06	PIPE IN TUNNEL 21 INCH	LF
193	06	PIPE IN TUNNEL 24 INCH	LF
824	06	PIPE IN TUNNEL 27 INCH	LF
169	06	PIPE IN TUNNEL 30 INCH	LF
831	06	PIPE IN TUNNEL 33 INCH	LF
825	06	PIPE IN TUNNEL 36 INCH	LF
826	06	PIPE IN TUNNEL 42 INCH	LF
229	06	PIPE IN TUNNEL 48 INCH	LF
243	06	PIPE IN TUNNEL 54 INCH	LF
2061	06	PIPE IN TUNNEL 60 INCH	LF
2138	06	PIPE IN TUNNEL 66 INCH	LF
2605	06	PIPE IN TUNNEL 72 INCH	LF
2606	06	PIPE IN TUNNEL 78 INCH	LF
2601	06	PIPE IN TUNNEL 84 INCH	LF
2710	06	PIPE IN TUNNEL 90 INCH	LF
2608	06	PIPE IN TUNNEL 96 INCH	LF
1901	17	PIPE SEWER (SLIP-LINE) 8"	LF
2046	19	PIPE SEWER 06 INCH (SANITARY/COMBINED)	LF
32	04	PIPE SEWER 06 INCH (INCLUDES EXCAVATION)	LF
33	04	PIPE SEWER 08 INCH (SANITARY/COMBINED)	LF
34	04	PIPE SEWER 10 INCH (SANITARY/COMBINED)	LF
35	04	PIPE SEWER 12 INCH (SANITARY/COMBINED)	LF
36	04	PIPE SEWER 15 INCH (SANITARY/COMBINED)	LF
37	04	PIPE SEWER 18 INCH (SANITARY/COMBINED)	LF
38	04	PIPE SEWER 21 INCH (SANITARY/COMBINED)	LF
39	04	PIPE SEWER 24 INCH (SANITARY/COMBINED)	LF
40	04	PIPE SEWER 27 INCH (SANITARY/COMBINED)	LF
41	04	PIPE SEWER 30 INCH (SANITARY/COMBINED)	LF
180	04	PIPE SEWER 36 INCH (SANITARY/COMBINED)	LF
1976	04	PIPE SEWER 42 INCH (SANITARY/COMBINED)	LF
2081	04	PIPE SEWER 48 INCH (SANITARY/COMBINED)	LF
2082	04	PIPE SEWER 54 INCH (SANITARY/COMBINED)	LF
1982	19	PIPE SEWER 6 INCH (SANITARY)	LF
2060	04	PIPE SEWER 60 INCH (SANITARY/COMBINED)	LF
2709	04	PIPE SEWER 90 INCH (SANITARY/COMBINED)	LF
2232	17	PIPEBURST 12 INCH PIPE AND INSTALL 18 INCH PIPE	LF
2660	17	PIPEBURST 18 INCH PIPE AND INSTALL 18 INCH	LF
1956	07	PLUG VALVE 30 INCH	EA
1957	07	PLUG VALVE 36 INCH	EA
1958	07	PLUG VALVE 42 INCH	EA
2560	17	POINT REPAIR - (THREE OAKS)	LS
2469	17	POINT REPAIR - OVER 10 FEET DEEP	EA
2470	17	POINT REPAIR - UNDER 10 FEET DEEP	EA
2130	15	PRECAST CONCRETE ARCH BRIDGE	LF
2697	15	PRE-CONSTRUCTION PROPERTY DAMAGE SURVEY	EA
2514	15	PROBE EXTENSOMETERS	LF
900	16	PROTECTION AND RESTORATION OF SITE	LS
2401	19	PROTECTION AND RESTORATION OF SITE, LESS SODDING - BLUEGRASS	LS
2607	15	PUMP STATION	LS
2466	15	PUMP STATION ACCESS ROAD	LS
2104	15	PUMP STATION AND SITE WORK (COMPLETE)	LS
2066	15	PVC COUPLING	EA
2068	15	R & R CONCRETE APRON	SY
2101	15	RAILROAD TIE WALL - REMOVE AND REPLACE	SY
2106	19	RECONNECTION OF 6" SANITARY SEWER SERVICE LATERALS	EA
2117	19	RECONNECTION OF SANITARY SEWER SERVICE LATERALS	LF
2449	17	REHABILITATE BENCH AND INVERT	EA
