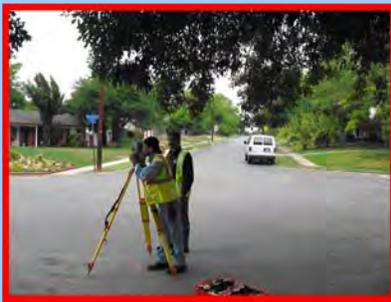




City of San Antonio

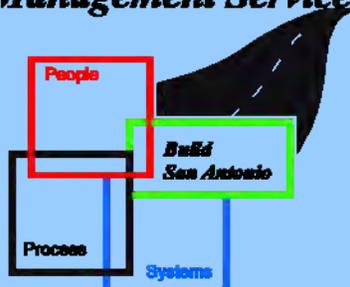
Capital Improvements Management Services



Design Guidance Manual

Our Mission:
Together, Dedicated to our Community
.....Building a Great San Antonio

***Capital Improvements
Management Services***



February 2012

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Functional Manual: City of San Antonio Design Guidance Manual

Effective Date: February 2012

Purpose

This manual is intended to provide general guidance in the management and design of horizontal civil projects for the City of San Antonio. It outlines the procedures and formats that must be followed in performing design tasks associated with roadway and drainage projects within the city.

Contents

The manual is organized in sections that cover the following topics:

- Project Management and Administration
- Surveying and Mapping
- Drainage
- Utility Coordination
- Traffic Engineering
- Roadway, Bicycle, and Pedestrian Design
- Environmental Coordination/Permitting
- CAD Standards
- Geotechnical Services
- Public Involvement
- Cost Estimating
- Quality Control/Quality Assurance

Instructions

This is a new revision and supersedes the June 2008 document.

Changes from June 2008 Edition

This is a summary list of the major changes to the Manual.

- Updates to *Section 4.0 – Drainage* tables and miscellaneous items. Storm Sewer plan and profiles will be required at 40% submittal.
- Updated *Section 5.0 - Utility Coordination*
- Updates to 40%, 70% and 95% design checklist
- Added a “Bid Phase” checklist.
- Updated *Project Work Plan* to identify tasks required at each submittal phase
- Added a *Complete Streets* component to sections 6.0, 7.0 and 11.0, including a Streets Assessment and Filed Analysis Checklist.
- City of San Antonio Standard Details for Construction will not be required in the construction plans, but must be included as a reference in the bid documents.

- Added/revised the following forms:
 - Utility Conflict Matrix
 - Review Comment & Resolution
 - Variance Letter, Plan of Record (As-Builts) Requirements
 - CPS - “Things to Consider”
 - QA/QC Certification.
- The following miscellaneous items were revised: generalized scope of services, estimated quantities sheet , summary sheets, street cross sections

Contact

For more information regarding any topic in this manual, please contact the Assistant City Engineer’s office within the Capital Improvements Management Services Department of the City of San Antonio.

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SECTION 1.0

Introduction

Purpose

This *Design Guidance Manual* (manual) has been prepared to instruct design engineers on the procedures and formats to be followed in the design of capital improvement projects (CIP) for the City of San Antonio (COSA). This manual is primarily concerned with horizontal projects, which include streets, storm drainage systems, and regional drainage projects.

Sections are devoted to the preparation and standardization of reports, plans, specifications, cost estimates, and project and quality management. Design engineers should read and understand the manual before beginning design and should discuss any concerns with the Capital Improvements Management Services (CIMS) Department project manager, Public Works project manager, or other City of San Antonio representative prior to proceeding with design of the work.

The manual enables uniformity of design standards and plan contents. Standardization enhances consistency in design quality and presentation, which is expected to minimize error and improve understanding of design intent, as data presentation and documentation practices become routine. Design engineers, inspectors, and contractors will benefit from the consistency of designs and plans, once they are familiar with the requirements. It is not the intent of the manual to restrict the design engineers from preparing unique or innovative solutions to particular problems. Solutions that involve new theories, processes, materials, or construction methods are essential elements of the engineering profession. However, when such solutions deviate from those proposed in the following sections, design engineers should first discuss their proposals with the CIMS project manager and seek approval for variances from the City Engineer's office before beginning work.

Application of Guidelines

Although this manual was initially developed to provide minimum standards for design of the 2007–2012 Bond Program, it is intended to set the standard for all design associated with horizontal city projects. To this end, guidance is provided on the following topics:

- Project Management and Administration
- Surveying and Mapping
- Drainage
- Utility Coordination
- Traffic Engineering
- Roadway, Bicycle, and Pedestrian Design
- Environmental Coordination Permitting
- CAD Standards
- Geotechnical Services
- Public Involvement
- Cost Estimating
- Quality Assurance/Quality Control

The authors recognize that, in order for this document to achieve its purpose, the provisions herein must be used. To improve design quality and consistency, resist temptation to set aside requirements in order to achieve short-term goals or minimize costs.

Revisions

This manual is expected to be dynamic, and sections will be updated as the needs of the city change and improvements are identified.

The engineering community in San Antonio is encouraged to take ownership of this manual by offering ways to improve the practice of engineering within the city and documenting those improvements for subsequent editions.

Closing Comment

Succeeding sections of this manual define the administrative and technical requirements for the design of streets and roadways and storm and regional drainage systems. Unless otherwise noted, criteria and standards apply to public sector projects. Specific technical design criteria are often provided in other documents, which are referenced herein.

SECTION 2.0

Project Management and Administration

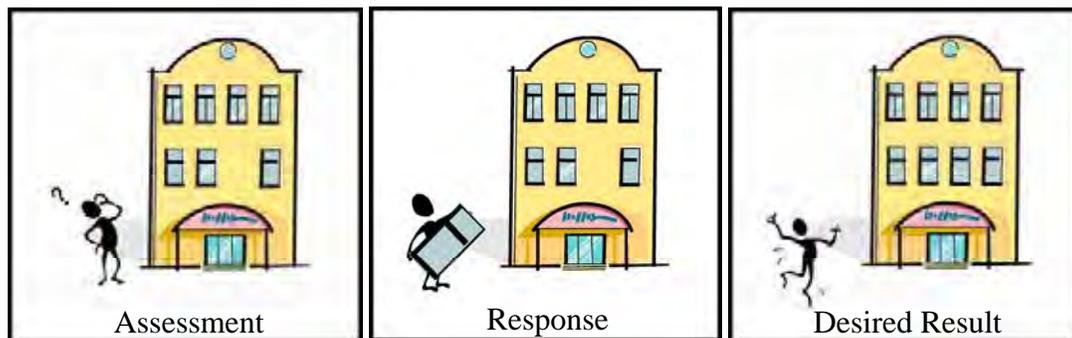
Introduction

Within the field of municipal civil engineering, the term “project management” is used to describe a broad spectrum of activities related to the completion of a specified scope of work. Because these descriptions vary from organization to organization, it is important that the City of San Antonio clearly articulate and memorialize those activities it considers to be project management activities and describe how they differ from either program management or project implementation. This section focuses on the city’s expectations regarding project management as they relate to capital improvement projects undertaken by the COSA.

Let’s start with basic concepts. The definition of “project management” in *The American Heritage Dictionary* is “the act of directing or controlling (managing) an undertaking that requires a concerted effort (a project).” By “concerted effort” we mean an effort that is planned and accomplished by working *together*. Implied in this definition is that there is some overall purpose associated with the project—one that inspires and informs its management.

Project management activities can be divided into two realms: *assessment* and *response*.

- *Assessment* — In the first realm, we regularly assess how well a project activity or indicator compares with the planned or desired condition.
- *Response* — In the second realm, we take appropriate actions that move the activity or factor toward its planned or desired condition.



This implies the project manager knows from the beginning the desired condition, that the manager understands the action that will move the activity or factor closer to the desired condition (without adversely affecting other aspects of the project), and that the manager is willing and able to take that action.

Effective project managers make assessments and direct corrective action on regular intervals to avoid the need for drastic corrections that consume resources which otherwise could be used elsewhere. Moreover, effective managers evaluate whether those corrective actions produce the desired results, learning and adapting to improve their performance. Finally, effective managers

are prudent in selecting factors to be assessed, focusing energy and resources on those that ensure successfully delivering a successful project.

Management vs. Execution

The same people who *designed* a project often perform the project *management*. This can lead to confusion about the boundary between design and execution. Design is the creation of a plan that solves one or more problems and involves inquiry and observation. It is focused on delivering a *successful* project that meets the client's objectives and resolves their issues. Project management is a collection of activities that ensures that resources dedicated to implementing the client's goals are employed effectively, typically with an eye toward meeting cost and schedule goals.

A similar situation exists for construction. While construction involves organizing the means and methods needed to construct a successful project, project management involves accomplishing the construction successfully. If project managers do not understand the basic design and construction processes, there is risk of assessing inappropriate factors and/or directing ineffective or counterproductive corrective actions.

Project Management vs. Program Management

As the term implies, project management is related to a specific project (an undertaking requiring concerted effort), whereas program management is related to an organized collection of projects. Many of the principles that apply to project management also apply to program management, just at a higher level. A significant part of program management involves organizing the projects that comprise the program. Some of the factors considered in program management include scheduling projects to coordinate with funding availability, to accommodate special events, to identify opportunities for achieving synergies and efficiencies among projects, and to adjust project schedules and project budgets. The program manager focuses on delivering the program successfully, while the project manager is focused on successful delivery of a single project.

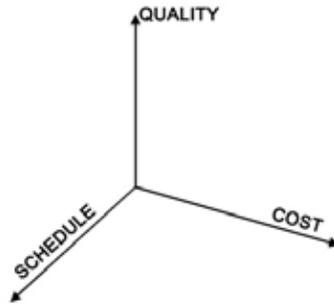
The Project Management Team

The management of a city capital improvement project is not the responsibility of a single person or even one entity. It is a team effort, with responsibility residing in part with the design team to which the project is assigned, in part with the contractor selected to build the project, and in part with the City of San Antonio's project manager to which the project is assigned. Effective communication among these parties is essential to achieve a successful project.



Dimensions of Project Management

In its efforts to deliver capital improvement projects, the City of San Antonio focuses on three primary factors—cost, schedule, and quality—each of which is discussed briefly below as it relates to project management.



Cost

Costs include those for design, program management, design enhancements, right-of-way acquisition, environmental permitting and mitigation, environmental remediation, utility relocation and adjustment, infrastructure construction, and those for administering the work. The focus on cost should be for the total project, not a single component. For example, thoughtful expenditures for subsurface utility engineering during design process will clearly increase the design cost, but it is likely to reduce construction costs.

Schedule

There are several ways to assess the schedule of a particular project, but the most important is whether the project is completed on time. Developing a realistic schedule includes establishing prudent milestones that will help the project manager make adjustments necessary to deliver the project in accordance with the client's goals.

Quality

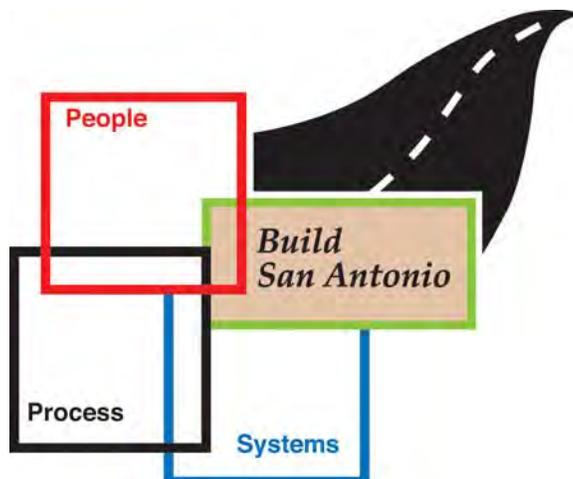
In the absence of specific standards, quality is a subjective factor, that is, it depends upon the evaluator's personal preferences and biases. Later in this section we will provide specific standards that diminish this subjectivity. For now, we will say simply that quality is a characteristic of the tangible work products, such as reports, designs, plans, specifications, estimates, invoices, pavement, concrete, etc.

Although intangible, the quality of the service provided is just as important. Are project delivery team members dependable? Do they communicate effectively with one another? Are they competent and cooperative? Are they able to adapt to changing circumstances?

In the ensuing sections, we will address these dimensions of quality in more detail.

Understanding the People, Processes, and Systems

As mentioned earlier, to effectively manage a project, one must understand basic design and construction processes. The CIMS Department's logo, reflecting people, process, and systems, establishes a logical approach to discuss how these design and construction processes work.



People

Every capital improvement project involves a universe of people and organizations related to it in one manner or another. Who are these people, and what might their respective roles be?

- **Advocates** — Every project starts with one or more advocates. In many cases, these are individual or corporate members of the community who perceive or are affected by an infrastructure deficiency, such as a low water crossing, a congested roadway, an inadequate drainage facility, or the absence of a park. Their concerns are communicated to elected officials, city staff, or the volunteers of the bond committee. While not directly involved in delivering the project, advocates are important and can be a source of good information about the problem the project is to fix and, in the end, will judge whether a successful project was successfully delivered.
- **Affected residents, businesses, and traveling public** — Constructing a capital improvement project affects the people who live and work in the project area and others who travel through that area. Like advocates, these people are not directly involved in the delivery of the project but, if not satisfied, will voice their dissatisfaction to elected officials, who will contact appropriate city staff and petition them to make adjustments to resolve concerns.
- **Client** — The client for the capital improvement projects for which this *Design Guidance Manual* is developed is the City of San Antonio. Several individuals represent the city in a variety of circumstances and for a variety of purposes.
 - *City Council Members* — Most capital improvement projects lie entirely within the geographic district of a member of City Council, and most City Council members (or their predecessors) were instrumental in the final selection of the projects that comprise

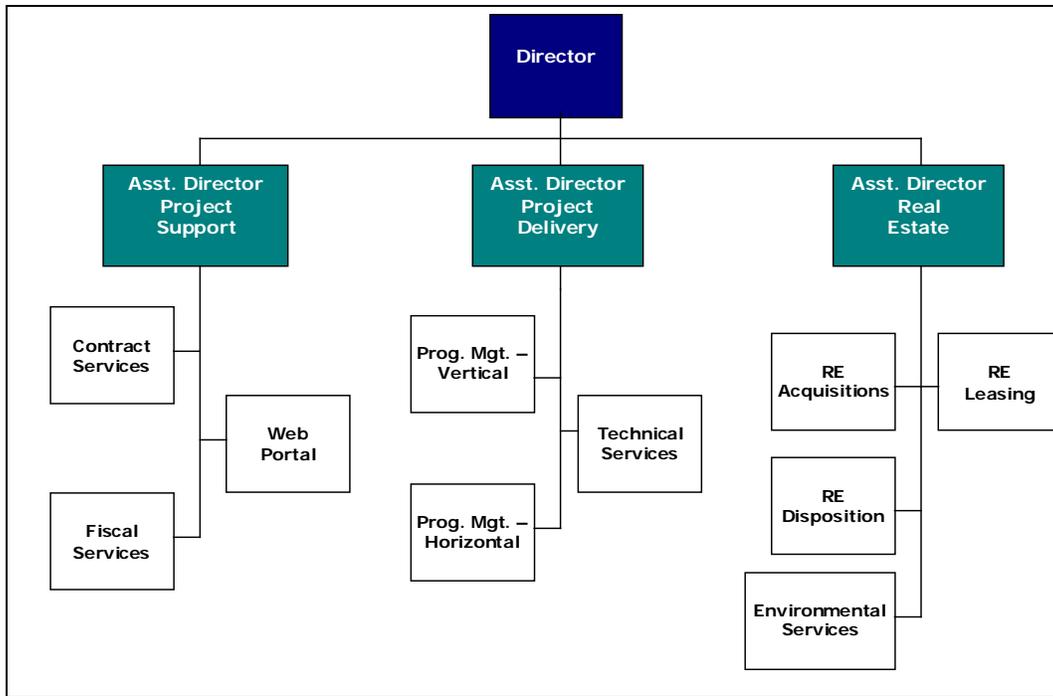
the program being undertaken. The process of deciding which projects are included—and, more painfully, which projects are *not* included—represents a significant personal effort on the part of the council members. As a result, most have a keen interest in making sure the projects in their districts are successful, i.e., that they are completed on time and solve the relevant problems.

Once a program of CIPs is established and approved, council members monitor progress, communicate with constituents, and, as a body, ratify certain project-related business transactions, such as approving design contracts, construction contracts, and right-of-way (ROW) and easement acquisition. Council members can take action only as a body and are not authorized to act individually on behalf of the city. Nevertheless, although individual council members do not have authority to direct how a project is to be designed or built or to approve variances, additional services, change orders, and other similar matters, by working with city staff they can and do influence how a project progresses and evolves.

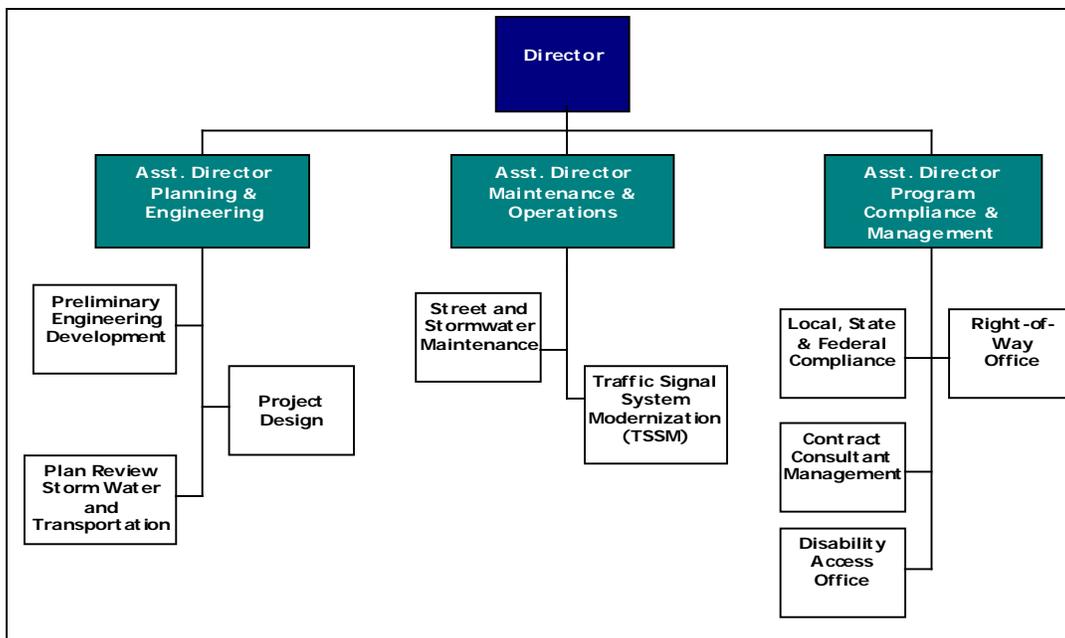
City Manager — The City of San Antonio uses what is referred to as a “strong city manager” form of government. Under this form, the City Council takes action as a body on policy matters and certain statutory items, such as approving annual budgets, contracts, and the purchase of goods and supplies. The city manager executes the directives of the council through his or her staff. Either directly or through designated representatives, he or she is responsible for the formation of a budget, the development and negotiation of contracts, and all other day-to-day operations of the city, including the execution of capital improvement projects.

Because the City of San Antonio is such a large enterprise, the city manager accomplishes his or her responsibilities by appropriately assembling and organizing resources into departments, then delegating performance to individuals who are chosen to lead and manage those departments. In addition, he or she may have one or more assistant managers or deputy managers to help monitor, oversee, and evaluate the departments. Although the city manager will not normally participate in day-to-day project management or execution activities, he or she has the ultimate authority to direct how a project will be delivered.

- *CIMS Staff* — The department of the City of San Antonio that has been assigned the responsibility to successfully deliver Bond Programs and CIP Projects is the Capital Improvement Management Services (CIMS) Department. The department is organized as shown on the following page.



- *Public Works Staff* — The department of the City of San Antonio that is assigned the responsibility to successfully deliver successful Storm Water Revenue Bond Projects is Public Works. The department is organized as follows:



- **Program Manager** — To help the CIMS staff manage the overall Bond Program, the City of San Antonio may contract with a firm to serve as executive program manager. The role of the executive program manager is to assist the CIMS staff with project scheduling, project

delivery, budget, performance measurement, web portal support, design and construction management, and public relations.

- **Bond Oversight Commission** — The commission advises city and county elected officials and staff regarding recommended processes for delivery of CIPs, including review of scope, cost estimates, budget, schedule, public input, alternative delivery systems, and program management.
- **Design Consultant** — Most capital improvement projects undertaken by the city involve the use of a design consultant. The relationship between a design consultant and the City of San Antonio is governed by a Professional Services Agreement, a copy of which is included in this manual as [Appendix 2-A](#). Historically, most capital improvement projects were delivered using the traditional Design-Bid-Build (DBB) method of project delivery. Going forward, other delivery methods, such as Competitive Sealed Proposals, Construction Manager at Risk (CMAR), or Design-Build (DB), may be used with increasing frequency. In these cases, modifications to the standard professional services contract will be needed.
- **Construction Contractor** — Each capital improvement project is a construction project and requires the selection of a construction contractor to build the work. The relationship between the construction contractor and the City of San Antonio is governed by a construction contract, a copy of which is included in this manual as [Appendix 2-E](#). Again, most projects will be delivered using the traditional DBB method of project delivery, and projects will be awarded based on low-bid or competitive sealed proposals. In certain cases, CMAR or DB methods may be chosen, in which cases, modifications to the standard professional services contract will be needed.
- **Utility Companies** — Many utilities have infrastructure located within the rights-of-way and easements of projects to be built. Some of these utilities are public organizations, whose primary motivation is providing service at a low cost; some are private businesses whose primary motivation is to provide service while generating profit and shareholder return.

One of the criticisms most commonly aimed at CIPs regards failure to facilitate utility construction in advance of or in coordination with street and drainage construction. Such failures undermine the public's trust and confidence in local government, which are essential to the approval of future bond programs. Therefore, all participants must cooperate to minimize the likelihood that newly constructed infrastructure will be damaged by utility work soon after completion. Utility work can be organized into three categories: functional replacement, relocation, and adjustment.

Functional Replacement involves replacing a utility line that is not otherwise in conflict with proposed infrastructure construction due to the line's condition, obsolescence, or inadequate capacity. The line can be put back in the same place or in another location that is not in conflict with a proposed improvement. An example of this would be to replace a sewer line that is in poor condition to avoid the need to replace it three years after other improvements are complete.

Relocation involves installing a new line or lines in a different location due to the existing line's conflict with proposed infrastructure construction. An example is to install a water line in a new location to facilitate construction of a large storm drainage trunk line in a street.

Adjustment involves minor changes to accommodate proposed infrastructure construction. An example is the installation of a relatively short section of water line to facilitate the construction of a drainage lateral or a storm drainage inlet.

The utility companies involved in the delivery of City of San Antonio capital improvement projects include:

- *San Antonio Water System* — sanitary sewer, potable water, and recycled water;
- *CPS Energy* — natural gas and electricity;
- *AT&T* — telephone and Internet service;
- *Time Warner* — cable television, telephone, and Internet service;
- *Grande Communications* — cable television, telephone, and Internet service;
- *Other utilities* — “cross country” pipelines, local water supply companies, and competitive local exchange carriers (CLEC), among others.

A brief look at each of these entities helps better understand whether and how they are typically involved with City of San Antonio Capital Improvement Projects.