2446	17	REHABILITATE CONE	EA
2448	17	REHABILITATE PIPE SEALS	EA
2447	17	REHABILITATE WALL	EA
1902	15	REINFORCED CONCRETE ACCESS RAMP	LS

ALPHABETICAL LISTING OF CIPRO PAY ITEMS

PAY_ ITEM #	Category	Description	Unit
2670	05	REINFORCED CONCRETE ARCH PIPE SEWER 31 INCH X 51 INCH	LF
827	10	REINFORCED CONCRETE CONSTRUCTION	CY
2054	07	REINFORCED CONCRETE HEADWALL & SPILLWAY	LS
2050	07	REINFORCED CONCRETE HEADWALL & SPILLWAY - DRURY LN	LS
2051	07	REINFORCED CONCRETE HEADWALL & SPILLWAY - ELLENDALE AVE [DELETED]	LS
2052	07	REINFORCED CONCRETE HEADWALL & SPILLWAY - KENSINGTON AVE	LS
2053	07	REINFORCED CONCRETE HEADWALL & SPILLWAY - PICADILLY AVE	LS
2055	07	REINFORCED CONCRETE HEADWALL & SPILLWAY - WELLINGTON CT	LS
2120	10	REINFORCED CONCRETE HEADWALL AND SPILLWAY	CY
2682	05	REINFORCED CONCRETE HORIZONTAL ELLIPTICAL PIPE SEWER ?? INCHES X ?? INCHES	LF
2017	05	REINFORCED CONCRETE HORIZONTAL ELLIPTICAL PIPE SEWER 24 INCHES X 38 INCHES	LF
1979	17	REINFORCED CONCRETE INVERT	CY
2507	05	REINFORCED CONCRETE LOW-HEAD PRESSURE PIPE, CL C-125, 108"	LF
2160	12	REINFORCED CONCRETE MANHOLE	EA
1933	12	REINFORCED CONCRETE MANHOLE BOTTOM SECTION	EA
2067	15	REINFORCED CONCRETE PILE CAP	LS
10	05	REINFORCED CONCRETE PIPE SEWER 12 INCH CLASS III	LF
2223	05	REINFORCED CONCRETE PIPE SEWER 12 INCH CLASS IV	LF
2633	05	REINFORCED CONCRETE PIPE SEWER 144 INCH CLASS II	LF
11	05	REINFORCED CONCRETE PIPE SEWER 15 INCH CLASS III	LF
12	05	REINFORCED CONCRETE PIPE SEWER 18 INCH CLASS III	LF
13	05	REINFORCED CONCRETE PIPE SEWER 21 INCH CLASS III	LF
14	05	REINFORCED CONCRETE PIPE SEWER 24 INCH CLASS III	LF
2421	05	REINFORCED CONCRETE PIPE SEWER 24 INCH CLASS V	LF
15	05	REINFORCED CONCRETE PIPE SEWER 27 INCH CLASS III	LF
2194	05	REINFORCED CONCRETE PIPE SEWER 27 INCH CLASS IV	LF
2683	05	REINFORCED CONCRETE PIPE SEWER 27 INCH CLASS V	LF
16	05	REINFORCED CONCRETE PIPE SEWER 30 INCH CLASS III	LF
2571	05	REINFORCED CONCRETE PIPE SEWER 30 INCH CLASS V	LF
17	05	REINFORCED CONCRETE PIPE SEWER 33 INCH CLASS III	LF
18	05	REINFORCED CONCRETE PIPE SEWER 36 INCH CLASS III	LF
2684	05	REINFORCED CONCRETE PIPE SEWER 36 INCH CLASS IV	LF
2685	05	REINFORCED CONCRETE PIPE SEWER 36 INCH CLASS V	LF
19	05	REINFORCED CONCRETE PIPE SEWER 42 INCH CLASS II	LF
1916	05	REINFORCED CONCRETE PIPE SEWER 42 INCH CLASS III	LF
2681	05	REINFORCED CONCRETE PIPE SEWER 42 INCH CLASS IV	LF