- *San Antonio Water System (SAWS)* — SAWS is a public utility owned by the City of San Antonio. It operates water supply and distribution facilities, sewage collection and treatment facilities, and treated wastewater transmission and distribution facilities. SAWS is governed by a seven member Board of Trustees, responsible for overall policy and management of the system. Board members are appointed by City Council and include the Mayor of San Antonio.



SAWS may agree to allow evaluation and design of any replacement, relocation, or adjustment (RRA) of its facilities to be performed by the design consultant pursuant to its professional services contract with the city and to have any RRA work be done by the construction contractor pursuant to its construction contract with the city.¹

- *CPS Energy* — CPS Energy (CPS) is the largest municipally owned energy company in the nation; it provides both natural gas and electric service. Its five-member board, comprises the Mayor of San Antonio and four members who represent the quadrants of the city. Any vacancy in the four non-mayoral positions is filled by majority vote of the remaining board members, subject to formal confirmation by City Council, as evidenced by resolution or ordinance. The board employs a general manager and staff, who conduct the day-to-day operations.



CPS facilities include natural gas transmission and distribution facilities and both underground and overhead high-voltage electrical transmission. CPS may agree to allow evaluation and design of any RRA of its gas and underground electric facilities

to be performed by the design consultant, pursuant to its professional services contract with the city, and may have any RRA work be done by the construction contractor, pursuant to its construction contract with the city. Implied in this is that CPS staff may facilitate any RRA work related to its overhead and underground electrical facilities.

- *AT&T* — AT&T, Inc. (AT&T) is a holding company whose subsidiaries and affiliates provide both wireline and wireless telecommunications services and equipment. The services and products offered by AT&T that are most vulnerable to being affected by CIPs include local-exchange services, long-distance services, and data/broadband and Internet services, using underground, overhead, and wireless technology infrastructure.



AT&T operates many of its facilities within the rights-of-way and easements owned by the city, pursuant to a franchise agreement, some sections of which govern how AT&T's facilities are to be adjusted and relocated to accommodate capital improvement projects.

- *Time Warner* — Time Warner is the second largest cable operator in the nation. It provides cable television, Internet, and digital telephone service through a network of underground, overhead, and wireless technology infrastructure, operating within rights-of-way and easements, pursuant to a franchise agreement with the city. The company typically manages design and construction of RRA work in advance of or concurrent with construction of capital improvement projects.
- *Grande Communications* — Grande Communications is a Texas-based communications system providing high-speed Internet, local and long-distance telephone service, and digital cable services through a fiber optic network. Grande operates its facilities within rights-of-way and easements, pursuant to a franchise agreement with the city, and typically manages design and construction of any RRA work in advance of or concurrent with capital improvement project construction.

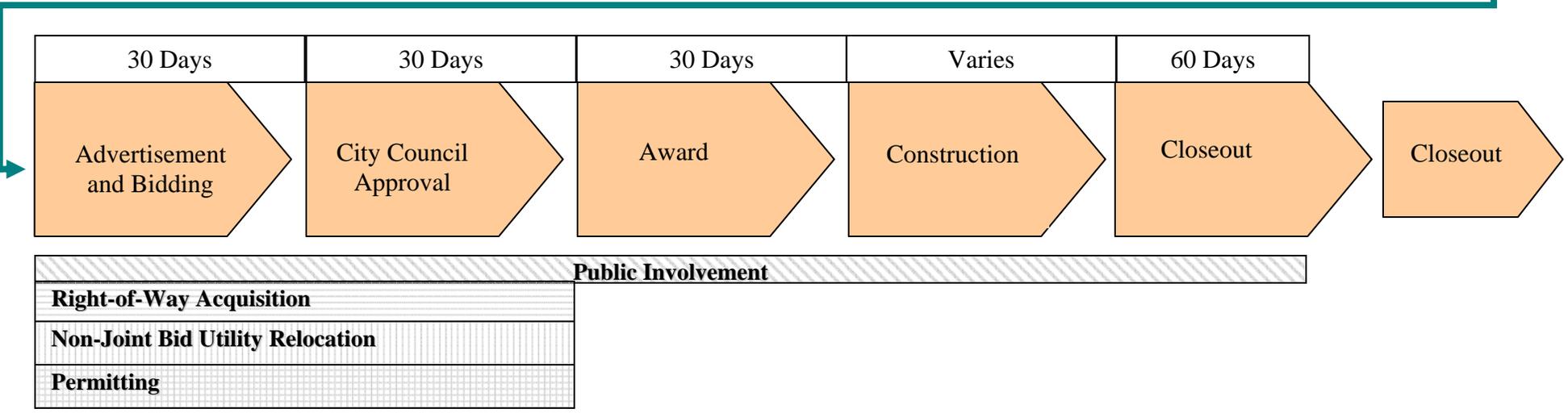
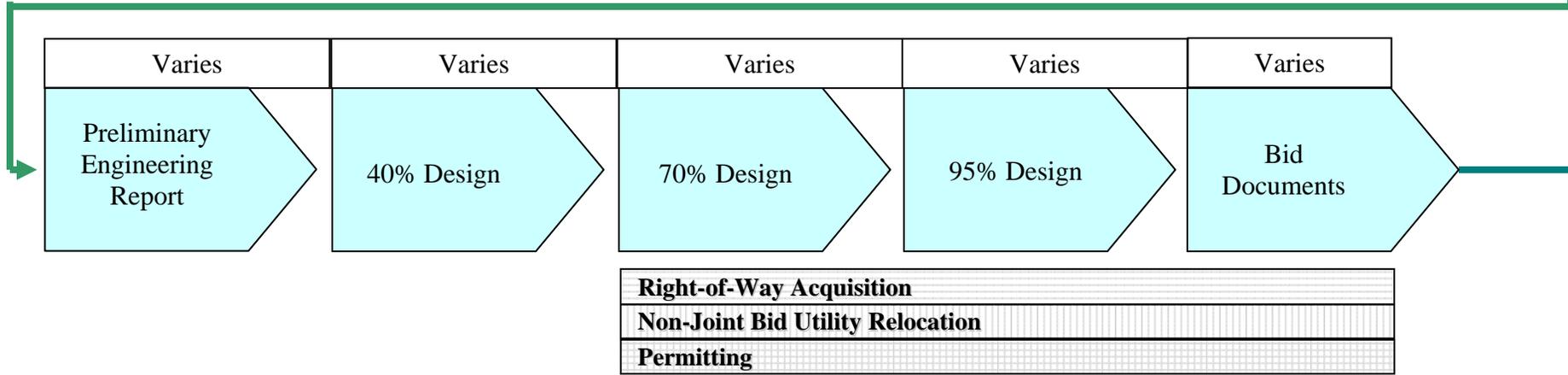
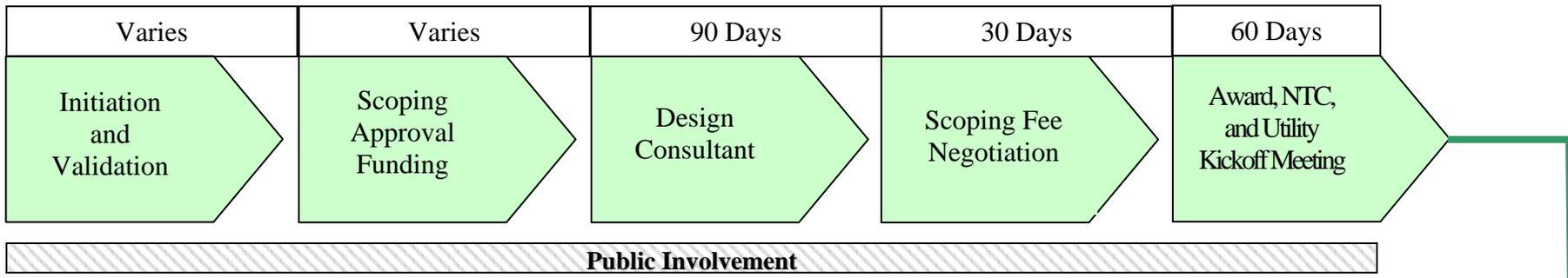


- *Other utilities* — Other utilities that may be encountered include the following:



- fiber optic and copper wire lines owned by entities other than AT&T, such as Sprint, Verizon, and a host of competitive local exchange carriers (CLECs);
 - underground pipelines owned and operated by a variety of entities, such as Valero and Coastal States, typically conveying petroleum products; and
 - private lines and tunnels operating in City of San Antonio ROW, both with and without benefit of formal approval.
- **Municipal, Emergency, and Postal Service Providers** — Rounding out the cast of those involved in or affected by CIPs are entities that provide services to those who live and work in the area. These entities are responsible for providing services that are either critical to the health, safety, and welfare of people in the project area or are so fundamental that they are considered essential. These include VIA public transportation, trash and recycling collection, emergency medical services (EMS), fire, police, the United States Postal Service, and local school districts.

Undertaking a capital improvement project is a complicated endeavor with the potential to affect many people and organizations. Undertaking a large number of such projects simultaneously increases that complexity, straining the resources of all involved. To mitigate this, participants typically strive to execute projects using consistent processes and protocols. Project managers who study, become familiar with, and adapt their design approach to conform to the processes described in this manual are more likely to achieve success. However, effective project managers are also alert for and open to innovation and change that will improve the efficiency and effectiveness of the overall effort, and they work within the system to improve it.



City of San Antonio Capital Improvement Project Process

Processes

A number of processes are executed in order to deliver a capital improvement. Some affect the design, construction, and maintenance of the work, while others are administrative. One might say that the former influence the *success of the project*, while the latter influence *how successfully the project is delivered*. An effective project manager understands both kinds of processes, how they work, how they influence each other, and, of course, how to manage them. Let's look first at those processes that influence the project itself.

- **Initiation and validation process** — A capital improvement or Bond project begins when an advocate identifies a problem to be solved and gains the attention of the city. This can occur in one of several ways, including a call to a City Council member, city manager, or staff; testimony before City Council; coordination with citizen committees; a 3-1-1 call; or, of course, city staff addressing an infrastructure deficiency.

Typically, a city staff member with technical expertise evaluates the initial request and determines what potential solution or range of solutions might be appropriate. Sometimes this is part of the normal course of business, and sometimes this work is outsourced to an engineer under contract to assist city staff in this effort. Actions at this stage include:

- determining in which council district(s) the project is located;
- proposing a preliminary scope of work (street, drainage, etc.) and preliminary project limits and boundaries;
- making a preliminary determination of whether the subject project is affected by or affects one or more other approved or potential projects;
- identifying major problems that might be encountered (e.g., hazardous materials, managing traffic during construction, utility complications, inadequate ROW, etc.);
- identifying potential sources of funds to design and build the project;
- establishing a preliminary estimate of the cost to execute the project; and
- documenting the month and year this information was assembled.

One could refer to the collection of this information for a large number of projects as a “wish list.” Ideally, a record is created to preserve this information, since many projects that survive the initiation and validation process do not move forward immediately due to lack of funding, priority, or other reasons. If the initiation and validation work is lost or poorly organized, that same work must be repeated when someone raises the concern again, wasting precious resources. Conversely, if the information is well organized, maintained, and clearly recorded, the work simply needs to be updated in order to move to the next stage.

The initiation and validation work for most of the bond projects is placed in a document called *Potential Capital Improvement Projects–Level 1*.

- **Scoping, approval, and funding process** — During scoping, approval, and funding, a project moves closer to implementation. Along the way, more in-depth (though still preliminary) investigations are conducted, some refinements may be made, cost estimates are updated and/or refined, the project is approved by the City Council for inclusion in the capital improvement program, and the program financing arrangement is approved by City

Council or the voters. This process is not linear, but iterative and collaborative, involving the project's advocates, City Council (and their appointees), all levels of city staff, and design consultants selected to provide technical support.

There are many ways to accomplish this process, but little consensus about which is most effective. This is ironic because both basic project parameters and expectations with regard to cost, schedule, and quality are established during this phase. Whether they are reasonable or not, these parameters will be used to determine a project's success. Since 2002 the city has significantly improved the scoping, approval, and funding process.

The most recent and, thus far, the most successful example of this is the scoping, approval, and funding process leading up to the 2007–2012 Bond Program. Having been advised of its prudent debt capacity by the city manager, the City Council resolved to formulate and secure voter approval of bond issuance to finance a major capital improvement program. In November 2006, the Council created four advisory committees to recommend a program of capital improvement projects to be included in the 2007–2012 General Obligation Bond Program. The four committees created were streets and sidewalks, drainage, parks, and community initiatives. Each committee comprised 32 individuals, three members from each council district, and two co-chairs appointed by City Council. Each bond committee was provided an initial “straw-man bond program proposal” that had been prepared by city staff, and each committee also received public comments. As a result of the committees' deliberations, some projects moved from the straw-man list to the deferred list, some moved the other direction, and some were scaled back or otherwise modified, all with technical input from city staff and their consultants. Eventually, the committees forwarded their recommendations to the City Council, and council then deliberated over the course of two months. After making a few changes to some specific projects, City Council approved the program and called for an election. Voters approved the sale of bonds to pay for the projects.

The additional investigations, refinements, and cost estimates (referred to as level 2 estimates) were placed in a document called *Potential Capital Improvement Projects–Level 2*. Level 2 estimates prepared earlier in the process were more likely to be carefully prepared than those proposed or modified late in the formulation process. Nevertheless, Level 2 estimates lay the foundation for project implementation.

A word regarding bond covenants — When bonds are sold, the issuer (in this case the City of San Antonio) pledges or covenants to do certain things and to avoid doing other things. While many of these covenants relate to how the issuer manages its financial affairs, others relate specifically to the projects themselves. For example, a covenant might say that the issuer will not expend any of the proceeds from the sale of the bond on any project other than those described in the bond. Depending on how this is worded, this could prevent the use of bond funds to reconstruct intersecting streets to the limits of the utility RRA work. Another common covenant relates to the use of surplus bond proceeds and how and when they can be expended: never, after all projects are substantially complete, etc. Early in the design process a prudent project manager will learn how any bond covenants might affect the design.

The Selection Process — The city will pursue the selection through its normal process, which generally involves the widespread notification of the city’s intent to award contracts to design consultants.

Design consultants respond by submitting statements of interest in certain projects and their qualifications to design them and the associated utilities. The city then will select a design consultant for each project and will begin the process of negotiating a [Professional Services Contract](#).

An important part of the selection process is identifying the first two members of the project management team: the city project manager (PM) and the design consultant project manager. Ideally, both of these team members will serve in those capacities through both the design and construction stages of the project.

The city project manager is typically known prior to requesting statements of interest, and ideally the city PM should be identified in the request for interest statements. This affords the design consultant the opportunity to select the design consultant project manager who offers the best combination of technical and non-technical qualifications to manage the project, with one of those qualifications being a good relationship with the city PM.

The relationship between the two PMs is one of the most critical elements for the project team. If they perform competently, treat each other with fairness and respect, communicate well, and cooperate, there is a strong probability that they will successfully deliver the project, even despite adversities that may arise. Otherwise, there is a strong likelihood that the project will suffer, even under the best of conditions.

- **The Scoping and Fee Negotiation Process** — The decisions, agreements, and commitments made in this process are significant in determining whether the design consultant will have the financial resources to successfully design the project. Accordingly, it is important that the two PMs have sufficient experience in delivering similar projects, understand the history of the project, and understand not only the assumptions on which the design budget has been based, but also the risks associated with relying on imperfect or incomplete information.

A key goal of most capital improvement programs is to deliver the projects on time. Accordingly, a primary focus of the project management team should be to optimize the time needed to complete the scoping and fee negotiation process. In other words, consuming excessive amounts of time to gain a few dollars or reduce a fee by a few dollars is unwise. The negotiations should be about coming to an agreement that both parties can support as expeditiously as possible, not about winning the negotiation. In addition, effective negotiations establish a framework for managing the project. The following process has proven effective for a number of agencies and will be used by the City of San Antonio to negotiate the design fee for its capital improvement projects:

- **Initial Scope Meeting (ISM)** — The first step is the initial scope meeting. Participants should include the city project manager, the design consultant project manager, appropriate discipline specialists and subconsultants, SAWS, CPS and all utility

representatives. Depending on the circumstances, company representatives and any agency partners, such as the Texas Department of Transportation (TxDOT) that may be involved in the project may attend.

The scope and magnitude of the project should determine the duration and formality of the ISM, but the goal of the ISM is to develop and agree on a definitive scope of work. In preparation for the meeting, the city PM and the design consultant PM should review the information from *Potential Capital Improvement Projects—Level 2*, visit the project site, and take necessary actions to independently complete the *Generalized Scope of Services* (GSOS) form (see [Appendix 2-C](#)). During the first part of the ISM, those attending should review the GSOS form and resolve all discrepancies with regard to the services to be provided.

In the second part of the ISM, the project team will discuss plan presentation format, design criteria, and other items that may influence the design consultant's fee proposal. This information will be recorded in the *City of San Antonio Design Summary Report* (DSR), a copy of which is included in [Appendix 2-B](#).

The design consultant should bring a copy of the DSR to the ISM, including as much information as is available and highlighting areas that warrant discussion and resolution. Following the ISM, the design consultant should update the DSR to reflect the results of the ISM discussions. It is not uncommon for some items included in the DSR to be unknown even after the ISM is complete. These items should be noted as "TBD" (to be determined), and a process should be agreed upon to resolve them.

It is noted that the DSR is intended to be a living document, evolving as the project progresses and serving as a record of that evolution. While decisions about what is in the DSR are to be made by the city PM or the project team, it is the design consultant's responsibility to maintain the DSR, including republication to all team members whenever significant changes occur.

Other topics of discussion at the ISM include:

- utility coordination and subsurface utility engineering requirements;
- plans for joint bidding with utilities or other design consultants;
- city preferences for traffic control, environmental responsibilities, project sequencing, complete streets and public information efforts;
- expectations and submittal requirements for the preliminary engineering report (PER), 40 percent, 70 percent, 95 percent, and bid documents phases;
- CAD standards, drawing standards, and file-management standards;
- standard specifications that will govern the construction of the project; and
- desired overall project schedule and duration of time required by the city to review each milestone submittal.

Finally, administrative and management issues will be discussed, including the following:

- invoicing requirements and normal turnaround time for payment;

- change management procedures; and
 - communication procedures.
- **Fee Negotiations** — Following the ISM, the design consultant PM will take the agreed-upon GSOS and develop a Project Work Plan (PWP) spreadsheet (see [Appendix 2-D](#)), including estimates of the number of sheets to be prepared and the hours of the various categories of labor needed to complete the work. By applying the design consultant’s standard hourly billing rates to the various categories of labor, a total preliminary fee proposal can be developed.

The city PM will review the fee proposal and determine whether the fee is acceptable or further negotiation is required. Because the Level 2 Cost Estimates were developed through a generally thoughtful and deliberate process, there is a natural tendency for them to drive the development of the scope of work and associated fee. The project management team is encouraged to use the Level 2 estimates as only one measure of the fee proposal.

The final fee for each project can be considered a function of the manner in which these major variables are combined:

- the scope of work, as reflected in the detailed task listing;
- the estimated hours for various types of personnel to complete the tasks; and
- the billing rates for these personnel.

Addressing each of these major items in a deliberate and methodical fashion can expedite successful negotiations. When a fee has been agreed upon, the design consultant can prepare a preliminary cost-loaded schedule that can be used to manage the project design.

Once negotiations are complete, the design consultant will develop minutes of the ISM and any subsequent meetings, including the DSR, GSOS, and PWP, and transmit them to the city PM for inclusion in the design contract. If major changes to the scope of work occur after contract execution, the design consultant should update the DSR, GSOS, and PWP and include the updated documents in the design contract amendment.

Scoping and negotiating the professional services agreement is integral to the project delivery and project management process. When done properly, it greatly enhances the efficiency of the rest of the project delivery and management process, helping projects to be completed more expeditiously and efficiently.

- **Design Processes** — Once a Professional Services Contract has been negotiated, it is submitted to City Council and the design consultant is notified in writing to proceed with the design of the project. (See [Professional Services Contract](#) — Section IV.4.1.) The design consultant PM should pursue the completion of the project design in accordance with the milestones described in the Professional Services Contract. The typical design milestones are:
- preliminary engineering report (only if required by city);

- 40 percent design;
- 70 percent design;
- 95 percent design; and
- bid documents.

In general, the design consultant PM should regularly assess the progress of the design team against the planned progress, in terms of both effort expended and completion status, and take necessary action to stay on or ahead of schedule. In addition, on a monthly basis, the design consultant PM should prepare a brief summary of the status of the design effort indicating the following:

- whether the project is essentially behind, on, or ahead of schedule;
 - whether any significant variance exists and, if so, an explanation of the source or cause;
 - if appropriate, measures being taken to mitigate adverse variances; and
 - any other matters that are anticipated to affect the design consultant's ability to meet the project schedule.
- **Administrative Processes** — In addition to actual design and construction, all CIPs involve a variety of administrative processes. These administrative processes do not generally have direct influence the design or construction of the project. Still, they are important in that they facilitate the flow of information and resources that sustain the various members of the project delivery team, and when these processes fail or falter, progress on the project may be impeded.

In general, these processes include communication, documentation, change management, and invoicing and payment. The City of San Antonio has developed a web-based tool intended to make these administrative processes more efficient. The [User's Guide for the Web Portal](#), found on the Help Desk of the portal, details these administrative processes. Design consultant PMs should become familiar with using this communication and collaboration tool.

- **Construction Processes** — Although the emphasis of this *Design Guidance Manual*, as the name indicates, is on the *design* of capital improvement projects, the design consultant's responsibilities extend beyond the design phase, into the bidding, construction, and closeout phases of a project. While the design consultant's efforts during these phases are not design activities, they can influence project delivery.
- **Bidding** — During the bidding phase, the design consultant issues bid documents, including plans, specifications, and addenda. Good records must be kept to ensure that all potential bidders are afforded equal access to the same information.

From time to time, a potential bidder will ask the design consultant questions outside of the pre-bid conference. Sometimes these are simple questions intended to help the bidder understand the project better to prepare his or her best bid. In other cases, the questions may be intended to afford a contractor competitive advantage over other

bidders. For example, a question about whether the design consultant would support making a certain change to the work, if the bidder were awarded the contract. If answered affirmatively, that bidder would have information other bidders do not have. The design consultant must exercise good judgment in these situations, extending cooperation where it facilitates fair competition among bidders, while avoiding preferential treatment of any potential bidders.

The design consultant should attend the bid opening and, after the opening, secure a copy of each responsive bidder's proposal. The design consultant should then evaluate each bidder's proposal, checking to ensure that all bidders used the same bid forms and quantities and verifying that unit prices were correctly extended and totaled. In addition, the design consultant should scrutinize the unit prices and note any that are unusually high or low. In such cases, it is a good idea to double check the quantities for these items to assess the possibility that a bid is "unbalanced." Should quantity mistakes be discovered, the design consultant should determine which bid will likely result in the lowest cost with the corrected quantity, then confer with the city PM to determine how to proceed.

A more detailed listing of the bidding process responsibilities and activities is found in [Appendix 2-F](#) of this manual.

- **Construction** — The responsibilities of the design consultant during the construction of a project are specified in the design contract. While these responsibilities are clearly articulated in that contract, the design consultant should recognize that it is uniquely positioned to serve as a valuable resource to the City of San Antonio and, as their agent, a resource to the construction contractor. As the entity most familiar with the project, the design consultant is usually in the best position to evaluate and respond to requests for information, changed conditions, and proposed design changes. In this capacity, the design consultant should provide a timely response to all requests, after a careful, thorough, and expeditious review.
- **Closeout** — During the closeout phase of the project, the design consultant's purpose is to update and annotate the plans to depict the project as constructed. In performing this work the design consultant relies on information developed and supplied by the construction contractor, inspectors, and, in some cases, by material and equipment suppliers. Where information supplied by a third party appears ambiguous, incorrect, or incomplete, the design consultant should exercise reasonable efforts to resolve the discrepancies through discussions with appropriate parties. Where discrepancies cannot reasonably be resolved, the design consultant should clearly state the nature of the discrepancies on the plans.

In addition, during project closeout, the design consultant should participate in any evaluation efforts undertaken by the city or the contractor. In the absence of such efforts, the design consultant should conduct an independent evaluation of the project, noting successes, failures, and opportunities for improvement.

- **Operations and maintenance** — Once a project has been closed out and accepted by the City of San Antonio, it becomes part of the city’s overall infrastructure and is operated and maintained accordingly. Although operations and maintenance of recently completed projects can provide insight and information that may lead to improved planning and design-phase processes for future projects, there is no formal process in place to accomplish this.

Systems

City of San Antonio Design Summary Report

One of the ways to deliver projects more efficiently is to use consistent, thoughtful systems, such as the [City of San Antonio Design Summary Report](#).

The DSR is a tool intended to be used by the project management team to anticipate and record basic project information, with the objective being to minimize or eliminate rework, last minute surprises, and the associated costs and delays.

Although the DSR addresses a wide range of issues that can affect the design and delivery of a project, every project is unique and, as such, each warrants thoughtful consideration of how its design and construction will be accomplished. Not all factors identified in the DSR will apply to each project, and issues will arise on some projects that are not addressed in the standard DSR. Those contributing to the DSR are encouraged to think comprehensively and tailor their use of the DSR form to meet the unique needs of the project. If a PER is to be prepared for a project, most of the information can be derived from the DSR, even if it is not complete.

It is likely that the DSR will be partially completed prior to the ISM and updated from time to time as the project progresses. As information is added or revised, it is strongly recommended that the additions, modifications, and deletions be associated with a date and the author of the change. Information that is outdated should not be deleted, but stricken, so as to preserve a more complete record of the progression of the project design.

The responsibility for maintaining the DSR is shared by the design consultant PM and the city PM. Initially, the city will use the form to communicate its preferences and special information about the project. It is recommended that the city PM complete the initial DSR and store it on the Portal. After that, the design consultant PM will assume responsibility for updating the DSR to reflect the results of the ISM, as well as any subsequent changes in preferences, scope, schedule, and other information. The DSR should be available for viewing by all who have roles in the project, but the ability to modify it should be limited to the city and design consultant PMs.

The DSR, found in [Appendix 2-B](#), is organized into five sections:

- scheduling, funding, and delivery;
- existing conditions;
- base mapping, geotechnical and environmental, permitting, and community relations;
- design issues; and
- project journal.

Completing the DSR Form Electronically

1. Open the document.
2. Save the document as <DSRForm.[project name].doc>, using the name of the project in place of [project name].
3. Right click the Permission Button on the Tool Bar or Right Click on any blank area of the Tool Bar.
4. Left click “Forms.”
5. Engage the “Protect Form” icon (pad lock).
6. Complete as much of the form as possible, and resave the file.

Expanding the DSR Form — For some projects, parts of the form will need to be expanded. From example, on page 3, under Existing Conditions, it may be necessary to list more than one set of existing typical roadway conditions. In this circumstance the user is encouraged to expand the form using the following procedure.

1. Open the document.
2. Right click the Permission Button on Tool Bar or Right Click on any blank area of the Tool Bar.
3. Left click “Forms.”
4. Disengage the “Protect Form” icon (pad lock).
5. Highlight the part of the form that needs to be duplicated.
6. Copy the highlighted area (depress the Control button while hitting the “c” key, or left click the “Copy” button in tool bar).
7. Move the cursor to the correct location.
8. Paste the copied text (depress the Control button while hitting the “v” key, or left click “Paste” button in tool bar)
9. Right click the Permission Button on the Tool Bar or Right Click on any blank area of the Tool Bar.
10. Left click “Forms.”
11. Engage the “Protect Form” icon (pad lock).
12. Resave the file.

Adding supplemental information — More information is generally better than less information, and adding explanatory text at certain items will make the DSR more effective. Following is the procedure to add text:

1. Open the document.
2. Right click the Permission Button on the Tool Bar or Right Click on any blank area of the Tool Bar.
3. Left click “Forms.”
4. Disengage the “Protect Form” icon (pad lock).
5. Move the cursor to correct location.
6. Type the comments desired. It is recommended that the author of any supplemental text use italicized Times New Roman font (12 pt) and indicate author and date added.
7. Right click the Permission Button on the Tool Bar or Right Click on any blank area of the Tool Bar.
8. Left click “Forms.”
9. Engage the “Protect Form” icon (pad lock).

10. Resave the file.

City of San Antonio Generalized Scope of Services

Most of the capital improvement projects undertaken by the City of San Antonio involve a similar set of design and analysis activities. These are included in the Generalized Scope of Services found in [Appendix 2-C](#). The GSOS should be used during the ISM to identify the activities, work products, and other issues that influence the level of effort associated with designing capital improvement projects. From the completed GSOS, the design consultant will develop a *Project Work Plan* (PWP) spreadsheet (see [Appendix 2-D](#)), including estimates of the required number of sheets to be prepared and of the hours of various categories of labor required to complete the work.

By using the GSOS and PWP forms consistently over time, the City of San Antonio can establish the range of costs associated with certain design activities, begin to make informed decisions regarding the costs and benefits of these activities, and become a more successful negotiator.

City of San Antonio Web Portal

The City of San Antonio has adopted a web-based project management tool set that includes:

- Primavera Contract Manager[®], a collaborative document control software program for contract administration and contract management, and
- Primavera Project Manager (6.x)[®] or Contractor 4.1[®], or higher, a web-based planning and scheduling program.

These tools have been configured and customized for use on City of San Antonio projects, and the comprehensive tool set is commonly known as “The Web Portal.” While some existing projects may be executed without benefit of these tools, all future CIPs will be managed using the Web Portal. Note, however, that the Web Portal was developed primarily for city project and program managers, not the design consultant project managers.

Nevertheless, the Web Portal does allow all project and program managers to assess the status of a project or program with regard to schedule and cost. The cost status is reported as the Cost Performance Index (CPI), while the schedule status is reported as the Schedule Performance Index (SPI).

- **Cost Performance Index (CPI)** — The Cost Performance Index is the ratio of the Earned Value of a particular effort to the Actual Cost of that effort on a particular date known as the “Data Date.”
- **Schedule Performance Index (SPI)** — The Schedule Performance Index is the ratio of the Earned Value to the Planned Value.

The web portal provides cost and schedule information for only the Professional Services Contract and Construction Contract. Other costs, such as administration, program management, and right-of-way acquisition, are not captured within the web portal. Therefore, city staff and/or program managers monitor these costs and schedules separately and develop a separate, more comprehensive reporting format for the particular program being managed.

The User's Reference Guide for the web portal is found in the Help Desk area of the portal.

Conclusion

Effective project management is essential for delivering successful capital improvement projects on time and on budget. The project management effort for City of San Antonio capital improvement projects is a team effort with responsibilities shared among the city project manager, the design consultant project manager, and the construction contractor project manager.

Thoughtful and thorough project scoping coupled with developing a sound project work plan early in the design process lays the foundation for a successful project. This can be accomplished through the use of the [City of San Antonio Design Summary Report](#) and the [Generalized Scope of Services](#). With only a little more effort, this can be translated into a cost-loaded schedule that can be used to manage the design process. Although these tools can make it more efficient, effective management is fully dependent on the design consultant project manager and the skill and experience used in monitoring progress and making appropriate adjustments.

SECTION 3.0

Surveying and Mapping

Introduction

The following section presents a wide range of survey activities that may be undertaken on capital improvement projects. Not all activities described in this section will be needed for each project. Instead, the city and design consultant project managers should use the DSR and the GSOS to develop a scope of the surveying work that is appropriate for the project they are managing.

Surveying the ROW

One of the critical decisions that must be made in scoping the survey work involves the extent to which the ROW will be surveyed. At one end of the spectrum is to survey the apparent ROW, using fences, existing roadway centerlines, block maps, and other readily available information (Apparent ROW Survey). At the other end of the spectrum is to prepare a full-blown boundary survey of the ROW (ROW Boundary Survey). The following should be used as a guide in deciding which approach to use.

The Apparent ROW Survey should be considered to be the typical or default approach. However, if it is known that the existing ROW is inadequate and that ROW acquisition will be required throughout a significant part of the project, a ROW Boundary Survey should be specified in the DSR and GSOS. On some projects, an intermediate condition may exist that requires the acquisition of isolated parcels, for example, the inclusion of corner clips or isolated parcels that have not dedicated additional ROW. In these cases, some additional plats and field notes may be required, but a full-scale survey of the entire ROW would not be required. While the city PM has the responsibility for proposing the initial approach for the ROW survey, the finally agreed upon approach should be the result of discussions between the design consultant PM and the city PM.

There may be instances in which both PMs initially agree that the prudent approach is to do an Apparent RPW Survey, but for which further investigation reveals a ROW Boundary Survey to be more appropriate. One example of this would be when a significant discrepancy is discovered between the block map ROW width and what exists on the ground. In such cases, the PMs should expeditiously negotiate the additional services required to provide the appropriate survey work.

Minimizing ROW Acquisition Related Delays

ROW acquisition is frequently the cause of not meeting a project delivery schedule. In some cases this delay is related to failure to begin ROW acquisition early enough to be finished by the time design and permitting activities are completed. In other cases, the delay is related to utility companies' inability to relocate their facilities to the newly acquired ROW in a timely manner. The project management team should thoughtfully scope and schedule the survey work to facilitate the completion of ROW acquisition at the earliest possible time, and in no event should ROW acquisition begin later than the 40

percent design milestone. Furthermore, if a project involves consideration of alternate alignments that may influence ROW acquisition, the project management team should consider a special interim submittal (between the PER and the 40 percent design submittals) that is focused on alignment selection. This will allow the ROW acquisition to proceed well ahead of the 40 percent submittal.

Boundary Surveying

Boundary surveying is performed when it is necessary to establish real property boundary locations to secure additional right-of-way and or easements and to avoid constructing public improvements on private property without the consent of the owner.

Boundary surveying is regulated by the State of Texas through the [Texas Board of Professional Land Surveying](#) (TBPLS), in accordance with the *Professional Land Surveying Practices Act* and *General Rules of Procedures and Practices*. Boundary survey work products include right-of-way maps and parcel descriptions.

Project Control and Base Mapping

Project Control

Each project must have a locative frame of reference to which all pertinent existing and proposed physical features relate. The frame of reference is three dimensional, comprising horizontal and vertical control. To facilitate coordinating one project with another, the City of San Antonio requires all future capital improvement projects to be based on the same control system. Three levels of project control should be established for each project: primary control, secondary control, and the stationing systems.

Primary control establishes the fundamental geometric basis for the secondary project control and stationing systems. The primary control system consists of three or four relatively stable monuments established outside of the project area, all of which have published horizontal coordinates and vertical. Secondary control and the stationing systems can be reestablished or verified at all times using the primary control system.

Secondary control is like primary control, except the monuments are located within the project area and, as such, are more vulnerable to disturbance and even destruction as a result of the project. In general, secondary control monuments are relatively stable monuments established at 800 to 1,000-foot intervals throughout the project, again all with published horizontal coordinates and vertical elevations. Secondary control can be used to locate evidence of boundaries and ROW lines, to locate topographic information for base mapping, to lay out stationing systems, and to lay out construction work.

Stationing systems form the geometric basis for the design and construction of the project and consist of appropriately marked centerlines, baselines, or coordinate systems and local benchmarks, all referenced to the primary or secondary project controls. Appropriate stationing system marks can be nail and shiner, PK nails, wooden stakes, or similar indicators. The markers should be identified with guard stakes or paint marks on

pavements identifying the stationing system and indicating the station. Examples would be: “Centerline Station 2+00” or “Baseline G Station 4+37.35.”

Stationing systems can be used to locate topographic information for base mapping and, with some discretion, to lay out construction work. Depending on the nature of the project being undertaken, stationing systems can be based on the apparent ROW; the resolved ROW; a physical feature, such as a drainage channel; or anything else that serves the engineer’s purposes. Because of their physical locations, stationing system markers are almost always destroyed during construction.

Base Mapping

Base mapping involves developing a picture of the project area that provides sufficient information to design the project and can be presented in a number of ways, including:

- ground surveyed planimetric mapping (with or without contours);
- aerial planimetric mapping (with or without contours);
- orthophotogrammetric photos (with or without contours);
- Digital Terrain Model (DTM);
- cross sections and spot elevations; and
- detailed measurements (structures, etc.).

Base mapping should reflect existing underground utility information sufficient to facilitate the design. Often base mapping evolves as the project design progresses. This is particularly true as it relates to subsurface utility engineering (SUE). Frequently, the early rounds of base mapping reflect the surveyed location of the surface evidence of underground utilities. Later, if the design engineer realizes a proposed facility may jeopardize an existing underground utility, the engineer may have the utility located using Quality Level B or A methods, updating the base mapping to reflect the new information.

Care should be taken in depicting underground utility information, and base maps should include a statement indicating the general quality level of the information shown. In addition, notes should be added to reflect higher or lower quality information.

Construction Layout

Construction layout involves providing detailed layouts for the locations and elevations of the proposed facilities, such as utility and drainage lines, box culverts, curb inlets and junction boxes, street centerlines, curbs, retaining walls, columns, bent and abutment caps, bridge decks, etc. Care and common sense should be taken in laying out the construction to ensure that the control system used is appropriate for the type of construction and that monuments and benchmarks referenced have not been disturbed.

General Guidelines

The following section describes surveying and mapping activities in more detail and serves as the standard for surveying and mapping for City of San Antonio CIPs. Surveying and mapping forms the essential foundation on which a project is designed and built. A complete, accurate survey and base mapping effort will allow the design engineer

to make the sound decisions needed to solve design problems. Moreover, good documentation of the surveying and base mapping effort, including comprehensive, clear survey notes, well-organized correspondence and electronic files, and other techniques, can help avoid rework, successfully defend claims, and otherwise help deliver the project on time and on budget.

Survey and Mapping Guidelines

Boundary and Right-of-Way

Survey Guidelines

Texas Board of Professional Land Surveying (TBPLS) Practices Act and [General Rules of Procedures & Practices](#).

[Texas Society of Professional Surveyors](#) (TSPS Manual of Practice Category 1A and Category 7).

Units: U.S. Survey Feet

There is a unit of measure called the “U.S. Survey Foot.” It is almost exactly equal to a standard foot, but its definition is slightly different:

- Standard (or “international”) foot = .3048 meters.
- U.S. Survey Foot = 1200/3937 meters.

In other words, one is defined in relation to the meter by a decimal expression; the unit of measure for the other is defined by a fraction.

Horizontal Datum: NAD 83(93) or NAD 83(CORS) — Texas State Plane Coordinate System, South Central Zone.

Surface Adjustment Factor: Reciprocal value of the Combined Adjustment Factor. The Surface Adjustment Factor for projects within Bexar County will be 1.00017.

Survey Safety — Required Items for Project Safety

- Proper traffic control devices in accordance with the [Texas Manual on Uniform Traffic Control Devices](#) (*Texas MUTCD*) shall be used when instruments/equipment are on or adjacent to the roadway.
- A set of warning signs will be used to warn that survey crews are working in or next to the roadway and should measure 48"x48" when working on major highways (*Texas MUTCD*). Survey personnel will wear safety vests at all times. Company vehicle(s) will have safety flasher (strobe) lights.
- If additional work is required outside of the right-of-way, prepare and send right-of-entry letters to all landowners affected by the survey.
- Before setting any subsurface monuments, such as Global Positioning System (GPS) points or benchmarks, all utilities in the area of proposed points must be located by calling 1-800-344-8377 (DIG-TESS).

Project Primary Control

A pair of project primary control points will be constructed at the beginning and end of the project, approximately 300 feet outside the project limits in order to avoid being disturbed or destroyed. Each of the primary control monuments will be a three-inch diameter aluminum disk on a $\frac{3}{4}$ " rebar driven a minimum of 24 inches into the ground (it can be shorter if in natural rock) or a three-inch disk set in concrete or rock with epoxy. The disk will be stamped "COSA CONTROL," with a project number and point number provided by the City of San Antonio (COSA) survey division. The primary control recovery sketches will be provided on an 11"x17" Mylar sheet. Each control sketch will provide the northing(y), easting(x), latitude and longitude, and elevation, with a tie to the closest street intersection. (See [Appendix 3-C](#).)

Three primary project monuments can be employed when the project length is less than 1,500 feet.

General Guidelines for a Boundary Survey

Overview

Information contained within this section is excerpted in its entirety and/or adapted for this manual from the Texas Board of Professional Land Surveying (TBPLS), the *Texas Department of Transportation (TxDOT) Survey Manual* (Revised 4/11), and the *Texas Society of Professional Land Surveyors (TSPS) Manual of Practice* available for purchase.

Preliminary Research

The foundation of any land survey is record research. According to the current rules of the Texas Board of Professional Land Surveying (TBPLS), the land surveyor must perform research adequate for the assignment.

[22 Texas Administrative Code §663.16 \(c\). Boundary Construction](#)

A land surveyor assuming the responsibility of performing a land survey also assumes the responsibility for such research of adequate thoroughness to support the determination of the location of intended boundaries of the land parcel surveyed. The surveyor may rely on record data related to the determination of boundaries furnished for the registrant's use by a qualified provider, provided the registrant reasonably believes such data to be sufficient and notes, references, or credits the documentation by which it is furnished.

Related Boundary Construction Information

Some sources of record data are:

- Texas General Land Office — Field Notes, Roll Sketches, County Maps, Working Sketches, Correspondence, Survey Reports, Patents
- County Clerk — Deed Records, Plat Records
- Court minutes, Patent Records, County Surveyor's Records
- Bexar Appraisal District — Tax Parcel Maps

- City Archives
- District Court Clerk
- San Antonio River Authority
- Irrigation Districts
- Utility Companies
- Municipal — Planning, Public Works, Engineering, Geographic Information System (GIS)
- Oil Companies, Lumber Companies, Railroads
- Private Surveyors

An abstract of title or a title run sheet may be of great assistance in determining which conveyances affect the land. The purpose of the title search for the land surveyor is not to determine title from a legal standpoint, but to retrace the history of the land as it affects the boundaries. The title must be searched sufficiently back in time to uncover all of the pertinent information. In many cases, this will be to the sovereignty of the soil.

According to the 22 *TAC* §663.16 (a), when delineating a property or boundary line as an integral portion of a survey, the surveyor shall respect junior/senior property rights, footsteps of the original surveyor, intent of the parties involved, the proper application of the rules of dignity or the priority of calls, and applicable statutory and case law of Texas.

Fieldwork

All fieldwork will be related to the NAD 83(93) or NAD 83(CORS) datum, Texas State Plane Coordinate System, South Central Zone, through a control network of National Geodetic Survey (NGS), Continuously Operating Reference Stations (CORS), and TxDOT regional reference survey points established before the commencement of the boundary survey. Surveys may be performed by global positioning system (GPS) techniques, such as static and/or Real-Time Kinematic (RTK) methods in terrain suitable for their employment.

Conventional survey methods may be needed in wooded, urban, or mountainous environments, or a mixture of GPS receivers and conventional total stations. Survey techniques shall comply with the procedures specified in the *TSPS Manual of Practice*. The surveyor will compute state plane coordinates on the Texas State Plane Coordinate System, South Central Zone, for all survey primary control. Surface coordinates will be computed by multiplying the state plane grid values by the Surface Adjustment Factor (SAF) of 1.00017 within Bexar County.

Final Right-of-Way Survey

The survey map will show record and calculated dimensions to facilitate the comparison of deeds with the survey construction. A background map of available aerial photography and digital orthophotographs will aid in delineating lines of occupation and natural terrain features having a locative effect.

Once the boundary construction of the lands affected by the project has been finalized, the location of the proposed acquisitions may proceed. At this stage, an initial overlay of the proposed takings may point out areas where the proposed ROW may be questioned.

The surveyor will consult with COSA's project manager to minimize uneconomic remainders and the taking of small slivers of land. The cost of acquiring miniscule gores of land from a parent tract can far exceed the value of the property. If possible, these parcels will be eliminated from the final ROW footprint. In addition, the review should examine the mitigation of utility adjustments through possible modification of the proposed ROW.

After the right-of-way is approved by the city project manager, the surveyor will prepare parcel plats with metes and bounds descriptions. The plats and field notes comprise together the property description. Permanent parcel corners will be set in compliance with Texas Board of Professional Land Surveying (TBPLS) [rules](#).

Company plastic caps with ½" diameter rebar will be set at all property corners, angle points, and points of curvature and tangency. Relative locations of the corner monuments set shall comply with the positional tolerance established by the TBPLS rules. A parcel strip map will be prepared from the property descriptions.

The parcel strip map will satisfy the current COSA requirements. The map will utilize MicroStation® computer graphics software currently required by COSA.

The parcel strip map is not a survey plat and therefore is not certified by a Registered Professional Land Surveyor (RPLS). It is a graphic representation of right-of-way conveyances in relation to the proposed roadway alignment. Appraisers, negotiators, right-of-way administrators and attorneys, and other staff involved in the acquisition of right-of-way will use the parcel strip map. The surveyor must take into consideration this fact in the preparation of the parcel strip map. As such, the parcel strip map functions not as a survey plat, but as a graphic index map to the parcels to be acquired by the city.

Fieldwork Instructions

Overview

Information contained within this section of the manual is excerpted in its entirety and/or adapted by the Standing Committee on Surveying (SCOS) from the *TxDOT ROW Manual Volume 1 – Procedures Preliminary to Release* <http://onlinemanuals.txdot.gov/txdotmanuals/ppr/index.htm>.

Conflicts

A conflict is defined as any intrusion or protrusion upon the property of another. A conflict may indicate the existence of an unwritten right that may evolve into a title right. Under the Texas and United States Constitutions, it is a fundamental duty to determine and compensate the owners for all rights acquired in the taking of property. Describe and tie all conflicts or possible conflicts in the survey field record.

Exercise special care in observing aerial conflicts such as overhead electric and telephone lines with cross-arms. Record these items in the field record. Other conflicts may include:

- fences;
- rock walls;
- power poles;
- guy wires;
- driveways;
- buildings, structures, basements, monitoring wells, irrigation canals, and sprinkler systems;
- underground utilities including water, sanitary sewer, communication, electricity, oil and gas pipelines, etc.;
- sidewalks;
- persons occupying the tract;
- clearing in the trees; and
- disturbed ground.

Roads and driveways crossing the subject tract shall be noted. These roads may be used by adjoining landowners for access to their property. Locate all dirt roads, as they may lead to a cemetery or be ingress and egress to another tract.

All improvements within, along, beside, or up to 25 feet outside the right-of-way lines must be located in relation to a property line, identified, and dimensioned.

Fence Ties

Property line fences shall be accurately located. Ties will be made as needed. The field survey record will note:

- age of fence;
- type of fence; and
- condition of fence.