20	05	REINFORCED CONCRETE PIPE SEWER 48 INCH CLASS II	LF
2163	05	REINFORCED CONCRETE PIPE SEWER 48 INCH CLASS III	LF
2686	05	REINFORCED CONCRETE PIPE SEWER 48 INCH CLASS IV	LF
2687	05	REINFORCED CONCRETE PIPE SEWER 48 INCH CLASS V	LF
21	05	REINFORCED CONCRETE PIPE SEWER 54 INCH CLASS II	LF
1931	05	REINFORCED CONCRETE PIPE SEWER 54 INCH CLASS III	LF
2688	05	REINFORCED CONCRETE PIPE SEWER 54 INCH CLASS IV	LF
2689	05	REINFORCED CONCRETE PIPE SEWER 54 INCH CLASS V	LF
22	05	REINFORCED CONCRETE PIPE SEWER 60 INCH CLASS II	LF
1932	05	REINFORCED CONCRETE PIPE SEWER 60 INCH CLASS III	LF
2690	05	REINFORCED CONCRETE PIPE SEWER 60 INCH CLASS IV	LF
2691	05	REINFORCED CONCRETE PIPE SEWER 60 INCH CLASS V	LF
23	05	REINFORCED CONCRETE PIPE SEWER 66 INCH CLASS II	LF
2164	05	REINFORCED CONCRETE PIPE SEWER 66 INCH CLASS III	LF
2692	05	REINFORCED CONCRETE PIPE SEWER 66 INCH CLASS V	LF
24	05	REINFORCED CONCRETE PIPE SEWER 72 INCH CLASS II	LF
25	05	REINFORCED CONCRETE PIPE SEWER 78 INCH CLASS II	LF
2420	05	REINFORCED CONCRETE PIPE SEWER 78 INCH CLASS III	LF
2419	05	REINFORCED CONCRETE PIPE SEWER 78 INCH CLASS IV	LF
26	05	REINFORCED CONCRETE PIPE SEWER 84 INCH CLASS II	LF
27	05	REINFORCED CONCRETE PIPE SEWER 90 INCH CLASS II	LF
28	05	REINFORCED CONCRETE PIPE SEWER 96 INCH CLASS II	LF
2499	05	REINFORCED CONCRETE PIPE SEWER 96 INCH CLASS IV	LF
1984	17	REINFORCED SHOTCRETE LINER 04-INCH, FILLMORE ST SEWER	LS
1977	17	REINFORCED SHOTCRETE LINER 04 INCH	SF
1978	17	REINFORCED SHOTCRETE LINER 10 INCH	SF

ALPHABETICAL LISTING OF CIPRO PAY ITEMS

PAY_ ITEM #	Category	Description	Unit
2486	17	REINFORCED SHOTCRETE LINER 02 INCH	SF
2086	17	REINFORCED SHOTCRETE LINER 04 INCH W/ LINER PLATES, ARLOE JOINT SEWER	LS
2088	17	REINFORCED SHOTCRETE LINER 04 INCH, DALE AVENUE JOINT SEWER	LS
2085	17	REINFORCED SHOTCRETE LINER 04 INCH, EUCLID AVENUE STORM SEWER	LS
2093	17	REINFORCED SHOTCRETE LINER 04 INCH, MANCHESTER AVE SEWER - REACH 1	LS
2089	17	REINFORCED SHOTCRETE LINER 06 INCH , DALE AVENUE JOINT SEWER	LS
2438	19	RELOCATION OF WATER SERVICE CONN. IN DIRECT CONFLICT W/THE NEW CONSTRUCTION	EA
2166	19	RELOCATION OF WATER SERVICES	EA
1878	15	REMOBILIZATION	LS
1898	15	REMOVAL AND ADJUSTMENT OF STRUCTURES	LS
1893	15	REMOVAL OF CONCRETE	LS
2576	15	REMOVAL OF INTERCEPTOR	LS
2569	15	REMOVAL OF SHEET PILING	SF
2694	15	REMOVAL OF UNSUITABLE SUBGRADE	CY
2113	15	REMOVE AND REPLACE STORM SEWER AND APPURTENANCES	LS