The intersection of cross fences with property line fences shall be located. A sketch of cross fences in the interior of a tract shall be made if an aerial photograph is unavailable. Cross fences in the interior of a tract shall not be surveyed unless requested by the RPLS in responsible charge.

Adjoining fences along the property line shall be located in the survey field record. A sketch of such fences will be made if low-level high-resolution aerial photography is unavailable.

Wire fences that meander from tree to tree shall not be located unless they are boundary division fences. When tying tree-to-tree fences, note in the survey field record as to where the fence begins to go from tree to tree and where the fence ends from tree to tree

with periodic ties to fence from a traverse line. Each individual tree does not need to be tied unless required by the RPLS in responsible charge.

Easements

An easement is “an interest in land created by grant or agreement which confers a right upon owners (private or public) to some profit, dominion, or lawful use of the estate of another.” All surface evidence of utilities corresponding to known easements of record shall be located in the field survey record. Locate all easements that are within and abut the project limits.

The surveyor will locate all facilities crossing the subject tract to verify the location of the object in relation to the location of a recorded easement.

The surveyor will note:

- new excavations;
- pipeline markers;
- buried cable route signs;
- cleared routes across property;
- manholes; and
- any feature that suggests aerial or buried utilities, whether or not they were constructed under benefit of an easement of record.

Evidence of all cemeteries or possible cemeteries will be located and noted in the survey field record. Gates found on the perimeter of the tract shall be located. Apparent frequency of use and condition shall be noted. Sketches of roads entering and exiting the tract shall be made. Aerial photographs may be used as a base map to approximate the location of roads or trails across the property.

Boundary Checklist

The following boundary checklist shall be reviewed before the beginning and end of a boundary survey:

Fences

- Are all boundary fences located?
- Note fence type, approximate age, type of wire.
- Locate all significant angle points in fences and plot on sketch and/or aerial photographs.
- Prepare detailed sketch of fence at major corners.
- Locate intersection of cross fences at division fences.

Utilities

Use the quality level recommended by the engineer/owner as defined by [ASCE Standard 38-02, Standard Guidelines for the Collection and Depiction of Existing Subsurface Utility Data, CI/ASCE 38-02.](#)

- Locate serial electric, telephone, and cable TV lines (unless previously located by topographic survey).
- Locate all utilities flagged by one call system.
- Note the number of wires and brief description of cross bar poles with pole ID number.
- Locate all guy wires and down guys.
- Locate all sanitary sewer manholes, water valves, water meters and fire hydrants.
- Locate all inlets.
- Locate all underground pipelines, communication, electric lines (locate route signing and vents of underground utilities), and vaults.
- Locate all above ground pipeline and oil or gas well appurtenances such as valves, cathodic protection facilities, tank batteries, pumps, etc., if not previously surveyed.

Locates shall include invert elevations, top of manhole elevations, meter and valve elevations, etc. See Appendix 2-C.

Property Corners

- Locate all monuments on points of curvature, points of intersection, and points of tangency of right-of-way fronting tract.
- Locate sufficient monuments of right-of-way adjacent to and on either side of tract, and across public roadways, to determine location of tract to adjoining tracts of right-of-way taking.
- Prepare detailed description of property corners located and survey control points set ($\frac{1}{2}$ " IRON ROD FOUND, 1" IRON PIPE FOUND, 2X2 HUB AND TACK SET, $\frac{3}{8}$ " IRON ROD IN ROCK MOUND FOUND, etc.); it is essential to note any markings of found monuments.
- Set survey control points in places that will be undisturbed in the future.
- Ensure there is sufficient information from deed plot or subdivision plats to tie in to adjoining property.

Locate Structures in Interior of Parcel Near Proposed Taking

- Barns
- Concrete slabs, sidewalks, and foundations
- Houses or any permanent structures
- Water wells
- Signs

Locate Natural Features Referred to in Deeds

- Drainage features
- Ridge lines or summits
- Woods/prairie boundaries
- Trees six inches in diameter and larger

Locate Roadways Entering and Exiting the Property

- Any dirt or gravel roads or driveways being used for access to adjacent properties
- Any abandoned roadways

Flag All Survey Points

- Guard stake and lath set on property corners of the subject parcel
- Control points
- Survey control points shall be set in such locations to facilitate setting calculated corners in the near future to complete the boundary survey

TSPS Survey Categories

Information in this subsection is excerpted and/or adapted for this manual from the *Texas Society of Professional Surveyors (TSPS) Manual of Practice*.

The Texas Society of Professional Surveyors has published the *Manual of Practice* for many years. Although aimed at the surveyor in the private sector, this manual contains much information useful to the COSA surveyor. In particular, the *Chart for Tolerances of Conditions* (which appears below in Table 1) may be appended to a Work Authorization as a survey specification. The manual contains categories of surveys and tolerances, or specifications, for each category of survey. The categories are further subdivided into conditions.

Category 1A provides specifications for a Land Title Survey. It is designed to fulfill the normal requirements of all title insuring agencies.

Category 1B is specified as a Standard Land Survey. A Standard Land Survey is not intended to support title insurance activities. Category 1B surveys will be used to locate real property, to write legal descriptions, or for platting.

Category 2 is defined as a Route Survey. This type of survey is used for the planning of the location and the acquisition of property for rights-of-way.

Table 1
Chart of Tolerances for Conditions

Conditions	IV	III	II	I	
	Rural	Suburban	Urban	Urban Business District	Remarks & Formulae
Error of Closure	1:5,000	1:7,500	1:10,000	1:15,000	Loop or between Control Monuments
Angular Closure	30" \sqrt{N}	25" \sqrt{N}	15" \sqrt{N}	10" \sqrt{N}	N = Number of Angles in Traverse
* Accuracy of Bearing in Relation to Source	± 40 sec.	± 30 sec.	± 20 sec.	± 15 sec.	$\text{Sin } \alpha =$ denominator in Error of Closure Divided into 1 (approx.)
Linear Distances Accurate to:	± 0.2 ft. per 1,000 ft.	± 0.15 ft. per 1,000 ft.	± 0.1 ft. per 1,000 ft.	± 0.05 ft. per 1,000 ft.	$\text{Sin } \alpha \times 1000$ (approx.) where $\pm =$ Accuracy of Bearing
Positional Error of Any Monument	$\frac{AC}{5,000}$	$\frac{AC}{7,500}$	$\frac{AC}{10,000}$	$\frac{AC}{15,000}$	AC = Length of Any Course in traverse
Calculation of Area - Accurate and Carried to:	0.001 .01 .1 .3	0.001 .01 .1 .2	0.0001 .001 .01 .1	0.0001 .001 .01 .1	To 1 acre To 10 acres To 100 acres To 1000 acres
Elevations for Boundaries by Tides, Contours, Rivers, etc. Accurate to:	± 0.2 ft.	± 0.1 ft.	± 0.05 ft.	± 0.03 ft.	Based on sea level datum
Location of Improvements Structures, Paving, etc.	± 1.0 ft.	± 0.5 ft.	± 0.2 ft.	± 0.1 ft.	Tie Measurements
Scale of Maps Sufficient to Show Detail but no less than Plotting not to Exceed: (Applies to Original only) Adjusted Mathematical Closure of Survey no less than	1"= 2,000' 50 ft. 1"= 2,000' 1:50,000	1"= 1,000' 25 ft. 1"= 1,000' 1:50,000	1"=400' 10 ft. 1"= 400' 1:50,000	1"=200' 5 ft. 1"= 200' 1:50,000	(National Map accuracy calls for 1/50 th inch).

NOTE: COSA policy requires all bearings or angles to be based on the following source: Grid bearing of the Texas State Plane Coordinate System, South Central Zone of NAD 1983 (93) or NAD 1983 (CORS).

Information Provided by COSA for Right-of-Way Mapping

- An example of a right-of-way map, traverse closure sheet, and property description
- Existing horizontal control information to the surveyor (if available)

- Existing applicable right-of-way maps of the project area, if available to the surveyor

Final Submittal Requirements

Right-of-Way (ROW) Acquisition Document Submission

Include the following in the right-of-way acquisition document submission:

- Prepare and furnish three strip maps (if two or more parcels are required) in plan sheet or similar style indicating the proposed right-of-way acquisitions, including fee simple parcels, permanent easement parcels, and temporary easement parcels.
- Prepare a parcel plat, as well as a metes and bounds description, for every proposed parcel: fee simple, permanent easement, and temporary easement. If there is more than one acquisition within the same tract of land, indicate and label all proposed acquisitions and easements on the same plat. A metes and bounds description and closure computation for each acquisition is required. Submit seven copies with at least two original copies. The parcel plat and metes and bounds description will be in whole, one document, and provided on letter size (8½"x11") paper, with pages numbered (i.e., Page 1 of 3, Page 2 of 3, etc.). Submit the metes and bounds description in Microsoft Word format.

Metes and Bounds Descriptions, Plats, and Field (See [Appendix 3-A](#))

Include the following items on plats, as well as metes and bounds descriptions:

Metes and Bounds Descriptions

- Heading shall identify every description: fee simple, permanent easement, or temporary easement.
- Must include the parcel number from the range of numbers given to the project manager/consultant by the City Real Estate Section.
- All survey marks shall be described on the written description. Provide a reference to and a description of the survey markers as shown on the plat.
- All metes and bounds descriptions prepared for easements shall be tied to physical monuments of record related to the boundary of the affected tract.
- A registered or licensed surveyor must seal, sign, and date every written description.
- All boundaries shall be connected to identifiable physical monuments related to corners of record.
- Include the New City Block (NCB), Block, and Lot(s) as well as any other subdivision name, volume, and page.
- Note showing bearing basis: NAD 83/93 or NAD 83 (CORS) surface coordinates, which can be converted to grid coordinates, dividing by a combined adjustment factor of 0.999830029.
- Provide field notes description in Microsoft Word format on a compact disk (CD).

Plats

- Must include the parcel number from the range of numbers given to the project manager/consultant by the City Real Estate Section.
- Identify and depict all improvements that are either located within the taking, including the fee simple, the permanent easement, and the temporary easement, or located within 20 feet from the taking. Include the distance the improvement is located from the proposed right-of-way line which is required for all improvements outside the taking and within the 20 feet. This is essential for preparation of valid appraisals.
- Indicate the whole property with its land area out of which the fee simple or easement is to be taken. Broken lines on large properties are acceptable as long as all overall dimensions are shown.
- Indicate all existing easements on and adjacent to the tract on the plat.
- If there is more than one acquisition within the same tract of land, indicate proposed acquisitions and easements on the same plat and only highlight and detail the area the written description describes. For example, there are two proposed acquisitions within Lot 8: fee simple and temporary easement. The Surveyor will need to provide a plat and a written description for the fee simple and use the same plat with another written description for the temporary easement. Show both areas on the same plat, but only highlight and detail the area that matches the written description for that taking. Likewise, if two to three (or more) contiguous lots or tracts are in the same ownership, this constitutes only one parcel whether different Bexar Appraisal District accounts or not.
- The surveyor shall note upon the survey plat which monuments were found and which monuments were placed as a result of his/her survey.
- When appropriate, reference shall be cited in the description prepared to record instrument that defines the locations of adjoining boundaries.
- Floodplain Areas: Always indicate the Federal Emergency Management Agency Map number, date, and floodplain boundary on the plat, and provide the square footage of the floodplain area within and outside of the fee title, permanent easement, and temporary easement individually. This is essential for preparation of valid appraisals.
- Indicate location(s) of any underground storage tanks, drums, pipelines, above ground storage tanks, obvious surface stains, etc. Contact the COSA project manager assigned to that project with any questions and/or concerns.

Field

- Set an iron pin with company cap on every corner of the fee simple taking and the permanent easement, except where monuments exist. Show all iron pins on the plat and call them out on the written description.
- Stake every corner (inflection point) of the temporary easement that is not a right-of-way corner.

Requirements

All survey work shall meet the requirement as described in the latest version of the [Professional Land Surveying Practices Act](#) and [General Rules of Procedure and Practices](#) adopted by the Texas Board of Professional Land Surveying and conform to the Texas Society of Professional Land Surveyors *Manual of Practice* for a Category 1A Land Title Survey and Category 7 Horizontal Control Survey. Ensure part to be taken has not been dedicated via plat dedication.

Quality Assurance/Quality Control

The Project Surveyor will be responsible for reviewing and checking the control standards and mapping standards.

Right-of-Way Map Components

Overview

Information contained within this section is excerpted in its entirety and/or adapted and modified by the Standing Committee on Surveying (SCOS) for this manual from the *TxDOT ROW Manual Volume 1 — Procedures Preliminary to Release* (<http://onlinemanuals.txdot.gov/txdotmanuals/ppr/index.htm>)

Title Sheet

On the title sheet (see Figure 3-1), include the following:

- Layout map large enough to show project location and nearest major collector streets
- Highway numbers and street name
- City project number and name (if applicable)
- Vicinity map
- Authorized right-of-way project limits
- Scale of the layout map
- North arrow
- Station numbers for the beginning and ending of the project, and station equations
- Datum statement including the basis of bearings and coordinates, adjustment factor used for converting from grid coordinates to surface coordinates and theta (true-to-grid rotation) angle, if applicable
- Signatures of appropriate signing authorities:
 - For initial submission: the city surveyor or right-of-way administrator will sign recommending acquisition after a technical review for compliance with COSA procedures and Texas Board of Professional Land Surveying rules is completed.
 - The city engineer or project manager will sign and date recommending acquisition after a review for conformance with the design schematic and verifying the proposed acquisition is adequate to build the proposed transportation facility. For final right-of-way map submission: the project manager and real

estate manager will sign and date for final approval, verifying right-of-way activities are complete as shown on the final right-of-way map.

Standard symbols shall be used to the greatest extent possible. See Figure 3-1 below for an example of a title sheet.

At the bottom center of the title sheet, directly under the note on station equations, include a statement labeled “NO EXCEPTIONS.” Normally, there will be no exceptions on a right-of-way project. If there are areas where no new right-of-way will be purchased, insert a note on the title sheet stating that “NO ADDITIONAL ROW WILL BE REQUIRED FROM STATION ____ TO STATION ____.”

Parcel Index Sheet

For larger projects containing four (4) or more plan sheets, this sheet will show map sheets and parcels as a large-scale overview of the project. The sheet may also include a chart identifying parcel numbers, land owners, and plan sheet numbers where parcels may be easily located.

Control Sheet

The control sheet may be used to identify the primary control used in preparation of the project. Include the following: the basis of datum, any monuments set for control, the baseline data throughout the project, and any other relevant metadata (i.e., history data). (See [Appendix 3-C](#).)

Plan Sheets

The most important factor in preparing a plan sheet is legibility and clarity of information, even to a person with limited surveying or engineering experience. (See Figure 3-1.)

Plan sheets shall be drafted at a scale of 1" = 100' (rural) or 1" = 50' (urban), unless a different scale is required for legibility. A planimetric plan sheet developed from aerial photography may be used for the base map of a right-of-way plan sheet. Plan sheets shall depict existing right-of-way, adjacent properties, and proposed parcels.

Existing Information

The following shall be shown on each plan sheet:

- Existing right-of-way (by bearing and distance) through the entire project length, even in areas where no new right-of-way is needed. In areas where new right-of-way is needed on only one side, the right-of-way on both sides of the new facility shall be delineated and monuments set at PCs, PTs, and angle points.
- Existing right-of-way monuments.
- Record ownership data of adjacent properties.
- Points of curvature, points of tangency, and points of intersection (show and label).

INDEX OF SHEETS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	OVERALL SHEET
3	OVERALL SHEET
4	ROW PLAN SHEET STA.: 35+34.50 TO 49+48.21
5	ROW PLAN SHEET STA.: 49+48.21 TO 64+73.31
6	ROW PLAN SHEET STA.: 64+73.31 TO 80+03.83
7	ROW PLAN SHEET STA.: 80+03.83 TO 95+32.64
8	ROW PLAN SHEET STA.: 95+32.64 TO 110+58.01
9	ROW PLAN SHEET STA.: 110+58.01 TO 125+84.46
10	ROW PLAN SHEET STA.: 125+84.46 TO 141+28.79



PLANS OF PROPOSED CITY OF SAN ANTONIO DEPARTMENT OF PUBLIC WORKS IMPROVEMENTS

FEDERAL AID PROJECT BEXAR COUNTY THEIR STREET

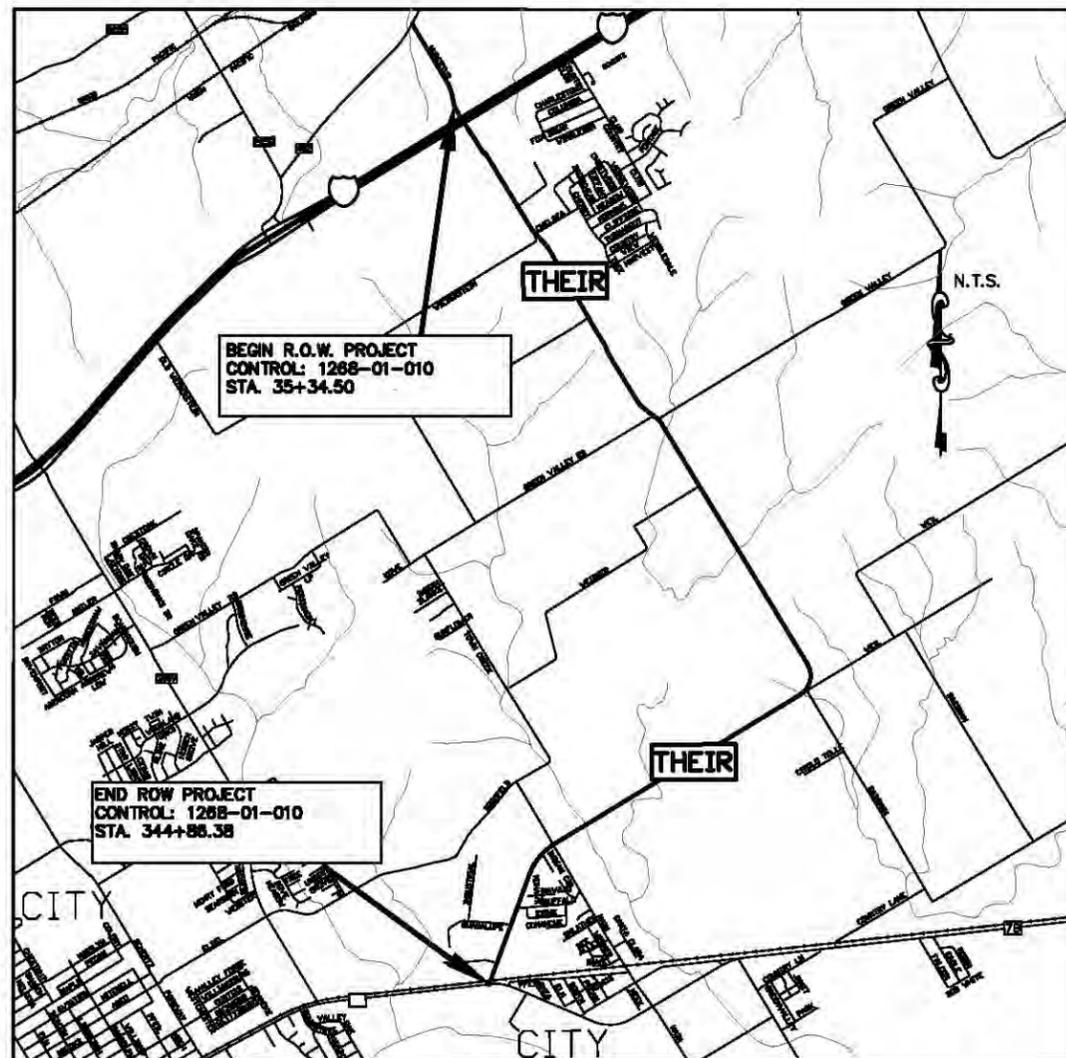
PROJECT NO: _____
 CONTROL NO: 2552-01-040
 LIMITS: WHY AVENUE TO END AVENUE
 NET LENGTH OF PROJECT = 5.862 MILES (30,951.88 FEET)

UTILITIES

UTILITY NAME CONTACT NUMBER

NOTES

1. THIS MAP IS AN INTERNAL CITY OF SAN ANTONIO DOCUMENT. IT'S CONTENTS SHALL NOT BE USED FOR ANY OTHER PURPOSE.
2. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS STATE PLANE SYSTEM, SOUTH CENTRAL ZONE. ALL DISTANCES ARE U.S. SURVEY FEET.
3. COORDINATES AND DISTANCES ARE SURFACE.
4. STATION AND OFFSETS SHOWN ARE BASED ON THE SCHEMATIC BASELINE.
5. THE ACREAGE OF THE PARENT TRACT WAS TAKEN FROM THE RECORDED INSTRUMENTS AND NOT BASED ON FIELD DIMENSIONS.
6. ACCESS IS PERMITTED TO THE HIGHWAY FACILITY FROM THE REMAINDER OF THE ABUTTING PROPERTY.

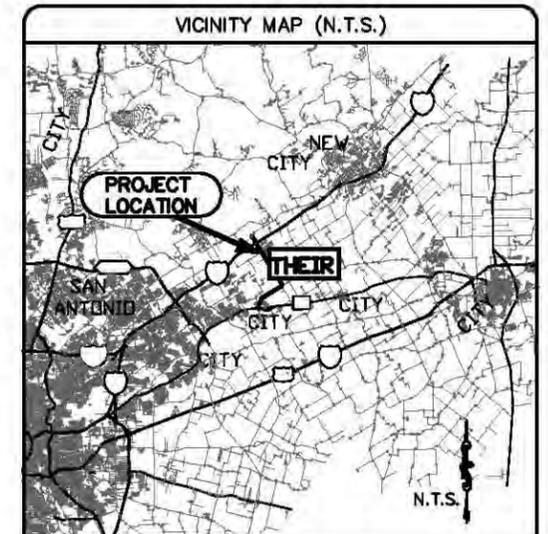


NO RAILROAD CROSSINGS
 NO EXCEPTIONS
 NO EQUATIONS



CIVIL ENGINEERING CONSULTANTS
 DON DUREN, INC.
 11550 L.H. 10 WEST, SUITE 395
 SAN ANTONIO, TEXAS 78250
 P) 210.641.9999
 F) 210.641.6440
 EMAIL: CEC@CECTEXAS.COM

FED. PROJ. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
		1 OF 10
STATE	DIST.	COUNTY
TEXAS	00	BEXAR
DATE: DECEMBER 31, 2007		
CONTROL	CONT.	SECT. JOB HIGHWAY NO.
	2552	01 040 THEIR ST.



RECOMMENDED FOR ACQUISITION

Project Manager	Date	Real Estate Manager	Date
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SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, JUNE 1, 2004 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, DECEMBER, 1993).

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- If appropriate, existing utility lines and easements (deed reference, if known).
- Existing improvements such as buildings, fences, trees (contact City Arborist's office), etc., within the existing and proposed right-of-way.
- Potential obstructions and/or conflicts. (Locate any improvements within 25 feet of the new right-of-way line. This will assist appraisers in determining damages to the remainders of properties.)
- Parent survey lines (show and label).
- City limit lines (show and label).
- Existing public roads, streets, and alleys (including recorded plat or deed reference).
- Existing drainage or channel easements (include recorded plat or deed reference).
- Whole property relative to existing and proposed right-of-way. If the whole property is too large to fit on the map sheet at the sheet scale, draw an inset at a smaller scale or not to scale with a note stating "N.T.S."

Proposed Information

On each plan sheet, show the following (see Figure 3-2):

- New right-of-way lines.
- New right-of-way markers with point number. Provide a chart on each plan sheet with point number, coordinates (y, x), and description.

Parcel Information

For each right-of-way parcel acquired, show the following information:

- Property owner name.
- Parcel number.
- Parent tract.
- Type of conveyance (e.g., deed, judgment)—for final right-of-way map
- Recording information (after acquisition)—for final right-of-way map
- Station to station.
- Area in acres and/or square feet (utilize the *TSPS Manual of Practice* to determine the accuracy used for calculating square footing based on the category and condition of survey); limits and offset to new right-of-way line.
- Area of remainder (calculated from deed).
- Property lines (show and define by bearing and distance relative to existing and new right-of-way lines); reference only.
- Bearing and distance to a monument found or set at a corner outside the area to be acquired. If the corner is defined as a point of commencement (POC) in a property description, then show the letters POC on the map to reference the corner.
- Remainder chart for right-of-way plan sheets is as follows:

PARCEL NO.	DEED ACREAGE	PROPERTY OWNER	TYPE OF CONV.	CONVEYANCE		TAKING PROP. CENTERLINE STATIONS		TAKING ACRES	REMAINDER	
				VOLUME	PAGE	FROM	TO		LEFT	RIGHT
1	28.793	SCHERTZ BANK & TRUST				35+74.97	37+78.82	0.087		28.706
2	2.484	RANDOLPH-BROOKS FEDERAL CREDIT UNION				35+74.97	37+93.46	0.115	2.369	
3	0.856	FUEL DISTRIBUTORS, INC.				43+63.50	45+29.78	0.119		0.737
4 PART 1	10.881	US HOLDINGS, LTD.				43+64.38	47+92.71	0.363	10.518	
4E PART 1	10.881	US HOLDINGS, LTD.				46+54.93	46+77.31	0.010	10.881	

Property Descriptions

In contrast to right-of-way maps being an internal departmental document, property descriptions (including parcel plats) are prepared as exhibits for the conveyance of a property interest. The property descriptions and parcel plats reflect a boundary survey and must be signed and sealed by a registered professional land surveyor (RPLS). Property descriptions prepared for right-of-way projects consist of a heading with a metes and bounds description and parcel plats prepared on letter-size (8½" x 11") sheets. Letter-size sheets allow the descriptions and plats to be filed with the County Clerk’s office without reducing copies. See [Appendix 3-A](#) for examples of property descriptions and parcel plats.

NOTE: Use a one-inch border on all sides of the property description.

Items to be included on property descriptions and parcel plats, in addition to Texas Board of Professional Land Surveying standards, include:

- All property descriptions and parcel plats must be tied to the Texas State Plane Coordinate System, South Central Zone, and reference metadata used in preparing the survey.
- A Texas state plane coordinate should be given for at least one point on the plat. This practice is optional for the metes and bounds description.
- Ownership information shall specify the type of public record referenced, for example, deed records, official records, real property records, or plat records, as well as the volume and page citation.
- Parcel plats are required for all property descriptions.
- For all partial acquisitions, at least one reference tie must be made to an established corner outside the parcel area, preferably to the nearest public street intersection.
- It is acceptable to use a set corner on the remainder or adjoiner in cases where no found corners exist, although the surveyor may be assuming liability for the remainder as well as for the adjoiner tract.
- This outside tie should be made to a boundary corner monument that will remain after construction.
- Centerline station ties may, or may not, be of value to the property description, but may be a convenient reference.
- A station and offset tie at both the beginning and end of each parcel is of value to engineers and designers for the construction of a centerline or survey baseline.
- Station and offset ties in a parcel description, right-of-way map, and parcel data should identify the source of the stationing.

JAMES W. GRAY SURVEY NO. 255
ABSTRACT NO. 144



ROBERT N. & DONNA CATALANO
CALLED A 33.258 ACRE TRACT
(VOL. 1224, PG. 864 O.P.R.G.)

HLH DEVELOPMENT, L.P.
A TEXAS LIMITED PARTNERSHIP
CALLED A 34.189 ACRE TRACT
(VOL. 2349, PG. 260 O.P.R.G.)

PATRICIA G. DEAN
REMAINDER OF A 75 ACRE TRACT
(VOL. 400, PG. 169 D.R.G.)

STA.: 110+58.01

STA.: 125+84.46

SEE SHEET 8

SEE SHEET 10

MATCH LINE

MATCH LINE

LEGEND

- ⊙ TYPE II BRASS CAP MONUMENT SET
- ⊙ TYPE II RIGHT-OF-WAY MARKER FOUND
- ⊙ TYPE III RIGHT-OF-WAY MARKER FOUND
- △ CONTROL POINT
- 1/2" DIA. REBAR WITH "CEC" PLASTIC CAP SET
- 1/2" DIA. REBAR FOUND
- 3/8" DIA. REBAR FOUND
- 5/8" DIA. RAILROAD SPIKE SET
- 1" DIA. REBAR FOUND
- ⊗ RAILROAD SPIKE SET
- NOT SET
- PKF P.K. NAIL FOUND

- N.T.S. NOT TO SCALE
- P.O.B. POINT OF BEGINNING
- P.O.C. POINT OF COMMENCING
- O.R.C. OFFICIAL RECORDS OF COMAL COUNTY, TEXAS
- P.R.C. PLAT RECORDS OF COMAL COUNTY, TEXAS
- D.R.G. DEED RECORDS OF GUADALUPE COUNTY, TEXAS
- O.P.R.G. OFFICIAL PUBLIC RECORDS OF GUADALUPE COUNTY, TEXAS
- O.R.G. OFFICIAL RECORDS OF GUADALUPE COUNTY, TEXAS
- P.R.G. PLAT RECORDS OF GUADALUPE COUNTY, TEXAS
- E.G.T.V. ELECTRIC, GAS, CABLE T.V.
- E.T.T.V. ELECTRIC, TELEPHONE, CABLE T.V.
- E.T.T.V.W. ELECTRIC, TELEPHONE, CABLE T.V., WATER
- SCHEMATIC BASELINE
- EASEMENT LINES
- EXISTING RIGHT-OF-WAY LINES
- LOT LINES
- PREVIOUS ROW TAKING
- PROPERTY LINES
- PROPOSED RIGHT-OF-WAY LINES
- SURVEY LINES

POINT	NORTHING	EASTING	DESCRIPTION
3058	13771931.8572	2214159.9043	1/2" REBAR WITH CEC PLASTIC CAP SET
3059	13771382.0769	2214518.1043	1/2" REBAR WITH CEC PLASTIC CAP SET
3060	13771316.5379	2214555.9276	1/2" REBAR WITH CEC PLASTIC CAP SET
3157	13771843.3056	2214038.8315	1/2" REBAR WITH CEC PLASTIC CAP SET
3158	13771811.6492	2214061.8246	1/2" REBAR WITH CEC PLASTIC CAP SET
3160	13771307.1000	2214388.1868	1/2" REBAR WITH CEC PLASTIC CAP SET
3161	13771299.1135	2214565.9835	1/2" REBAR WITH CEC PLASTIC CAP SET

PARCEL NO.	DEED ACREAGE	PROPERTY OWNER	TYPE OF CONV.	CONVEYANCE		TAKING PROP. CENTERLINE STATIONS		TAKING ACRES	REMAINDER	
				VOLUME	PAGE	FROM	TO		LEFT	RIGHT
18	142.199	JANET FRIESENHANN FOERG & LORETTA FRIESENHANN FRAMM				96+18.37	112+37.04	2.398		139.801
20	33.258	ROBERT N. & DONNA CATALANO				106+50.30	119+21.48	1.185	32.093	
21 PART 1	75.280	PATRICIA G. DEAN				112+37.04	118+45.81	0.140		75.120
21 PART 2	10.813	PATRICIA G. DEAN				119+41.60	132+08.99	2.023	8.590	
22	34.189	HLH DEVELOPMENT, L.P.				119+21.48	119+41.60	0.032	34.157	

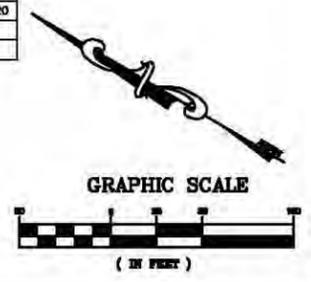
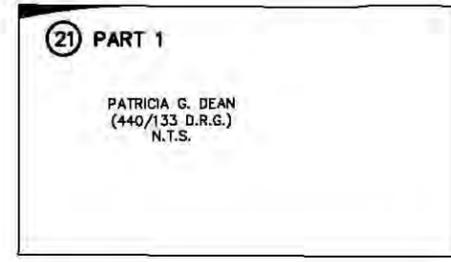
NOTES

- THIS MAP IS AN INTERNAL CITY OF SAN ANTONIO DOCUMENT. IT'S CONTENTS SHALL NOT BE USED FOR ANY OTHER PURPOSE.
- ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS STATE PLANE SYSTEM, SOUTH CENTRAL ZONE. ALL DISTANCES ARE U.S. SURVEY FEET.
- COORDINATES AND DISTANCES ARE SURFACE.
- STATION AND OFFSETS SHOWN ARE BASED ON THE SCHEMATIC BASELINE.
- THE ACREAGE OF THE PARENT TRACT WAS TAKEN FROM THE RECORDED INSTRUMENTS AND NOT BASED ON FIELD DIMENSIONS.
- ACCESS IS PERMITTED TO THE HIGHWAY FACILITY FROM THE REMAINDER OF THE ADJUTING PROPERTY.

LINE	BEARING	DISTANCE
L57	S 59°38'26" W	30.47'
L58	S 29°59'23" E	20.16'
L59	S 29°59'23" E	20.12'
L93	S 59°51'36" W	70.00'
L94	S 59°49'30" W	70.00'

CURVE	LENGTH	RADIUS	DELTA	CHORD	CHORD BEARING
C16	540.29'	5925.00'	57°3'29"	540.10'	S 33°34'09" E
C17	601.16'	5925.00'	5°48'48"	600.90'	S 32°53'47" E
C33	39.12'	5925.00'	0°22'42"	39.12'	S 35°59'32" E
C311	640.28'	5925.00'	6°11'30"	639.97'	S 33°05'08" E
C313	640.28'	5925.00'	6°11'30"	639.97'	S 33°05'08" E
C324	656.49'	8075.00'	6°11'30"	656.17'	S 33°05'08" E
C325	656.49'	8075.00'	6°11'30"	656.17'	S 33°05'08" E
C606	648.39'	8000.00'	6°11'30"	648.07'	S 33°05'08" E
C607	648.39'	8000.00'	6°11'30"	648.07'	S 33°05'08" E

J. N. RICHARDSON SURVEY NO. 102
ABSTRACT NO. 277



CITY OF SAN ANTONIO
DEPARTMENT OF PUBLIC WORKS

THEIR STREET
RIGHT-OF-WAY

FED. RD. DIST. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
		OF
STATE	DIST. NO.	COUNTY
TEXAS	15	BEXAR
DATE:	CONTROL	CONT. SECT. JOB HIGHWAY NO.
	1268	01 010 THEIR ST.

CEC
CIVIL ENGINEERING CONSULTANTS
D. O. DURDEN, INC.
11550 L.H. 10 WEST, SUITE 505
SAN ANTONIO, TEXAS 78230
P) 210.641.9999
F) 210.641.6440
EMAIL: cec@cectexas.com

Figure 3-2
Page 3-21

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- If the parcel is located in more than one county or land grant survey, show the land area in each county or land grant.
- Control of access lines.

Property Descriptions

In contrast to right-of-way maps being an internal departmental document, property descriptions (including parcel plats) are prepared as exhibits for the conveyance of a property interest. The property descriptions and parcel plats reflect a boundary survey and must be signed and sealed by a registered professional land surveyor (RPLS). Property descriptions prepared for right-of-way projects consist of a heading with a metes and bounds description and parcel plats prepared on letter-size (8½" x 11") sheets. Letter-size sheets allow the descriptions and plats to be filed with the County Clerk's office without reducing copies. See [Appendix 3-A](#) for examples of property descriptions and parcel plats.

NOTE: Use a one-inch border on all sides of the property description.

Items to be included on property descriptions and parcel plats, in addition to Texas Board of Professional Land Surveying standards, include:

- All property descriptions and parcel plats must be tied to the Texas State Plane Coordinate System, South Central Zone, and reference metadata used in preparing the survey.
- A Texas state plane coordinate should be given for at least one point on the plat. This practice is optional for the metes and bounds description.
- Ownership information shall specify the type of public record referenced, for example, deed records, official records, real property records, or plat records, as well as the volume and page citation.
- Parcel plats are required for all property descriptions.
- For all partial acquisitions, at least one reference tie must be made to an established corner outside the parcel area, preferably to the nearest public street intersection.
- It is acceptable to use a set corner on the remainder or adjoiner in cases where no found corners exist, although the surveyor may be assuming liability for the remainder as well as for the adjoiner tract.
- This outside tie should be made to a boundary corner monument that will remain after construction.
- Centerline station ties may, or may not, be of value to the property description, but may be a convenient reference.
- A station and offset tie at both the beginning and end of each parcel is of value to engineers and designers for the construction of a centerline or survey baseline.
- Station and offset ties in a parcel description, right-of-way map, and parcel data should identify the source of the stationing.
- If the parcel is located in more than one county or land grant survey, show the land area in each county or land grant.
- Control of access lines.

Parcels consisting of more than one part must include a summary at the end of the property description as follows:

Summary:

Part 1 = 4.333 Acres (188,745 square feet)

Part 2 = 2.667 Acres (116,174 square feet)

Total = 7.000 Acres (304,919 square feet)

Acreages will normally be carried out to three (3) decimal places. However, on large rural parcels that may have lengthy boundary segments, it is acceptable to truncate acreage figures to two (2) decimal places, which better reflects the accuracy of the surveyed line.

Certification and Monuments

Refer to 22 *TAC §663.11 of the General Rules of Procedures and Practices of the TBPLS Act* for certification and monumentation of surveys.

Each parcel corner on a project must have a survey marker on the ground to represent that corner. A ½" iron rebar with a company plastic cap, shall be placed flush with the ground at all points of curvature, points of tangency, angle points, and points having a maximum interval of 1,500 feet along tangent segments of the right-of-way, and shall be placed at the intersections of the new right-of-way line and individual property lines.

Public Roads and Alleys

Existing public roads or alleys that abut or pass through a right-of-way parcel need to be investigated carefully to determine the source of title. If a recorded instrument such as a right-of-way deed, dedication by subdivision plat or donation deed can be found, this title should be shown on the right-of-way map and parcel plats.

If no record can be located, a note should be added stating the existing right-of-way shown was determined by occupation. If included in the adjacent landowner's deed, the existing right-of-way should be included in the parcel area but cannot be included for payment.

For existing roadway, areas that do not appear in any conveyance to a public entity or adjacent property owner, a quitclaim deed from the local public agency occupying the facility should be obtained and filed with the County Clerk.

Original Submission to a City

The surveyor should complete and submit preliminary maps, parcel plats, property descriptions, and closure sheets to the city for review. The city will determine the size, type, and number of submittals to be used for review purposes. These maps shall be prominently marked as PRELIMINARY.

The city surveyor or appropriate personnel must review the submission for compliance with COSA policy and Texas Board of Professional Land Surveyors standards. The design engineer or appropriate personnel must review the map for compliance with the design schematic and to

verify that the area to be acquired and all easements are adequate to build the transportation facility.

Finalizing Maps after Project Acquisition

Once right-of-way map revisions are complete, all new right-of-way is acquired, and all documents are recorded, the project surveyor will send an 11" x 17" original of the right-of-way map marked "FINAL MAP" on bond paper and a completed electronic graphics file (if available), including all revisions, to the city for the permanent file. For the final map to be complete, it must contain:

- all project numbers;
- grantors' names;
- areas of acquired parcels;
- recording information;
- names of the utility owner(s) and graphic depiction of the easement or right-of-way on the ROW Map Plan Sheet;
- all signature blocks completed; and
- graphics file (if available) including all revisions.

Standardized MicroStation Graphic Files

Due to the multitude of formats used in the consulting industry, COSA has recognized a need for standardization in the creation and manipulation of MicroStation Graphic Files. The following guidelines should be used to assist MicroStation users in the development of graphic files that are compatible with COSA's MicroStation files.

Base Files — All geometry and line work is done in this file. Points, property lines, centerline information, etc., should be done on assigned levels. Any text/labels in this file should be for the user's own use on separate levels from the line work, so they may be turned off when the base file is used as a reference file for a sheet (map sheet) file.

Topographic Files — No work may be done in these files. The user may turn on or off any level as required in a topographic file when it is used as a reference file. When used as a reference file, all line work should be shown as zero line weight, dotted line symbology, and white or gray in color.

Sheet Files (Map Sheets) — These are the files where the drafting work is done. Text/labels, whole property sketches, enlarged details, north arrow, and bar scale are shown here. The base file and topographic file are referenced to the sheet file. In addition, other appropriate files showing new buildings and/or utilities shall be referenced. Then the appropriate levels are turned on or off in both of these reference files to show the line work and topographic features that will appear on the finished plan sheet. A COSA standard size plan sheet (11" x 17") must be used to define the working area. You may move or rotate the sheet cell as required. **DO NOT MOVE, ROTATE, COPY, OR IN ANY WAY ALTER THE ATTACHED REFERENCED BASE OR TOPOGRAPHIC FILES FOR USE IN YOUR SHEET FILES.** (Users may, for their own use rotate the view they are working in.) When numbering map sheets, always begin with number 2,

as sheet number 1 is reserved for the title sheet. The map sheet is “finished” by fencing the appropriate area and performing a clip boundary operation on the reference base and topographic files.

Title Sheet Files — A standard COSA title sheet must be used. This sheet contains the following information:

- highway number or street name;
- project number (if needed);
- project limits description;
- length in feet and miles;
- a legend of standard utility and mapping symbols;
- utility table; and,
- when appropriate, a vicinity map.

The title sheet will always be numbered as sheet one of the set of maps (see page 3-17, Example ROW Map Title Sheet).

Text and Labels – See the Table 2, *Text Style and Weight Chart* below, for COSA standard size, font, line spacing, and weight for text and labels.

Line Weight and Line Symbology — See Table 3, the *Line Weight and Line Symbology* chart below, for a chart of COSA standard line weight and line symbology.

Whole Property Sketches and Enlarged Details — These should always be created as “saved views,” referenced from the base file to the sheet file. This will ensure that changes or updates made in the base file will always be accurately reflected in the saved view(s). All labeling on the saved view(s) should be done in the appropriate sheet file.

Level Map — See Table 4, *Levels and Weights for Right-of-Way (ROW) Mapping Chart* below, for information on COSA standard levels for horizontal alignment, proposed and existing right-of-way lines, property lines, found points, survey lines, county lines, city limit lines, text and labels, easements, platted/subdivision properties, etc. Any level not designated for use on the level map sheet may be used at the MicroStation user’s discretion.

NOTE: A copy of your completed project level map sheet must accompany any electronic file sent to COSA.

Table 2
Text Style and Weight Chart

Subject	Style	Line Type	Weight
Dimension	1	6	1
Lot Number	1		1
Block Number	20		1
Owner Name	15		1
Remainder	12		1
Station	15	10	1
Subdivision Name	24	16	1

Subject	Style	Line Type	Weight
Survey Grantee	24	12	2
Street Name	15		1
Highway	20		2
Notes	20	12	1

**Table 3
Line Weight and Symbology Chart**

	WT = 0		SOLID
	WT = 1		DOTTED
	WT = 2		MEDIUM DASHED
	WT = 3		LONG DASHED
	WT = 4		DASH-DOT
	WT = 5		SHORT DASHED
	WT = 6		DASH-DOT-DOT
	WT = 7		LONG DASHED SHORT DASHED

**Table 4
Levels and Weights for Right-of-Way (ROW) Mapping Chart**

Level	Description	Weight	Line Style	Color	Text Style	Text Size
1	Proposed Centerline	2	4	Gray		
1	Centerline Text / PC, PT	2	0	Gray	1	10
1	Parcel Number	2	0	Gray	23	14
2	Centerline Curve Data	1	0	Gray	23	7
4	Point Numbers (Field Located)	1	0	Orange	23	7
4	Descriptions (Field Located)	1	0	Gray	23	5
5	Point Numbers (Calc.)	1	0	Yellow	23	5
5	Descriptions (Calc.)	1	0	Gray		
12	Volume & Page of Original ROW	0	0	Gray	23	5
12	Ownership Data	0	0	Gray	23	5
13	Road & Street Names	2	0	Gray	23	10
14	Subdivision Names	2	0	Blue	23	14
14	Block Numbers	2	0	Blue	23	10

Level	Description	Weight	Line Style	Color	Text Style	Text Size
14	Lot Numbers	1	0	Blue	23	7
15	Measured Parcel Data Text, Station Offset	1	0	Gray	23	7
15	Record Deed Data	0	0	Gray	23	5
15	Dim Arrows / Fee Hook / Etc					
16	Existing ROW	1	0	Purple		
16	Property Lines	1	0	Purple		
16	Exist. ROW / Prop. Line	1	0	Orange		1
17	Proposed ROW	6	0	Red		
17	Proposed ROW Circles	1	0	Red		1
18	Survey / Abstract Names	3	0	Green	23	21
18	Survey / Abstract Lines	2	6	Green		
20	Monuments Found / Set Text	0	0	Gray	23	5
62	Roll Sheet Data					
63	Notes					

All calculated corners should begin with a point number large enough to ensure there is no conflict with surveyed points, i.e., 2000. Miscellaneous points calculated to determine a boundary corner should be deleted and only the final location used.

Final Check List

PROJECT NO.:

HIGHWAY:

COUNTY:

LIMITS:

COSA-P.M.:

Right-of-Way Maps

General

1. All map sheet prints are legible, not light or faded.
2. All map sheets will be 11" x 17".
3. Text size is legible when full-size maps are reduced to half-scale for final right-of-way maps.
4. All title blocks are completely filled out, including the Project No.
5. Sheets have basis of bearings and scale factor used to convert grid coordinates to ground coordinates.
6. Graphic files are included and files are compatible MicroStation® DGN files.
7. Graphic scale is shown on all map sheets.
8. North arrow is shown on all map sheets.

Title Sheet Requirements

1. Title and description of project includes:
 - a. Project designation.
 - b. County.
 - c. Project No.

- d. Limits (same as shown on Work Order).
2. Project layout (with north arrow) shows beginning and ending stations of project.
3. Vicinity map (with north arrow) shows beginning and ending of project.
4. Index of sheets is shown.
5. Legend of symbols is shown.
6. Signature block:
 - a. Signed and dated recommending acquisition by:
 - (1) Right-of-Way Administrator.
 - (2) City Project Manager.
 - b. Signed and dated for final approval when acquisition is complete by:
 - (1) COSA Planning Commission Chairman and Secretary.
7. Length of project is shown.
8. Scale of layout is shown.

Parcel Index Sheet (Optional, Example Shown in Right-of-Way Manual) (N)

1. Intersections are shown and labeled.
2. Parcels are labeled.
3. Individual sheets are shown.
4. Beginning and ending stations of the project are labeled.