1896	15	REMOVE CONC. DRIVEWAY & REPLACE W/ ASPHALTIC CONC.	SY
1909	17	REPAIR OF CONCRETE AT BASE OF SEWER WALL (TYPE "B" REPAIR)	LF
2094	17	REPAIR OF LATERAL SEWER CONNECTION (TYPE "LC" REPAIR)	EA
2649	15	REPAIR RETAINING WALL UNDERMINING	LF
2230	17	REPAIRS AT MANHOLE CORBEL	PL
2443	17	REPLACE FRAME& COVER	EA
2153	17	REPLACEMENT OF LATERAL SEWER (TYPE "RL" REPAIR)	EA
2693	15	REPLACEMENT OF UNSUITABLE SUBGRADE	CY
2145	17	RETEST JOINTS (GUARANTY) FOREST PARK SW DRAINAGE FACILITIES REACH 1	LS
2156	14	REVEGETATION BLANKET	SY
2546	14	RIP RAP	SY
2565	10	RIPRAP KEY	SY
130	14	ROCK BLANKET	SY
129	14	ROCK BLANKET - GROUTED	SY
2528	06	ROCK BOLTS, GROUTED RESIN, #8 X 30'	EA
2529	06	ROCK BOLTS, GROUTED RESIN, #8 X 5.5'	EA
2530	06	ROCK BOLTS, GROUTED RESIN, #8 X 6'	EA
2531	06	ROCK BOLTS, GROUTED RESIN, FOUR #8 X 5.5' EA SET	PL
2578	10	ROCK FILL SLOPE PROTECTION	LS
2248	10	ROCK LINING	SY
2611	10	ROCK LINING (2 FT. THICK)	SY
2587	10	ROCK TOE PROTECTION	SY
2056	19	SANITARY LATERAL, 6"	LF
1862	15	SANITARY SEWER CLEANOUT	EA
2114	19	SANITARY SEWER SERVICE LATERALS	LF
2034	19	SAW-CUTTING CONCRETE PAVEMENT (LESS THAN TWENTY-FIVE (25) FEET/PLACE)	PL
2144	17	SEAL AND RETEST JOINTS - FOREST PARK SW DRAINAGE FACILITIES REACH 1	EA
2705	17	SEAL SERVICE CONNECTION	EA
1910	17	SEALING OF CRACKS BY GROUT INJECTION (TYPE "C" REPAIR)	LF
2168	15	SECURITY (ALLOWANCE)	AL
142	14	SEEDING	SY
2563	10	SEEDING & LIVE STAKING	SY
2251	17	SEMPLE SOUTH OF ST LOUIS AVE	EA
1975	15	SEPTIC TANK AND DRAINFIELD REPLACEMENT	LS
2121	17	SEWER DIVERSION - EUCLID DIVERSION STRUCTURE	LS
2382	19	SEWER RE-CONNECTIONS 8" - 24" DIA.	EA
2383	19	SEWER RE-CONNECTIONS OVER 24" DIA.	EA
2653	15	SEWER SEPARATION / DRIVEWAY DISCONNECT	EA
2536	06	SHAFT GROUT HOLE REINFORCEMENT, #8 X 20'	EA
1844	15	SHEET PILING	SF
2070	15	SHEET PILING	AL
2169	15	SHOP AND FIELD PREPERATION	LS
1887	15	SHORING LEFT IN PLACE	SF
2087	17	SHOTCRETE LINER 02 INCH , OLD BLACKSTONE PUBLIC SEWER	LS
2096	17	SHOTCRETE LINER 02 INCH, EXTENSION OF LINDELL SEWER	LS
2084	17	SHOTCRETE LINER 02 INCH, EXTENSION OF WYDOWN SEWER	LS
2095	17	SHOTCRETE LINER 02 INCH, MANCHESTER AVE PUBLIC RELIEF SEWER	LS
1983	17	SHOTCRETE LINER 02-INCH, FILLMORE ST SEWER	LS

ALPHABETICAL LISTING OF CIPRO PAY ITEMS

PAY_ ITEM #	Category	Description	Unit
2502	17	SHOTCRETE LINER 4 INCH THICK	SY
2429	17	SHOTCRETE MORTAR PROTECTION	SF
2488	13	SIDEWALK - ASPHALT	SY