Control Sheet

1. Beginning and ending stations of project are labeled.
2. All survey controls are shown.
3. All curve data are shown.
4. Intersection controls are shown.

Map Sheet Requirements

1. Adjoining property owner names with recorded volume and page numbers are shown.
2. Existing intersecting roadways with recorded deed reference or information are shown.
3. Existing right-of-way lines with all bearings and distances are shown.
4. Proposed right-of-way lines with all bearings and distances are shown.
5. Whole property sketches or whole property inset must show acreage of parent tract as existing at time of right-of-way project and must show commencing point (POC).
6. Matchline stationing is shown at the beginning and end of each map sheet.
7. Any survey, county, and/or city limit lines are shown and labeled.
8. ½" iron rebar with company cap markers used for PC, PT, and break points (max. 1,500-foot intervals and iron rods or equivalent used for intersecting property corners).
9. Property lines are extended.
10. Property descriptions (i.e., lot, block, tract, subdivision, etc.) are labeled.
11. Stationing and bearings are shown on centerline.
12. Outside ties (POC) correspond with property descriptions for all parcels.
13. Point of beginning (POB) is established on proposed right-of-way line.
14. If sending in a revised sheet, show date of revision with a description of the revision on the sheet it occurs or on a "Revision Sheet" showing all revisions.
15. Math is checked on remainders.
16. Parcel numbering complies with COSA assigned numbers.
17. All access rights have been addressed and designated.

18. All data correspond exactly with parcel plats and property descriptions, as well as closure sheets.
19. All utilities within or crossing existing and proposed right-of-way are shown and labeled as to size, easement, or fee width, as well as recording data of instrument.
20. Locations of underground storage tanks and/or filler caps are shown and labeled.
21. All survey controls are shown.
22. All curve data are shown.
23. Buildings, improvements, creeks, rivers, and other controlling topography are shown.

Parcels

Property Descriptions

1. 8½" x 11" sheets. (N)
2. Signature and seal of Registered Professional Land Surveyor (RPLS).
3. Roadway designation.
4. County.
5. Parcel number.
6. COSA Project No.
7. Revision date (if applicable).
8. Page number(s) (i.e., 1 of 2, etc.).
9. Give reference to and prepare parcel plat in conjunction with property description having the same survey date.
10. All data correspond exactly with right-of-way map and parcel plats, as well as closure sheets.
11. Control of access.
12. Has description been checked for compliance with Texas Board of Professional Land Surveying rules?

Parcel Plats

1. 8½"x 11" sheets. (N)
2. Signature and seal of Registered Professional Land Surveyor (RPLS).
3. Title block includes roadway designation, county, parcel number, and COSA Project No.
4. All data correspond exactly with right-of-way map and property descriptions, as well as closure sheets.
5. POB and POC are shown.
6. Give reference to and prepare parcel plat in conjunction with parcel plat having the same survey date.
7. Control of access is shown.
8. Has plat been checked for compliance with Texas Board of Professional Land Surveying rules?
9. Closure sheets have been included.

Send Right-of-Way Map Checklist, Signed & Dated by Reviewer, to Project Manager.

The title sheet, map sheets, parcel plats, and property descriptions have been reviewed and approved by:

Reviewer _____ Date _____

Design Survey for Topography, Tree Survey, etc.

Survey Guidelines

Texas Board of Professional Land Surveying (TBPLS) [Practices Act](#) and [General Rules of Procedures & Practices](#).

[Texas Society of Professional Surveyors](#) (TSPS Manual of Practice Category 6, Category 7, and Category 8).

Units: U.S. Survey Feet

There is a unit of measure called the “U.S. Survey Foot.” It is almost exactly equal to a standard foot, but its definition is slightly different:

- Standard (or “international”) foot = .3048 meters.
- U.S. Survey Foot = 1200/3937 meters.

In other words, one is defined in relation to the meter by a decimal expression; the unit of measure for the other is defined by a fraction.

Horizontal Datum: NAD 83(93) — Texas State Plane Coordinate System, South Central Zone.

Vertical Datum: NAVD 88.

Surface Adjustment Factor: Reciprocal value of the Combined Scale Factor. The Surface Adjustment Factor for projects within Bexar County will be 1.00017.

Survey Safety — Required Items for Project Safety

- Proper traffic control devices in accordance with the Texas [Manual on Uniform Traffic Control Devices](#) (MUTCD) shall be used when instruments/equipment are on or adjacent to the roadway.
- A set of warning signs will be used to warn that survey crews are working in or next to the roadway and should measure 48" x 48" when working on major highways (MUTCD). Survey personnel will wear safety vests at all times. Company vehicle(s) will have safety flasher (strobe) lights.
- If additional work is required outside of the right-of-way, prepare and send right-of-entry letters to all landowners affected by the survey.
- Before setting any subsurface monuments such as GPS points or benchmarks, all utilities in the area of proposed points must be located by calling 1-800-344-8377(DIG-TESS).

Project Primary Control

A pair of project primary control points will be constructed at the beginning and end of the project, approximately 300 feet outside the project limits in order to avoid being disturbed or

destroyed. Each of the primary control monuments will be a three-inch diameter aluminum disk on a ¾" rebar driven a minimum 24 inches into the ground (it can be shorter if in natural rock) or a three-inch disk set in concrete or rock with epoxy. The disk will be stamped "COSA CONTROL," with a project number and point number provided by the COSA survey division. The primary control recovery sketches will be provided on 11" x 17" Mylar sheet. Each control sketch will provide the northing(y), easting(x), elevation (if applicable), and the Surface Adjustment Factor with a tie to the closest street intersection.

Three primary project monuments can be employed when the project length is less than 1,500 feet.

General Guidelines for a Digital Terrain Model (DTM) Survey

Overview

Information contained within this section is excerpted in its entirety and/or adapted for this manual from the *Texas Board of Professional Land Surveying (TBPLS)*, the *Texas Department of Transportation (TxDOT) Survey Manual*, (Revised 1/08 – <http://onlinemanuals.txdot.gov/txdotmanuals/ess/index.htm>), and the *Texas Society of Professional Land Surveyors (TSPS) Manual of Practice*.

Field Procedures

DTM or topographic surveys require a reliable horizontal and vertical control system based on acceptably closed and adjusted traverses and level loops. Attention should be given toward developing this control system before any detail work is begun.

Fieldwork shall be performed to achieve the specified or intended accuracy and results as stated in the TSPS Manual of Practice Categories 6, 7, and 8, and as directed by the manufacturer of the surveying instrument(s) or equipment used.

For GPS applications, the Federal Geodetic Control Subcommittee's (FGCS) [Geometric Geodetic Accuracy Standards and Specifications for Using GPS Relative Positioning Techniques](#) shall be followed.

Field personnel shall be well trained in the technical aspects of surveying as related to their respective duties.

Surveying instruments shall be checked and kept in close adjustment according to their manufacturer's specifications or in compliance with textbook standards.

Field measurements of angles and distances shall be performed in such a manner as to attain the closures and tolerances as found in this manual and see the *TSPS Manual of Practice Chart* below for Tolerances for Conditions.

Where aerial photogrammetry is to be used to compile the topographic map, the surveyor shall consult with the photogrammetrist as to specific requirements for the photo control and for additional supplemental information required by conditions of a specific project or location.

For COSA purposes, methods that are more modern are normally used such as the DTM survey that incorporates methods described in the section below.

Surveying procedures with electronic total station or with GPS shall incorporate control points that are tied to a primary control system network of an appropriate level of precision and accuracy for the project.

Acquisition of field data may require running secondary control and benchmarks that begin and end at points on the primary control system.

The use of open-ended legs or “spur” lines should be avoided whenever possible. When such lines are necessary, appropriate checks shall be made on all field data before leaving the vicinity.

Any field notes written in a field book shall be kept in a neat and orderly manner on all control points, primary or secondary. Appropriate annotations shall be made on location, description of point, and reference to specific identifying features located during the DTM or topographic survey.

Topographic Features

The perimeter limits of any unique or special features, such as historical structures, cemeteries, burial grounds, or grave sites, known or found within the project limits or adjacent thereto and which may be affected (existing or proposed right-of-way) shall be shown by actual location.

Buildings and improvements, including distance from proposed right-of-way up to 25 feet. The project manager and/or city surveyor may extend this distance.

The following features shall be recorded:

- All trees with trunk diameter of four inches or greater.
- The engineer or owner will provide utility maps. Aboveground utilities and surface evidence of underground utilities will be located. The underground utility locator will conform to the [ASCE Utility Standards of Quality Level](#) provided in the survey work order.
- Centerlines of dry creeks, gullies, or other confined intermittent watercourses.
- Paths, car trails, pasture roads, etc.
- Curbs, sidewalks, driveways, mailboxes, crosswalks, signs, edge of pavement, etc.
- Borders, boundaries—city limits, county line, or state line.
- Additional data points shall be collected along such features, outside of street right-of-way, as required and directed by COSA. These additional features may include the following:
 - Creeks, streams, rivers, and water bodies, shown and identified by name. Water levels shall be determined and displayed by elevation, time, and date of observation.
 - Drainage areas—field information on drainage area(s) of a project shall be collected in the same manner as other information, to the extent directed by the project manager and/or city surveyor.

Electronic Data

In nearly all cases, collecting, reviewing, editing, and processing field data is automated by the use of computer software and hardware. A data collector may be connected to the instrument (total station, GPS receiver, digital level, etc.) to store the raw measurement data and perform coordinate geometry (COGO) functions while in the field. Original raw data must be saved as a file for retention, as a matter of record, before any data editing or processing is done.

Data Collection

Field data in electronic form should be collected in the Survey Data Management System (SDMS) software or Tripod Data Systems (TDS) collection form and processed in SDMS or TDS Processor. SDMS software was developed through the American Association of State Highway and Transportation Officials (AASHTO). Its purpose is to provide a more flexible and user-definable method of recording horizontal angle, vertical angle, and slope distance from most of the total stations and in a standard format recognized by the survey review or design software. There are other field data collection systems that can be used, pending approval by the city project manager.

There are numerous ways to provide connectivity. When performing radial topography surveys for a DTM, points in the same chain, such as edge of pavement, centerlines, and ditch lines, can be linked together. These survey chains can ultimately be ported to mapping files or to DTM files as DTM break lines. Standard feature codes are listed in [Appendix 3-B](#).

Office Analysis

Survey review and DTM — In order to view the results of a survey for troubleshooting and delivery of a .dgn file, pre-design software will be used. CAiCE Visual Transportation, GEOPAK Survey, and SDMS or TDS Processor software will serve as the tool(s). This software will accept the SDMS .cal file or TDS .raw files as input, with the feature table Exhibit “C,” and will graphically display the project for analysis. Corrections and additions can be made, and the DTM can then be created. Photogrammetry files, background maps, macros for visualization, and other enhancements may be used before 2D or 3D graphics are exported as a .dgn file for GEOPAK/MicroStation use by the designer.

COSA Deliverables — Computer Files, Maps, and Drawings

If required, printed maps or plan sets of topographic surveys or digital terrain model (DTM) files shall be represented by neat, reproducible drawing sheets. These drawing sheets are plotted for urban projects at a typical scale of 1" = 20' (full-size or scale) or 1" = 40'. Half-size, scale, or rural projects may use a typical scale of 1" = 100' and 1" = 200', unless otherwise approved or directed, and shall accurately depict the results and details of the fieldwork, research, and computations as compiled and checked.

For initial submission, plotted drawings may be on paper, in the same sizes listed above, or as requested by the city project manager. Information may also be submitted in electronic form according to city standards.

If required, full-size drawings shall be plotted on 22" x 34" media. Half (1/2) scale drawings shall be on 11" x 17" media. Bond paper may be used for initial submittal. Mylar shall be used for all final drawings.

No plat, map, or drawing shall be made on a sheet size smaller than 8½"x 11".

All information, existing topographic features, right-of-way or control monuments, or property corners, whether found or set, shall be represented on a map and in the computer file(s) in the properly dimensioned location. Some projects (i.e., right-of-way acquisition) may require that other features be labeled and dimensioned as to size, height, width, or depth and referenced to the nearest right-of-way or property line. Site maps for architectural design may require other symbology.

The Texas State Plane Coordinate System, South Central Zone, based upon NAD 83(93) or NAD 83(CORS), shall be used, and the proper adjustment factor, theta angle, and reference monument information shall be noted.

For purposes of all COSA projects, a statement containing the above information shall be placed on all drawings and/or included with all computer files that provide information or "metadata" on the control monumentation, NGS, or other reference used as a basis.

Title Sheet

A title/cover sheet shall be prepared for each project, if applicable, that includes the following items:

- location of the route or project being mapped;
- appropriate location sketch;
- station numbers of the project's beginning and end;
- project numbers;
- stated scale of the drawing with a graphic scale;
- project description;
- survey date;
- for larger projects, a sheet index may be preferred;
- statement of the basis for horizontal and vertical control, including information listed in sections below; and
- if prepared by a consultant, the company name, address, and phone number.

Horizontal Control

Horizontal control deliverables shall include the following:

- For COSA purposes, the Texas State Plane Coordinate System, South Central Zone of NAD83(93) or NAD 83(CORS) shall be used.
- Map coordinates and distances shall be in surface measurements, and the SAF must be indicated to allow for return to SPC.

- A statement shall also be made specifying the proper zone, referenced traverse or triangulation station(s), and the published coordinates of the station(s) used, along with elevation.

Vertical Control

Typically, COSA elevation basis is either 1.) an existing project (datum specified by project) or 2.) NAVD 88.

A statement of the basis of elevations, similar to one of the following examples, shall be made in computer files and placed on all map prints:

1. Elevations refer to a benchmark (BM) set near the NE corner of the intersection of First St. and Ave. B (Location), an “X” on top of a concrete inlet (description). Elevation is 200.00 feet, and is referenced datum of Project No. 0000.
2. Elevations are based upon NGS benchmark A1422, NAVD 88, published elevation—326.042 ft. (1988 Adjustment).

Certification

While COSA contract requirements call for supervision and monitoring by a Registered Professional Land Surveyor signing and sealing a topographic survey, a digital terrain model or preliminary design survey is not usually required.

The following chart is excerpted from the *TSPS Manual of Practice*:

Table 5
TSPS Manual of Practice Chart for Tolerances for Conditions

Condition	I	II	Remarks and Formulae
	Urban Business, District Urban, Suburban and Industrial	Rural and Broad Area General Mapping	
Error in Traverse Closure	1:10,000	1:7500	System Control Loop
Unadjusted Level Loop Closure (ft.)	.04 \sqrt{M}	.08 \sqrt{M}	System Control Loop M=Miles
Secondary Traverse Closure	1:7500	1:5000	Between System Control Points
Secondary Level Loop Closure (ft.)	.05 \sqrt{M}	0.2 \sqrt{M}	Between System Control Points
Positional Error of Any Primary Monument (horizontal)	1:15000	1:10000	For monuments used for Triangulation or Radial Surveying in respect to another
Positional Error of Any Primary Monument (vertical)	± .03 ft.	± 0.15 ft.	For permanent bench marks
*Contour Interval	2 ft.	10 ft.	Or as needed by the COSA
Contour Accuracy	± ½ Contour Interval	± ½ Contour Interval	

Condition	I	II	
Positional error of any Photo Control Point (horizontal and/or vertical)	0.50 ft.	2 ft.	Or as recommended by Photogrammetrist
Location of Improvements, Structures, and Facilities during survey	± 0.05 ft. ± 0.50 ft.	± 0.1 ft. ± 1 ft.	Vertical (inverts, flow lines) Horizontal
Plotted location of Improvements, etc.	$\pm 1/40$ in.	$\pm 1/40$ in.	Symbols may be used for large scale maps indicating Center point
Scale of maps sufficient to show detail, but no less than	1" – 200'	1" – 2000'	Drawings are to show location of survey monuments and bench marks

Scope of Service for DTM Survey

Phase 1 — Establish Primary Project Control

- Establish Texas State Plane Coordinate project control. Also, recover any NGS first order horizontal and first order vertical control stations in the vicinity of the project limits.
- Establish proposed location of a new monument pair, complete GPS obstruction field sketches, and communicate with and receive approval from the city project manager as to the proposed location of all new monuments.
 - GPS monuments, 1 pair (Station with Azimuth) set 300 feet outside the project limits at both ends of the project. Selected locations shall be free of overhead obstructions above a 15 degree elevation mask to allow for optimum satellite reception. Any deviation from this requirement must have prior approval from the city project manager.
- After approval of the proposed location of all new monuments, set all monuments and complete point sketches with descriptions and reference swing ties.
 - Monuments will consist of consultant's aluminum cap set in concrete.
 - The COSA assigned point number will serve as the station ID. The surveyor is responsible for purchasing materials for new monuments.
- Create a GPS survey plan and review with the city project manager, before proceeding.
- Perform a GPS static survey of all stations using dual frequency GPS survey equipment.
 - GPS methods may be used to establish elevations, if no vertical control is within the vicinity of the project. Otherwise, conventional three-wire leveling or digital leveling is required, holding existing COSA or NGS vertical control and following stated standards.
- Process, analyze, and adjust the data. Final coordinates should be provided in the Texas State Plane Coordinate System, South Central Zone, in U.S. Survey Feet. Provide coordinates in NAD83/93 or NAD 83(CORS). Vertical positions should be provided in NAVD88.
- Create approved COSA monument datasheets for all new monuments. A datasheet example will be provided upon request.

Phase 2 — Establish Secondary Control

- Set additional secondary control points along the project route, to be used for topographic features and cross sections. Additional secondary control points will be ½" iron pin with company caps and must be established by a closed traverse.
- Vertical established on control points must be tied to a minimum of two separate benchmarks and/or looped back to the starting benchmark.
- If a FEMA RM (Federal Emergency Management Agency Resource Management) is in the area, tie in for vertical comparison.

Phase 3 — Recover/Reestablish Apparent Right-of-Way

- Recover and/or reestablish apparent right-of-way within project limits. Apparent right-of-way is visible, evident, obvious, open to view, or appearing as real.

Phase 4 — Digital Terrain Modeling (DTM)

- Project Name — The COSA MicroStation file project name will be assigned by the city project manager.
- Length of DTM — Collect data for a minimum of 200 feet from both ends of the project limits or as directed.
- On side streets, extend 100 feet past the right-of-way or as directed. Also, cross-section upstream and downstream creeks for a minimum of 500 feet at 50-foot increments and each side of the center of stream bed extending 10 feet beyond the top of bank.
- Contact utility companies for copies of their utility maps.
- Width of DTM — Collect right-of-way to right-of-way (fence line to fence line) and extend three feet beyond the right-of-way line.
 - If applicable, the DTM shall include a minimum of break lines, roadway striping, edge of pavement, or edge of gravel, top and bottom of bank, spot elevation, and high and low points. If applicable, locate the top edge of pavement, if a grade break exists between natural ground and the edge of pavement.
 - Only COSA feature codes (see [Appendix 3-B](#)) will be allowed when collecting the DTM (if needed, contact COSA for current feature code list).
 - Tie in visible right-of-way monuments.
 - Topographic shots will not exceed 450 feet from the instrument and distance between ground shots and spot elevations will not exceed 50 feet.
 - Tie in all drainage structures, defining break lines around each end of the culvert or bridge.
 - Provide a field drawing of each headwall to all culverts, including pipe culverts.
 - Note: Digital photographs may be used in addition to sketches.

- Locate all visible utilities within project limits and provide ownership information and utility pole tag numbers as a PD tag, if applicable. Contact 1-800-344-8377 (DIG-TESS) to mark underground utilities. Utility alignments shall be included in CAD PD files.
- Locate all driveways when collecting DTM and provide PD of type (i.e., gravel, concrete, etc.).
- Locate trees, within and three feet beyond the existing right-of-way, which have a trunk diameter of four inches or greater at chest height and provide species and drip-line diameter as a PD tag. Right of entry will be required from property owner(s).
- When locating road signs, provide a description of sign type(s) and any labeling on signs (use PD tag).
- Provide a description of each instrument setup and back sight with the height of instrument and staff height noted. The last shot of each setup shall be to a control point.

Note: Digital photographs may be used in addition to sketches.

Deliverables

- Horizontal control layout on 11" x 17" Mylar, with one-inch left border. (See [Appendix 3-C.](#))
- Submit the following digital data on CD:
 - Complete backup of all of the project data including the project report and digital photos.
 - Raw GPS files in RINEX (Receiver Independent Exchange) format.
 - An ASCII (American Standard Code for Information Interchange) file of the final position information for inclusion into COSA GIS database.
 - MicroStation V8 2D and 3D Annotated (.dgn) files with an ASCII file. MicroStation files must comply with COSA V8 level structure.
 - The CD shall be labeled with a minimum of project name, limits, and units.

Construction Surveying

Overview

It is not the intent of the city to develop a strict guideline of policy and procedures for project engineers, project managers, and construction inspectors to follow in the area of construction surveying.

Surveying Suggestions

The following surveying suggestions may aid a project manager or inspector:

- The project surveyor for an individual project should establish the horizontal and vertical control. Project surveyors working for any subsequent construction contractors should be required to use the initially established control when establishing baselines/secondary control.
- Conduct periodic spot-checks of the contractor's completed surveying. This should be accomplished by city surveyors or by an independent existing consulting surveyor under contract with the city for that project. Spot-checks can alleviate undue pressure on the project manager or inspector.

The following checklist may be used by the project manager to review a contractor’s work:

**Table 6
Checklist**

Item	Minimum Frequency	Remarks
Benchmarks	All	Includes all BMs and TBMs set by contractor
Culverts & Storm Sewers		
Flow Lines	50%	Both U.S. and D.S. [upstream and downstream] flow lines should be checked. This check should include two of the first three lines the contractor places. There should also be intermediate checks on long structures.
Alignment	25%	This includes station location and placement angle.
Inlets and Manholes		
Grade	25%	This includes checking calculations at each end of curb inlet to assure proper alignment with curb. Top grades and flow lines of manholes and drop inlets should be checked.
Location	25%	Includes station and offset.
Bridges		
Alignment	100%	Check Contractor’s control points.
Deck Grades	50%	At least ½ of the bridge overhangs should be checked at 50 ft. intervals.
Drilled Shafts and Piling	100%	Check distance between shafts or piling.
Columns	100%	Check plumb before placing concrete.
Caps (Bearing Seats)	50%	Check for location and elevation prior to placing concrete.
Caps (Dowel Bars)	100%	Visually check location and projection.
Roadway		
Grade	10%	Independently check blue tops on all subgrade and base courses.
Width	1 per 2000’	Includes subgrade, base course, and finished roadway
Retaining Walls		
Height	1 per section	The first footing and wall the contractor forms should be checked.
Footing Elevations	1 per wall	

Notes:

- In all cases, records should be made of the survey checks and any corrections made. A daily report form may be used.
- If the contractor demonstrates a propensity for erroneous surveying, the frequency of checks should be inversely proportionate to the quality of the contractor’s work product so far.
- Checks by city personnel are not intended to relieve the contractor of responsibility for accuracy. All survey checks should be random and independent.

Construction Survey Specifications

For construction survey specifications, refer to the Category 5 section in the TSPS [Manual of Practice for Land Surveying in the State of Texas](#), available for purchase.

Aerial Photogrammetric Control

Survey Guidelines

Texas Board of Professional Land Surveying (TBPLS) [Practices Act](#) and [General Rules of Procedures And Practices](#).

Texas Society of Professional Surveyors (TSPS Manual of Practice Category 7 and Category 8).