2224	13	SIDEWALK - CHAT	SY
1870	13	SIDEWALK - CONCRETE	SF
133	13	SIDEWALKS & DRIVEWAYS CONCRETE- REM. AND REP.	SY
2503	13	SIDEWALKS EXPOSED AGGREGATE CONCRETE-REM AND REP	SY
2042	19	SIDEWALKS-ASPHALTIC CONCRETE-REM. & REP.	SF
2039	19	SIDEWALKS-CONCRETE-REM. & REP. (FIFTY (50) SQUARE FEET AND GREATER)	SF
2038	19	SIDEWALKS-CONCRETE-REM. & REP. (LESS THAN FIFTY (50) SQUARE FEET)	SF
2080	15	SINKHOLE TREATMENT	PL
2127	19	SITE PIPING	LS
2218	17	SLAB REPAIR - FULL DEPTH - 9 INCH	SF
2216	17	SLAB REPAIR - PARTIAL DEPTH - REBAR EXPOSED	SF
2217	17	SLAB REPAIR - PARTIAL DEPTH - REBAR NOT EXPOSED	SF
140	14	SODDING - BLUEGRASS	SY
2632	14	SODDING - FESCUE	SY
141	14	SODDING - ZOYSIA	SY
2077	15	SOIL TESTING	LS
2097	17	SPALLED CONCRETE AND EXPOSED REBAR REPAIR (TYPE "SC" REPAIR)	SF
1890	12	SPECIAL 2 GRATE INLET WITH TRAP	EA
1971	01	SPECIAL BEDDING - MANHOLE	PL
1970	01	SPECIAL BEDDING - PIPE	LF
1875	15	SPECIAL MANHOLE	EA
1897	15	SPECIAL MANHOLE WITH FOULWATER DROPS	LS
2030	12	SPECIAL SHALLOW INLET	EA
1919	15	SPECIAL SHALLOW MANHOLE	EA
2111	15	SPECIAL SHORING	PL
2715	15	SPECIAL SITE WORK	LS
2631	12	SPECIAL STRUCTURE	LS
2159	17	SPECIAL WASTE DISPOSAL (ALLOWANCE)	CY
2256	15	SPECIAL WASTE DISPOSAL (ALLOWANCE)	CY
2501	15	SPECIAL WASTE DISPOSAL/EXCAVATED SOIL	CY
2664	10	SPRING REPAIR	CY
2105	15	STAND-BY GENERATOR	LS
2537	06	STEEL PILE, BORED	LF
2568	15	STREAMBANK MITIGATION (404 & 401 PERMIT)	SF
1866	13	STREET PAVEMENT - ASPHALT OVERLAY (2 INCH)	SY
134	13	STREET PAVEMENT - ASPHALTIC CONCRETE REM. AND REP.	SY
135	13	STREET PAVEMENT - BITUMINOUS WEARING SURFACE	SY
2656	13	STREET PAVEMENT - CONCRETE	SY
131	13	STREET PAVEMENT - CONCRETE REM. AND REP.	SY
2043	19	STREET PAVEMENT-ASPHALTIC CONCRETE-REM. & REP.	SF
2044	19	STREET PAVEMENT-ASPHALTIC CONCRETE-SURF. & RIGID BASE-REM. & REP.	SF
2045	19	STREET PAVEMENT-CONCRETE-REM. & REP.	SF
132	13	STREET PAVMT-ASPHL CONC SURF & RIGID BASE-REM & REP	SY
2511	15	STRUCTURAL MONITORING POINTS	EA
2157	17	STRUCTURE VI	LS
160	07	STUB AND STOPPER 06 INCH PIPE	EA
115	07	STUB AND STOPPER 08 INCH PIPE	EA
828	07	STUB AND STOPPER 10 INCH PIPE	EA
116	07	STUB AND STOPPER 12 INCH PIPE	EA
829	07	STUB AND STOPPER 15 INCH PIPE	EA
208	07	STUB AND STOPPER 18 INCH PIPE	EA
2718	07	STUB AND STOPPER 36 INCH PIPE	EA
2548	07	STUB AND STOPPER 42 INCH PIPE	EA
2171	15	SUMP PUMP	EA
2512	15	SURFACE MONITORING POINTS	EA
2146	17	TEMPORARY ACCESS SHAFT, EUCLID AVENUE STORM SEWER	LS
2147	17	TEMPORARY ACCESS SHAFT, OLD BLACKSTONE PUBLIC SEWER	LS
1879	15	TERMINATION OF CONTRACT	LS
2427	15	TESTING ALLOWANCE	AL
2155	07	THRUST BLOCK	EA
2666	10	TIDEFLEX DRAIN OUTFLOW	EA

ALPHABETICAL LISTING OF CIPRO PAY ITEMS

PAY_ ITEM #	Cate-gory	Description	Unit
2538	06	TIE-BACK ANCHOR	EA
2539	06	TIMBER LAGGING	SY
2662	10	TOE WALL	LF
1996	17	TOTAL CONSTRUCTION FOR PERIOD	LS
1973	19	TOTAL CONSTRUCTION FOR PROJECT	LS
2618	15	TRANSITION SECTION - LARGE	EA
2619	15	TRANSITION SECTION - SMALL	EA
2231	15	TRASH GUARD	LS
2020	15	TREE	EA
1987	12	TRENCH DRAIN	EA
2679	12	TRENCH DRAIN (COMPLETE)	EA
2540	06	TUNNEL LINER PLATE	SF
2541	06	TUNNEL SHAFT #1	LS
2542	06	TUNNEL SHAFT #2	LS
2600	06	TUNNEL SHAFT #3	LS
2543	06	TUNNEL SHAFT #4	LS
1985	17	TYPE "C" REPAIRS	LF
2485	15	UNDERGROUND LOCATION	EA
1972	19	UNSUITABLE SUBGRADE	CY
2491	19	UNSUITABLE SUBGRADE	CY
2510	15	UTILITY MONITORING POINTS	EA
901	16	UTILITY RELOCATION	LS
2456	15	VALVE CHAMBER - REINFORCED CONCRETE	EA
1943	18	VALVE JUNCTION BOX	EA
2648	10	VEGETATED GABIONS IN PLACE	CY
2638	10	VEGETATED REINFORCED EARTHEN SWALE	SY
2590	10	VEGETATED REINFORCED SOIL SLOPE	SY
2463	13	VEHICLE ACCESS PAVERS	SY
1911	17	VOID REPAIR (TYPE "VR" REPAIR)	SF
2059	17	VOID REPAIR IN CROWN	SF
2108	19	WATER SERVICE CONNECTION	EA
1995	19	WATER SERVICES RELOCATED	LS
2544	06	WELDED WIRE FABRIC, WWF 4 X 4 - W2.9 X W2.9	SY
2545	06	WELDED WIRE FABRIC, WWF 6 X 6 - W4 X W4	SY
2170	15	WINDOW GLASS BLOCK	EA
2489	15	WROUGHT IRON GATE	LS
1961	15	WWTP BYPASS VAULT	EA
1960	15	WWTP VALVE VAULT	EA
110	07	WYE 06 INCH ON 08 INCH PIPE	EA
111	07	WYE 06 INCH ON 10 INCH PIPE	EA
112	07	WYE 06 INCH ON 12 INCH PIPE	EA
113	07	WYE 06 INCH ON 15 INCH PIPE	EA
114	07	WYE 06 INCH ON 18 INCH PIPE	EA
179	07	WYE 06 INCH ON 21 INCH PIPE	EA
183	07	WYE 06 INCH ON 24 INCH PIPE	EA
1903	07	WYE 06 INCH ON 27 INCH PIPE	EA
1969	07	WYE 06 INCH ON 30 INCH PIPE	EA
2211	07	WYE 06 INCH ON 36 INCH PIPE	EA
2454	07	WYE 06 INCH ON 42 INCH PIPE OR LARGER	EA
2136	07	WYE 08 INCH ON 08 INCH PIPE	EA
2225	07	WYE 08 INCH ON 12 INCH PIPE	EA
2167	07	WYE 08 INCH ON 18 INCH PIPE	EA
2226	07	WYE 08 INCH ON 24 INCH PIPE	EA
2132	07	WYE 08 INCH ON 36 INCH PIPE	EA
2552	07	WYE 12 INCH ON 36 INCH PIPE	EA
2227	07	WYE 12 INCH ON 12 INCH PIPE	EA
2228	07	WYE 12 INCH ON 15 INCH PIPE	EA
2229	07	WYE 12 INCH ON 24 INCH PIPE	EA
2553	07	WYE 12 INCH ON 36 INCH PIPE	EA