Units: U.S. Survey Feet

There is a unit of measure called the “U.S. Survey Foot.” It is almost exactly equal to a standard foot, but its definition is slightly different:

- Standard (or “international”) foot = .3048 meters.
- U.S. Survey Foot = 1200/3937 meters.

In other words, one is defined in relation to the meter by a decimal expression; the unit of measure defining the other is a fraction.

Horizontal Datum: NAD 83(93) or NAD 83(CORS) — Texas State Plane Coordinate System, South Central Zone.

Vertical Datum: NAVD 88.

Surface Adjustment Factor: Reciprocal value of the Combined Adjustment Factor. The Surface Adjustment Factor for projects within Bexar County will be 1.00017.

Survey Safety — Required Items for Project Safety

- Proper traffic control devices in accordance with the [Manual on Uniform Traffic Control Devices](#) shall be used when instruments/equipment are on or adjacent to the roadway.
- A set of warning signs will be used to warn that survey crews are working in or next to the roadway and should measure 48" x 48" when working on major highways (Texas MUTCD). Survey personnel will wear safety vests at all times. Company vehicle(s) will have safety flasher (strobe) lights.
- If additional work is required outside of the right-of-way, prepare and send right-of-entry letters to all landowners affected by the survey.
- Before setting any subsurface monuments, such as GPS points or benchmarks, all utilities in the area of proposed points must be located by calling 1-800-344-8377 (DIG-TESS).

Photogrammetry

Control Target Documentation

All control points will be documented with:

- A graphical representation of the location of markers.

- A textual documentation in the form of a spreadsheet.

The above information shall be provided to the city project manager. However, the city project manager may require additional documentation, depending on the requirements of the project.

Graphical Information

Graphical documentation presented as a sketch or CAD drawing shall include the following information:

- Spatial location of control point with sufficient detail to allow recovery of the point in the field.
- Map scale and north arrow.
- Stationing annotated project centerline or roadway alignment (if available) as supplied by the city.

Textual Information

- Date of installation.
- Highway name and project limits.
- General description of the location of point referenced to highway intersections, city limits, etc.
- COSA work order number.
- Identification of reference coordinate system and elevation datum.
- Combined surface adjustment factor (CAF) or COSA SAF.
- Point coordinates identified as being either grid or surface.

Textual documentation shall be submitted using a Microsoft Excel[®] spreadsheet.

The standard deviations computed from the network adjustment shall be included on this form.

Control Targets — General

The secondary control network described in the previous section is marked with cross-shaped targets during the aerial photography flight. The targets are visible on the developed aerial film and are used to relate the aerial photography to the ground. Targeting is an essential part of photogrammetric mapping. Studies conducted by the Federal Highway Administration (FHWA) determined that pre-marked targets improve the efficiency of photogrammetric processing and increase overall accuracy of point measurements.

A right-of-entry agreement with a landowner must be obtained prior to entering private property to set photogrammetric control. The agreement shall include detail on the length of time that the control target will be on the ground and those responsible for removal of the material. The agreement may include additional detail, such as specific times for access to the property or conditions on notification before entering the property.

Targets may be placed on hard surfaces, such as pavement or concrete, or on soft surfaces, such as soil, gravel, or grass. In general, hard surfaces are preferred because point measurements, both

for the surveyor and for the photogrammetrist, are more accurate on a hard surface. In addition, a hard surface allows targets to be painted, which increases the durability and longevity of the mark.

The cross-shaped target is centered on the PK (Parker-Kalon) nail, iron rod, or other surveying marker that defines the control point. On hard surfaces the targets shall be painted using flat finish paint. The target color shall be either white (on darker background surfaces) or black (on lighter background surfaces). Contrast between the target and the background material is important for point measurement in the photogrammetric process. It is permissible to use both paint colors, one as a background color and the other as the target color, to enhance the contrast further. However, in general, white targets are preferred.

On soft surfaces the target is constructed of cardboard, sheetrock, plastic film, Tyvek, or other similar materials durable enough to remain in place until the flight mission is complete and the film has been inspected. Once the flight mission has been approved, the target materials shall be collected.

Placement of control targets shall meet the following criteria:

- The target should be clear of any obstruction that may obscure the target on the aerial photography. When standing on the target, there should be a clear view of the sky from 45° above the horizon to zenith in every direction.
- The target shall be placed as flush to the ground as possible. Any vegetation that may grow beneath the target should be cleared prior to placing the target material. Vegetation growth can cause a target to bow, affecting the accuracy of the photogrammetric measurement.
- Targets should not be placed in a shadow or in a shady area. It is advisable to visit target locations at the approximate time of the planned flight mission to determine the location of shadows.
- Placement of targets beneath overhead wires should be avoided. Overhead wires make measurement of the targets in the photogrammetric process problematic.
- Targets should be placed on as level an area as possible. If a target must be placed on a slope, the target should be oriented so that two of the legs that form a straight line traverse the slope at approximately the same elevation.
- The horizontal coordinate provided for the target shall be at the center of the target at the location of the control monument. The vertical elevation of the target shall be at the center of the target at the level of the target material. This is important because the photogrammetric measurement of the point is made at the elevation of the target material, which may or may not be the elevation of the survey marker.

Control Targets — Design

Figure 3-1, shown below, shows the design of a typical control target. Note that the size of the target is dependent on the scale of the aerial photography for which it will be used.

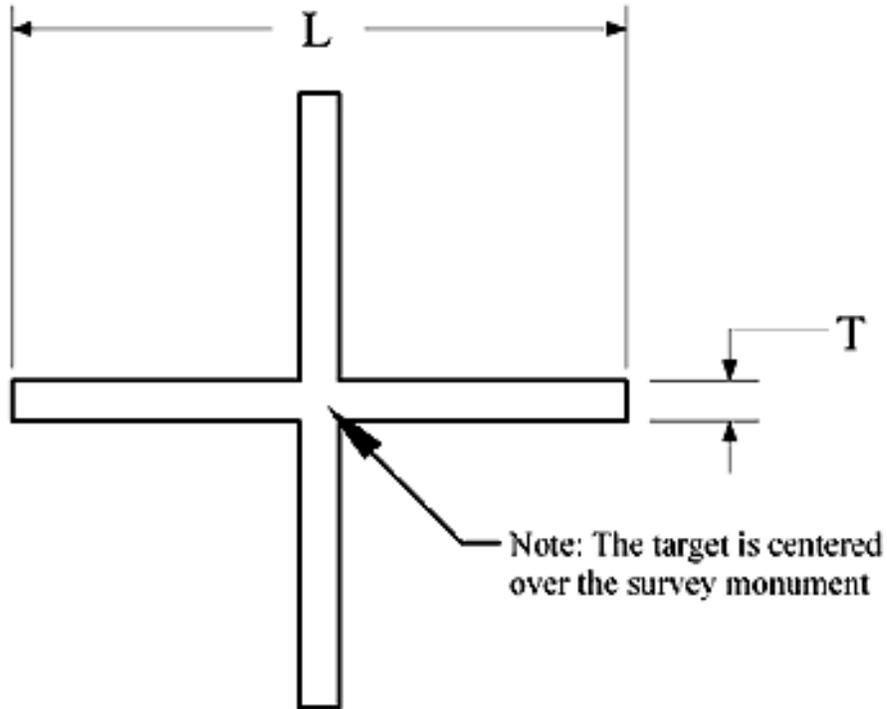


Figure 3-1. Target design and dimensions example.

For a typical 1" = 250' photo scale, the dimensions of the target are: Thickness (T) = 6" and Length (L) = 84".

Figure 3-2, below, shows the design of a box-type target used to designate new flight tangents.

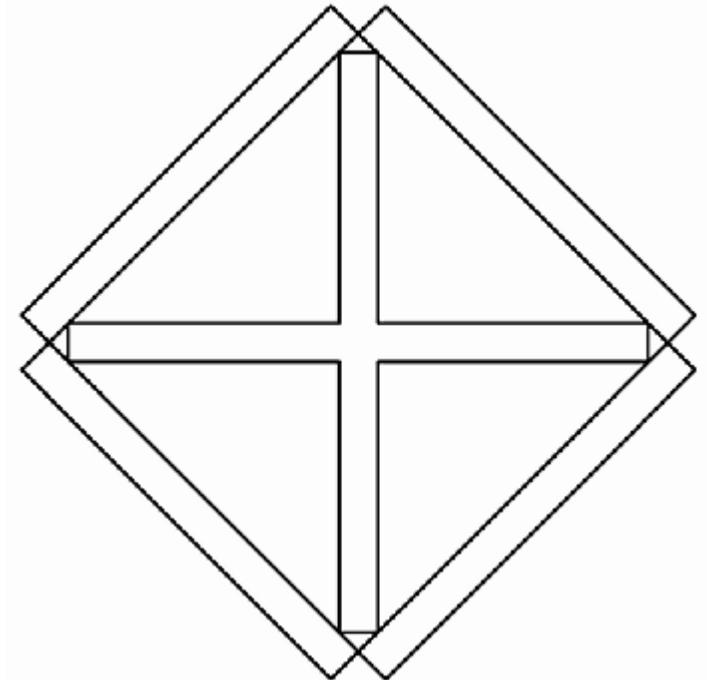


Figure 3-2. Box target design example.

A flight tangent is a single, straight flight line maintained by the aircraft. Anytime the aircraft has to make a turn to maintain photo coverage over a roadway, that turn and new flight direction constitute a new flight tangent. Generally, a point of intersection (PI) in a roadway of 15 degrees or more will require a new flight tangent.

Control Targets — Placement

Placement of the secondary control network survey markers and targets shall adhere to the following requirements:

- A band of control is placed 300 to 500 feet before the beginning and ending control bands for the project. A band of control is defined as being the centerline survey marker and its associated wing markers.
- Control bands are placed at 1,500 feet maximum and 1,000 feet minimum intervals along the flight line. The maximum distance between bands can be increased to 1,800 feet, but not for two or more consecutive bands.
- Wing markers are set at the width of the mapping area, with a maximum distance of 600 feet from the centerline. The minimum distance is typically 200 feet from the centerline marker. However, in situations where access to private property is denied or physical features prevent placement at the minimal 200 feet, the target can be placed at the edge of the right-of-way.
- The first and last centerline survey point of each separate flight line shall be constructed as a “box” marker. Note that if the roadway being covered by the aerial photo mission has a point of intersection greater than 15 degrees, a new separate flight line will be required to maintain photo coverage. In this case the new flight line will require box panels at the beginning and ending of the flight line.
- All flight lines require a minimum three (3) horizontal markers.

Figure 3-3 below illustrates the control marker and target layout for a typical aerial mapping project. Note the PI that occurs towards the center of the figure and the corresponding control point locations.

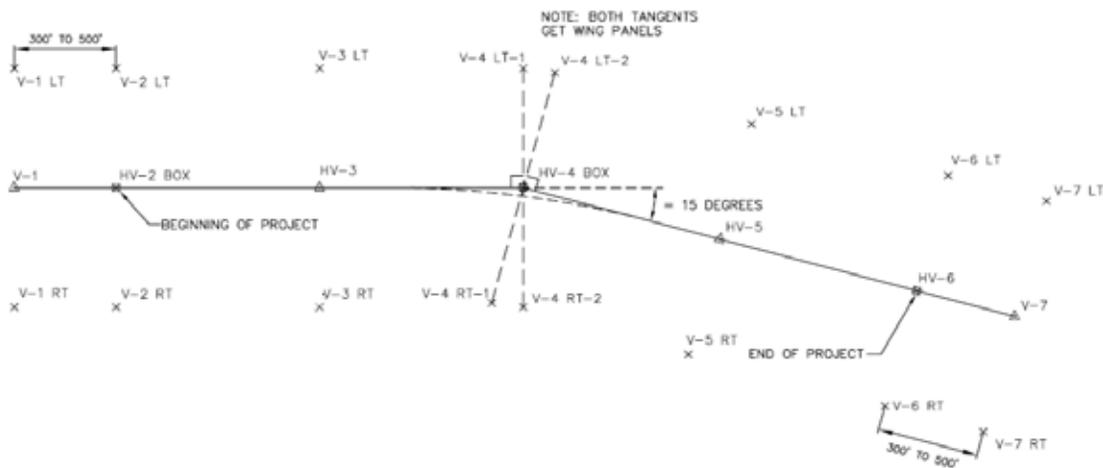


Figure 3-3. Control target layout and naming example.

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SECTION 4.0

Drainage

Introduction

This section provides criteria for performing drainage design and guidance on what standards the drainage design shall conform to. It is not the intent of this manual to instruct the design engineer in the usage or applicability of these criteria. Engineering training, experience, and judgment must be used in the performance of drainage design tasks. The means and methods used in completing the design are under the direction of the design engineer, who will be required to submit design calculation summaries as part of the plan submittals during the various phases of the design. The drainage calculation results will be required in the plan of record. Drainage calculation summary formats are included in this section of the manual.

The [Unified Development Code](#) (UDC) is the basic reference for drainage design, although it does not address some drainage design items in sufficient detail. The [TxDOT Hydraulic Design Manual](#) has been referenced to cover some of these areas. Note that the city requires designs to conform to different storm frequencies than TxDOT does.

The drainage design criteria reference the documents listed below. These reference documents are not duplicated in order to avoid discrepancies that may develop as these references are updated.

- *City of San Antonio Unified Development Code Article 5, Division 2, section 35-504 and Appendix F. To view the code:*
<http://www.municode.com/Resources/gateway.asp?pid=14228&sid=43>
To buy the code: <https://secure.municode.com/munistore/productspage.asp>
- *City of San Antonio Storm Water Design Manual*
<http://www.sanantonio.gov/publicworks/stormwater/index.asp>
- *TxDOT (Texas Department of Transportation) Hydraulic Design Manual*
<http://onlinemanuals.txdot.gov/txdotmanuals/hyd/index.htm>
- *San Antonio River Authority, Regional modeling standards for Hydrology and Hydraulic Modeling*
<http://www.bexarfloodfacts.org>
- *U.S. DOT FHWA (Department of Transportation, Federal Highway Administration) Hydraulic Engineering Circular No. 5, Hydraulic charts for the selection of highway culverts*
<http://www.fhwa.dot.gov/engineering/hydraulics/pubs/hec/hec05.pdf>
- *Open Channel Hydraulics* by Ven Te Chow, McGraw-Hill, 1959, ISBN: 978-0070107762.
- *U.S. DOT FHWA Hydraulic Engineering Circular No. 14, Hydraulic design of energy dissipators for culverts and channels*
<http://www.fhwa.dot.gov/engineering/hydraulics/pubs/hec/hec14SI.pdf>
- *San Antonio (Low Impact Development Guidelines (LID) Guidelines, 2011*

Table 1 depicts the sections of drainage design and the appropriate document and section to reference for specific design criteria and guidance.

Table 1
References

Topic	Item	Document	Section or Chapter
Hydrology	Method of computing runoff	UDC	(c)
	< 640 acres	UDC	(c) (1) (A)
	> 640 acres	UDC	(c) (1) (B)
	Time of concentration	UDC	(c) (2)
	Runoff coefficients	UDC	(c) (3)
	Runoff intensities-	UDC	(c) (4)
	SCS curve numbers	UDC	(c) (5)
	Percent impervious cover	UDC	(c) (6)
	Design rainfall	UDC	(c) (7)
	Routing of runoff	UDC	(c) (8)
	Manning's n value	UDC	(c) (9)
Floodplain Analysis (See Appendix B-106 – Floodplain Submittal Checklist)	Establish design surface elevation		
	Stream channel planning consideration	TxDOT	7
	Stream stability issues	TxDOT	7
	Regional modeling standards for hydrology and hydraulic modeling	SARA / BRWM	
Hydraulics			
Channels and Improved Watercourses			
	Watercourse to remain unobstructed	UDC	(h) (1)
	Channel modifications	UDC	(h) (2)
	Maintenance	UDC	(h) (3)
	Multiple uses	UDC	(h) (4)
	Velocity criteria	UDC	(h) (5)
	Retard spacing	UDC	(h) (6)
	Concrete lined channels	UDC	(h) (7)
	Vegetated earth channels	UDC	(h) (8)
Bridges	Introduction	TxDOT	9
	Planning and location considerations	TxDOT	9
	Bridge hydraulic considerations	TxDOT	9
	Hydraulics of bridge openings	TxDOT	9
	Single and multiple opening designs	TxDOT	9
	Bridge scour	TxDOT	9
	Flood damage prevention	TxDOT	9
	Risk assessment	TxDOT	9

Topic	Item	Document	Section or Chapter
	Appurtenances	TxDOT	9
Culverts	Introduction	TxDOT	8
	Design considerations	TxDOT	8
	Hydraulic operation of channels	TxDOT	8
	Improved inlets	TxDOT	8
	Velocity protection and control devices	TxDOT	8
Streets	Streets	UDC	(g)
	Primary and secondary arterial streets	UDC	(g) (3)
	Local "B" and collector streets	UDC	(g) (3)
	Local "A" streets	UDC	(g) (4)
	Alleys	UDC	(g) (5)
	Traditional street design	UDC	(g) (6)
	All-weather crossings	UDC	(g) (7)
	Dangerous conditions on crossings during floods	UDC	(b)(1)C2
	Street velocities and capacities	UDC	(g)(1)C&D
	Storm Sewers	Storm sewers	UDC
Junction loss			
Inlets and openings		UDC	(j)
Drop curb openings—side walk does not abut curb		UDC	(j) (1)
Curb or drop inlets		UDC	(j) (2)
Grate inlets		UDC	(j) (3)
	Curb opening inlets	UDC	(j) (4)
Erosion and Stabilization	Roadside channel design	TxDOT	7
	Introduction	TxDOT	13
	Soil erosion control considerations	TxDOT	13
	Inspection and maintenance of erosion control measures	TxDOT	13

Design Criteria

The City of San Antonio, Bexar County, and the San Antonio River Authority (SARA) have an agreement of understanding to address common flooding and drainage issues. These three agencies, along with 19 suburban communities, have formed the [Bexar Regional Watershed Management \(BRWM\)](#) partnership. A BRWM technical committee agreed on and adopted regional modeling standards, which are to be used when modeling floodplains and watercourses.

The BRWM has produced a number of hydrologic and hydraulic models of major watercourses in Bexar County. These studies are based on regional modeling standards and can be used for detailed planning purposes. Study data can be found at <http://www.bexarfloodfacts.org>. Prior to using these models, coordination is required to determine applicability to a specific project. The BRWM hydrologic models will be discussed with city staff during scoping meetings, and their applicability and degree of usage will be specified in the design summary report.

Hydrology

The UDC lays out the methodology to use in establishing project hydrologic values.

Areas that are smaller than those portions of the watershed shown in BRWM studies should be analyzed individually by the design engineer using the methodology outlined in the UDC.

Floodplain Analysis

BRWM hydraulic models may be used if determined to be applicable.

The TxDOT [Hydraulic Design Manual](#), Chapter 7, Section 2, *Stream Channel Planning Consideration*, and Section 4, *Stream Stability Issue,s* are referenced for additional information.

Projects may require a Letter of Map Revision (LOMR), a Conditional Letter of Map Revision (CLOMR), a Floodplain Development permit, and/or other permits. These requirements will be discussed in the DSR at the initial scope meeting. The permits and plans shall be developed in accordance with applicable state and local requirements.

Hydraulics

The hydraulic design for each project can be divided into five areas of concern: channels and improved watercourses, bridges, culverts, streets, and storm sewers

Channels and Improved Watercourses

Channels and improved watercourses will be designed using the criteria outlined in the UDC.

Bridges

Bridges will be analyzed in conjunction with floodplain analysis or channels and improved watercourses. Refer to the UDC for hydrology and hydraulic modeling and to the TxDOT *Hydraulic Design Manual*, Chapter 9, *Bridges*. Scour calculations will be required on all new and existing structures. Scour must be calculated for the 1 percent annual chance storm (100-year ultimate) and the lesser of the overtopping flow or the 0.2 percent annual chance storm (500-year).

Culverts

Culverts may be designed by hand or using available software. The design will follow the approach in the TxDOT *Hydraulic Design Manual*, Chapter 8, *Culverts*, and U.S. DOT FHWA Hydraulic Engineering Circular No. 5, [Hydraulic charts for the selection of highway culverts](#). Minimum culvert velocities shall be as specified in the TxDOT *Hydraulic Design Manual*.

The decision between constructing a culvert or a bridge requires an evaluation of initial cost, maintenance, and environmental and operations considerations. Generally, culverts that span a distance of 30 to 50 feet could be replaced with a span bridge.

Streets

Streets are used for drainage conveyance in San Antonio. The limitations are outlined in the UDC Sect. 35-504(g). The design engineer will provide calculation data showing that velocities are acceptable and ponding widths are within limits. The pavement design shall consider the effects of water inundation at sags and low areas.

Storm Sewers

Refer to the UDC Sect. 35-504 (i) for criteria on storm sewer design. The preference of the city is to use curb inlets, combination curb and grate inlets, or a 4-way inlet. Grate inlets should be used only under isolated situations and only with the specific approval of Storm Water engineering staff.

Junction losses can have a significant effect in the design of storm sewers and should be considered in the design. Historically, the city has used *Pressure Changes at Storm Drain Junctions*, Engineering Bulletin No. 41, University of Missouri (Sangster, Wood, Smerdon, and Bossy, 1958), commonly called the “Missouri Charts.” This publication may be used, although other options are available for the designer to use, including several computer storm sewer design programs that contain options to calculate junction losses.

Junction boxes or manholes, as appropriate, shall be constructed at spacing not to exceed 500-ft and used to join multiple lines and at locations of change in grade or alignment. The riser portion of a junction may be placed on the top of a box culvert for this purpose, with the inclusion of sufficient details and standard drawings.

When connecting proposed storm sewers with existing storm sewers, the beginning water-surface elevation needs to be identified or calculated. Use existing plan information when available. The starting water-surface elevation shall be documented in the design summary report (DSR) and determined by the design engineer with concurrence from the Storm Water Department.

Conduit Strength and Durability

Concrete pipe class can be determined using Table 1 and 2 from item 401 of the [City of San Antonio Standard Specifications for Public Works Construction](#). Reinforced concrete pipe is the required drainage conveyance in pipe systems. Corrugated metal pipe and HDPE (high-density polyethylene) pipe shall be considered on a case-by-case basis in non-roadway areas.

Erosion and Stabilization

The UDC addresses acceptable channel surfaces for various velocity conditions. The design must minimize channel erosion. The designer should consider grass, concrete retards, or concrete riprap lining as the standard surfaces for channels.

The design engineer may consider erosion control mats in conjunction with vegetative control to line channels. The design must consider operation and maintenance practices

and the durability of the specified mat and vegetative control. Some of these special circumstances could be the protection of outlets and outfalls and the lining of improved channels. These concepts should be discussed during the scoping and preliminary meetings to determine project requirements and appropriateness.

Rock riprap may also be used in special circumstances, and with approval for a single project application. The design must follow applicable HEC (Hydrologic Engineering Center) guidelines. Abutments, slopes, and other bridge features are appropriate areas. Use of rock riprap should be discussed during the scoping and preliminary meetings to determine project requirements and appropriateness.

The Storm Water Pollution Prevention Plan (SW3P) will address erosion control and stabilization methods to be used during construction of the project. Best management practices (BMP) will address those design concepts that can best manage erosion control and stabilization when the project is completed.

Plan Submittal Requirements

Table 2 lists the plan requirements for various project phases.

Table 2
Drainage Plan Submittal Requirements

	PER	40%	70%	95%	Bid Documents
Hydrology					
Drainage area map	x	x	x	x	x
Discharge calculations	x	x	x	x	x
Floodplain Analysis					
Plan of watercourse	x	x	x	x	x
Profile of:					
Existing ground		x	x	x	x
Proposed invert		x	x	x	x
Water surface elevations		x	x	x	x
Cross sections		x	x	x	x
HEC-RAS detailed calculation		x	x	x	x
HEC-RAS summary		x	x	x	x
Hydraulics					
Channels and Improved Watercourses					
Plan show watercourse	x	x	x	x	x
Proposed sections		x	x	x	x
Plan and Profile sheets		x	x	x	x
Details:		x	x	x	x
Concept	x				
Final		x	x	x	x
Hydraulic computation sheet		x	x	x	x
HGL/EGL		x	x	x	x

	PER	40%	70%	95%	Bid Documents
Bridges					
Location	(1)	(1)	(1)	(1)	(1)
Layout	(1)	(1)	(1)	(1)	(1)
Sizing		x	x	x	x
Hydraulic analysis		x	x	x	x
Scour analysis		x	x	x	x
Hydraulic data sheet		x	x	x	x
Culverts					
Layout	x	x	x	x	x
Plan and profile sheets		x	x	x	x
Details:					
Concept	x				
Final		x	x	x	x
Hydraulic data sheet		x	x	x	x
Streets					
Hydraulic computation sheet		x	x	x	x
Storm Sewers					
System layout	x	x	x	x	x
Plan and profile sheets		x	x	x	x
Inlet sections			x	x	x
Details:					
Concept	x				
Final		x	x	x	x
Hydraulic computation sheet		x	x	x	x
HGL/EGL		x	x	x	x
Erosion and Stabilization					
SW3P			x	x	x
SW3P details			x	x	x
SW3P narrative			x	x	x
BMP	x	x	x	x	x
Outlet stabilization			x	x	x
Outfall stabilization			x	x	x
<i>(1) include in roadway plans</i>					

Calculation Submittal Requirements

Table 3 lists the calculation requirements for the various project phases.

Include a CD of applicable calculations with each submittal. HEC-RAS (Hydraulic Engineering Center River Analysis System), Microsoft Excel, and other common digital file formats are preferred. Paper calculations shall also be in PDF (Portable Document Format). Calculations shall include an index and must be in the order listed below.

Table 3
Calculation Submittal Requirements

	PER	40%	70%	95%	Bid Documents
Hydrology					
Discharges for areas < 640 acres	X	X	X	X	X
Discharges for areas > 640 acres	X	X	X	X	X
Time of concentration	X	X	X	X	X
SCS curve numbers	X	X	X	X	X
Percent impervious cover	X	X	X	X	X
Frequency of coincident occurrence	X	X	X	X	X
Floodplain analysis					
HEC-RAS analysis:	X	X	X	X	X
Existing	X	X	X	X	X
Proposed	X	X	X	X	X
Ultimate	X	X	X	X	X
Hydraulics					
Channels and Improved Watercourses					
HEC-RAS analysis		X	X	X	X
Manning's Equation	X	X	X	X	X
Bridges					
HEC-RAS analysis		X	X	X	X
Scour calculations		X	X	X	X
Culverts					
Tail water calculations		X	X	X	X
Culvert sizing		X	X	X	X
Energy dissipation		X	X	X	X
Soil stabilization (if required)			X	X	X
Street velocities and capacities		X	X	X	X
Storm Sewers					
Conveyance calculations					
Inlets sizing		X	X	X	X
Discharge summary	X	X	X	X	X
Tail water calculations		X	X	X	X
Energy dissipation		X	X	X	X
Soil stabilization (if required)			X	X	X
Erosion and Stabilization					
SW3P Sizing Calculations					
			X	X	X

Design by Frequency Selection

Table 4 shows the frequencies to which various drainage elements shall be designed.

Table 4 - Facility Design Frequencies

Improvement Type	Design Frequency							
	5E	5U	25E	25U	50	100E	100U	500E
Hydraulics								
Channels and Improved Watercourses:								
Drainage area less than 100 acres	x	x	x	x				
Drainage area greater than 100 acres				x		x	x	
Bridges:								
Scour						x	x	x
Analyze the lower of overtopping flow or 500 year								
Culverts:								
Drainage area less than 100 acres	x	x	x	x(1)				
Drainage area greater than 100 acres				x		x	x(1)	
Streets, area less than 100 acres: (2)								
Local "A":								
Curb full	x	x						
Within ROW				x	x			
Local "B" and collector:								
Curb full				x	x			
Primary and Secondary Arterial:								
Max depth of 0.30 feet				x	x			
Passable lane (10 ft.) each direction				x	x			
Storm Sewers:								
Inlets, area less than 100 acres: (3)								
Desirable				x	x			
Drain line:								
Drainage area less than 100 acres				x	x			
Drainage area greater than 100 acres					x		x	
Erosion and Stabilization:								
SW3P	x							
BMP:								
Drainage area less than 100 acres				x	x			
Drainage area greater than 100 acres					x		x	
Outlet stabilization	same as structure or channel							
Outfall stabilization	same as structure or channel							
E = Existing U = Ultimate								

- (1) Check "Dangerous Conditions on Crossing during Floods," UDC figure 504-2, table 504.
- (2) For drainage area greater than 100 acres - Streets must be designed for the 100-yr ultimate storm event to be below the top of the curb.
- (3) For drainage area greater than 100 acres - Inlets must be designed to accommodate the 100-yr ultimate storm event.

Plan Sheet Formats

The design and data shall be presented on various plan sheets. Example sheets with a minimum level of content are included in this manual to show how the design and calculations shall be presented. The design engineer should use judgment as to whether additional information is needed for proper design of the proposed system.

Drainage Area Maps

The information presented on the drainage area map should include: watershed identification code (from regional modeling standards), overall watershed boundary, project sub-boundaries, project drainage area identification symbology, flow arrows, outfall(s), and 2-foot contours from COSA GIS mapping or survey data. Also show discharge calculations, including time of concentration. At a minimum, show areas, discharge values, concentration / collection points and time of concentrations, with full calculations shown on the second sheet. See figure 4-1.

Interior Drainage Area Map(s)

Some projects may benefit from interior drainage area maps, showing smaller areas that drain to specific inlets. Demonstrate calculations as described for the Drainage Area Map, described above. See figure 4-2.

Plan of Watercourse

Used with floodplain analyses. Show plan of the watercourse in the study reach, location of cross-sections used in the analysis, existing and proposed topographic features that affect the study, and FEMA effective, proposed and ultimate 100-year floodplain delineations, as agreed to in the project scoping meetings.

Hydraulic Data Sheets

These sheets can be used to show summary calculations for bridges, culverts, and natural and improved watercourses. In addition to the summary data, include the method and program used for the calculation and the frequency(s) used in the calculations. See Figures 4-3 and 4-4.

Hydraulic Computation Sheets

Storm sewer calculations are shown on these sheets, divided into discharge calculations, conveyance calculations, and inlet hydraulics calculations. This information may fit on one sheet or may need multiple sheets on larger projects. See figure 4-5.

Plan and Profile Sheets

Various components of the drainage design will need to be shown on plan and profile sheets. The hydraulic grade line and energy grade line (HGL/EGL) must be shown on the sheets during the design phases of the project. For clarity the EGL/HGL will be shown only on a designated set of plans submitted to Storm Water and these lines must be in color or highlighted in color. Turn off the HGL/EGL on the final construction documents to avoid confusion during construction. See figures 4-6, 4-7, and 4-8.

Standard Details

COSA has a number of standard details that may be used, for example, [Standard Specifications for Public Works Construction](#). TxDOT has standard details for culverts, headwalls, curb inlets and extensions, and other drainage items that may also be used. Any modifications to standard details must be called out on the standard sheets and be sealed by a Texas professional engineer.

Drainage Details

Details designed for the project, but not included in standard details, shall be shown on drainage detail sheets. These details are typically drawn to scale and show plan, section(s), and perspective views as needed.

Drainage Cross Sections

Cross sections will be needed for channel and watercourse projects. Show existing ground, proposed improvements, and design basis water-surface elevations. For proposed channels, cross sections will be provided at 50-foot intervals and as needed. For natural watercourses, sections will be shown at the intervals used in the HEC-RAS model. Storm sewer improvements will be shown on the roadway cross sections. Show flow arrow at ROW where it may not be clear whether adjacent areas are draining into or away from the project. See figure 4–9.

Inlet Sections

Storm sewer laterals shall be shown on section views similar to cross sections. Include HGL/EGL lines on these sections. See instructions in the plan and profile sheet section of this manual and figure 4–10. An example of how HGL and EGL data are to be presented is shown in figures 7, 8, and 10.

Storm Water Pollution Prevention Plan

This plan will be of sufficient scale to show project features that need protection during construction. Project complexity will dictate how many sheets will be needed to convey the prevention plan to the contractor and the inspection representatives. Some projects will need the SW3P to follow the construction phasing plan. The plan shall include contours, flow arrows, existing topographic features, proposed improvements as appropriate, proposed devices, notes, and instructions. In addition, this plan must be developed in accordance with applicable state and local requirements.

Storm Water Pollution Prevention Narrative

A standard narrative sheet has been prepared by the city and shall be filled out with the appropriate project information.

Storm Water Pollution Prevention Details

Some projects will need additional engineering details that are not shown in the standard SW3P details provided by COSA and TxDOT. The engineer shall present these details with the SW3P or on separate detail sheets if needed.

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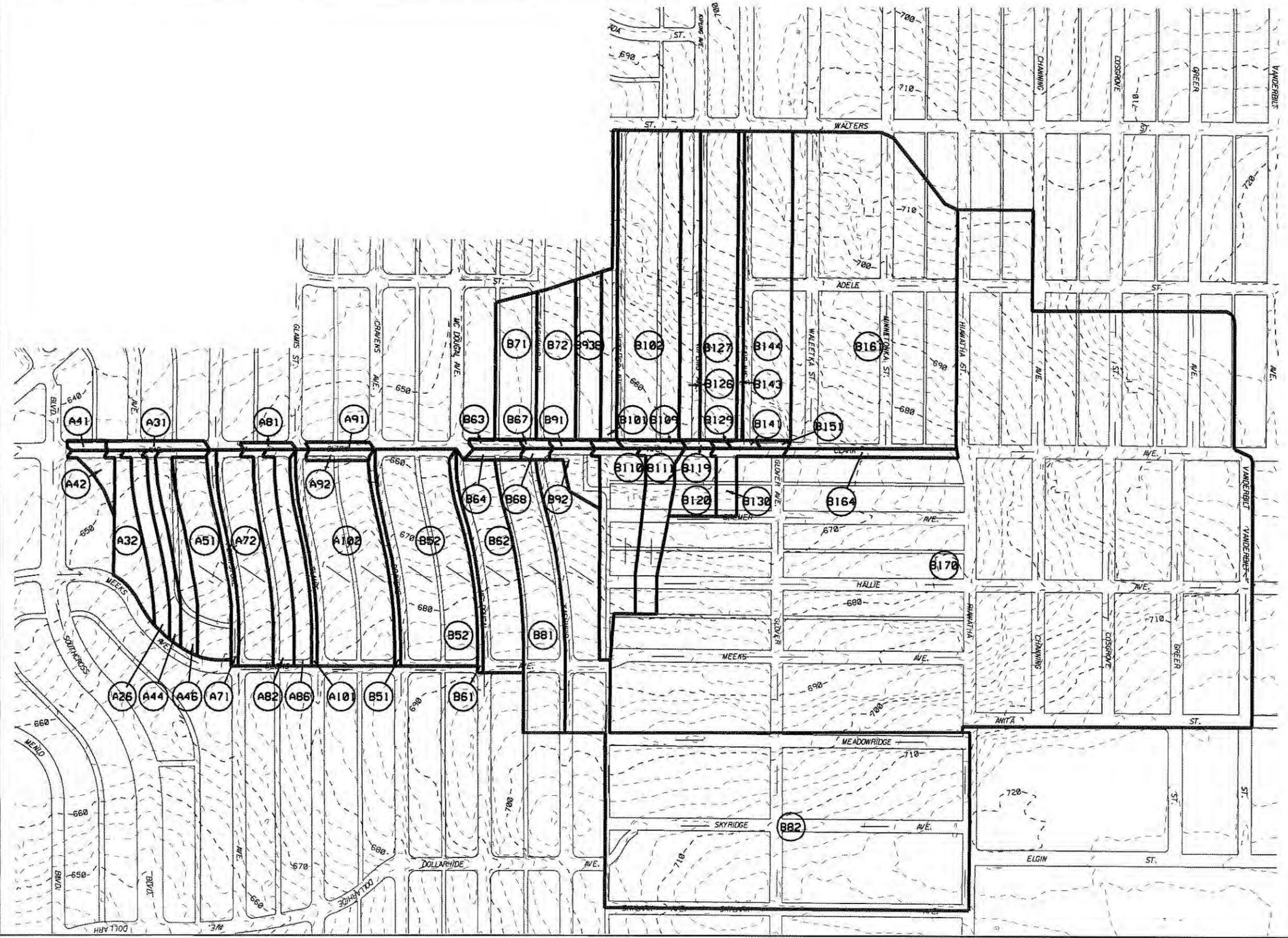


SCALE: 1" = 400'

LEGEND

- (B63)** DRAINAGE AREAS
- DRAINAGE FLOW DIRECTION
- WATERSHED BOUNDARIES
- WATERSHED CODE - XXXXXX

No.	Comp Area acres	Comp C	Tc Used	Discharge for Individual				Time of Concentration				Overland Flow			Total Tc minutes		
				Existing		Ultimate		Reach 1		Reach 2		Reach 3		Overland			
				I25 in/hr	Q25 cfs	I25 in/hr	Q25 cfs	L Ft	Vel. fps	L Ft	Vel. fps	L Ft	Vel. fps	L Ft		Slope %	Tc
A26	1.03	0.67	15	4.48	3.09	6.71	4.64										



No.	Revision	Drawn	Approved	Date

REVISIONS

Figure 4-1
Page 4-13

CONSULTANT NAME			
STREET NUMBER AND ADDRESS			
CITY	STATE	ZIP CODE	
TELEPHONE NUMBER	FAX NUMBER	INTERNET ADDRESS	
CITY OF SAN ANTONIO			
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT			
PROJECT TITLE			
CLARK AVE. DRAINAGE AREA MAP (FIGURE 1)			
% SUBMITTAL	PROJECT NO.	DATE	
DRAWN BY:	DESIGN BY:	CHECKED BY:	SHEET NO. OF

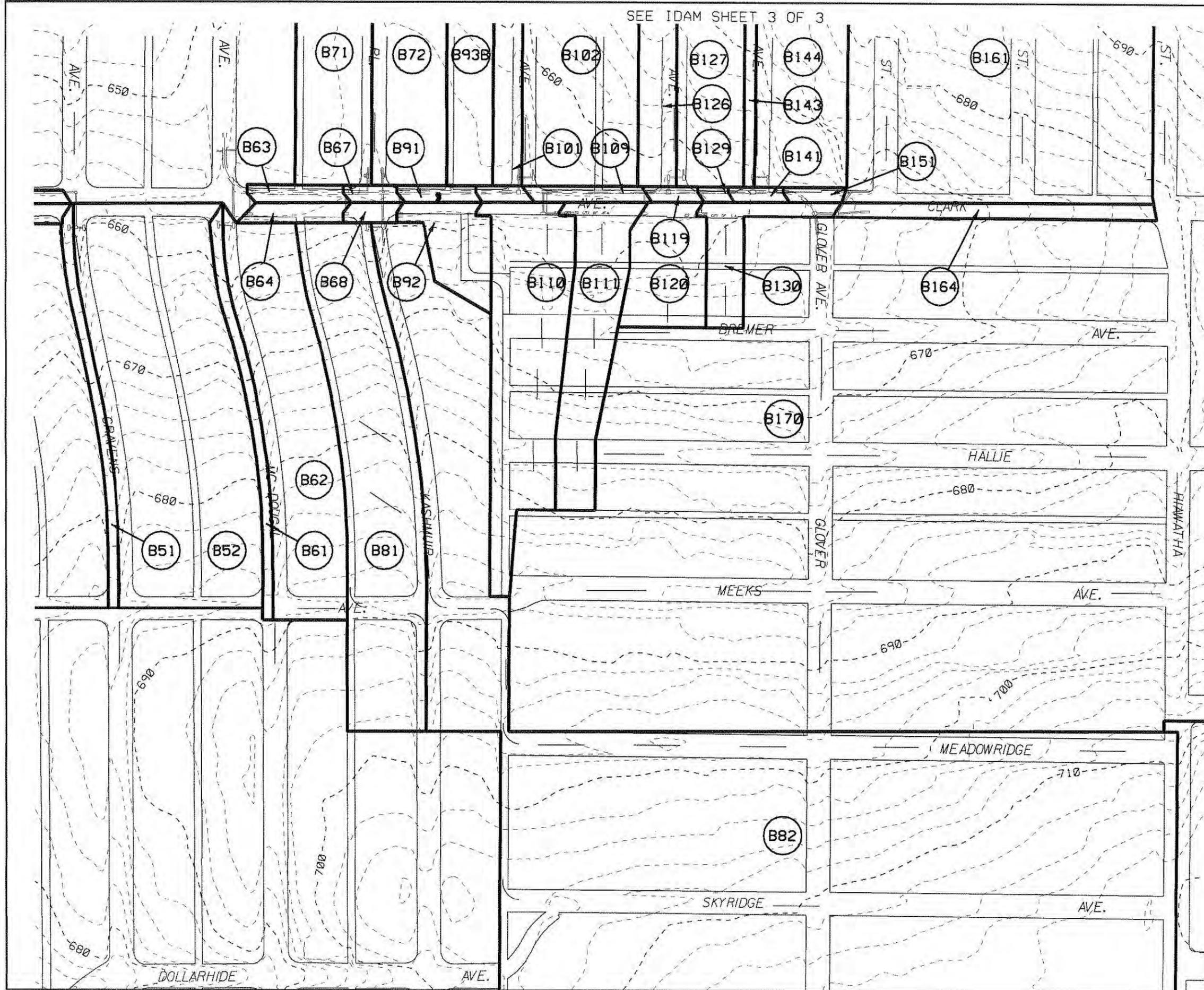
SEE IDAM SHEET 3 OF 3



SCALE: 1" = 200'

LEGEND

- B63 DRAINAGE AREAS
- DRAINAGE FLOW DIRECTION
- WATERSHED BOUNDARIES



No.	Revision	Drawn	Approved	Date
REVISIONS				

Figure 4-2
Page 4-14

CONSULTANT NAME			
<small>STREET NUMBER AND ADDRESS CITY STATE ZIP CODE</small>			
<small>TELEPHONE NUMBER</small>	<small>FAX NUMBER</small>	<small>INTERNET ADDRESS</small>	
CITY OF SAN ANTONIO			
<small>CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT</small>			
<small>PROJECT TITLE</small>			
CLARK AVE. INTERIOR DRAINAGE AREA MAP			
<small>(FIGURE 2)</small>			
<small>DATE</small>	<small>PROJECT NO.</small>	<small>DATE</small>	<small>PROJECT NO.</small>
<small>DRAWN BY</small>	<small>ORGN. BY</small>	<small>CHKD. BY</small>	<small>SHEET NO. OF</small>

HEC-RAS CROSS SECTION LAYOUT (SALADO CREEK)



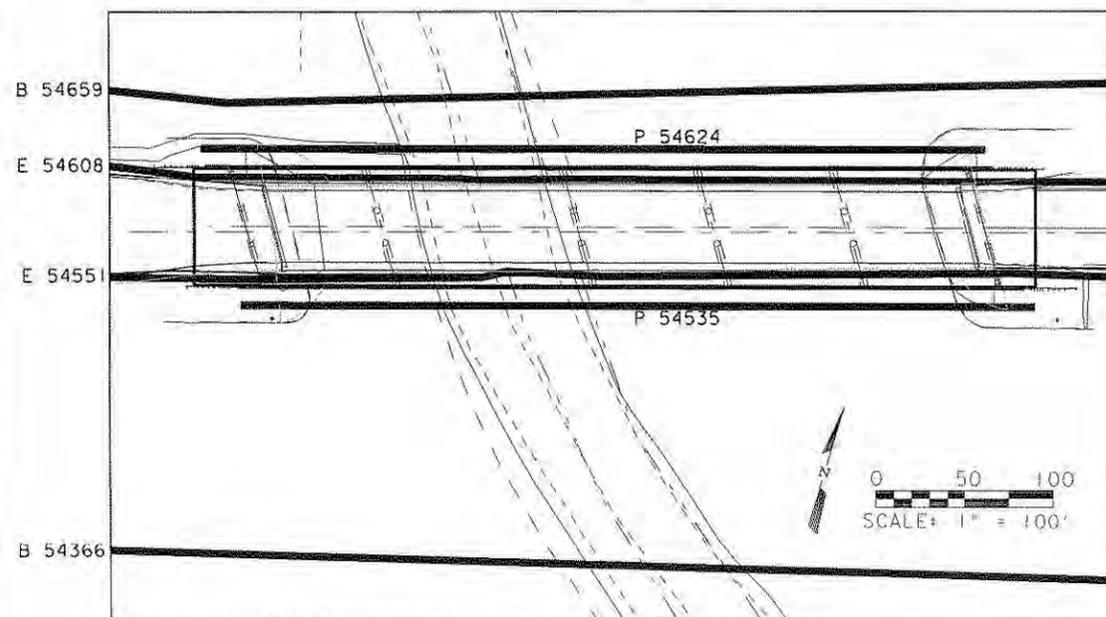
HEC-RAS OUTPUT EXISTING

River Sta	Prof	Q (cfs)	Min EL	W.S. EL	Crit W.S.	E.G. Elev	E.G. Slope	Vel	Flow A	Top W	F no.
55210	Q100	27600	572.00	593.11	584.10	593.68	0.002455	6.22	5709.74	1411.15	0.29
55210	Q25	20297	572.00	591.11	582.31	591.59	0.002229	5.62	3875.08	572.80	0.28
54659	Q100	27600	571.90	591.29	585.32	591.96	0.004262	6.68	4845.24	1214.62	0.37
54659	Q25	20297	571.90	589.33	583.51	589.95	0.004162	6.32	3290.79	506.32	0.38
54608	Q100	27600	571.85	590.89	584.58	591.63	0.009970	6.95	3971.66	1218.96	0.38
54608	Q25	20297	571.85	589.04	582.95	589.63	0.009491	6.17	3288.67	362.14	0.36
54579.5		Bridge									
54551	Q100	27600	571.80	590.77	584.38	591.52	0.004148	6.97	3957.85	1285.73	0.37
54551	Q25	20297	571.80	588.96	582.79	589.54	0.003467	6.13	3313.37	679.72	0.35
54366	Q100	27600	571.80	590.58	583.42	590.79	0.00642	4.18	9132.40	1867.22	0.23
54366	Q25	20297	571.80	588.56	581.69	588.88	0.002392	4.80	5593.37	1681.27	0.28
54033	Q100	27600	571.70	590.64	583.95	590.67	0.000076	0.76	21846.68	2303.71	0.04
54033	Q25	20297	571.70	588.70	582.81	588.72	0.000074	0.70	17662.49	2072.55	0.04

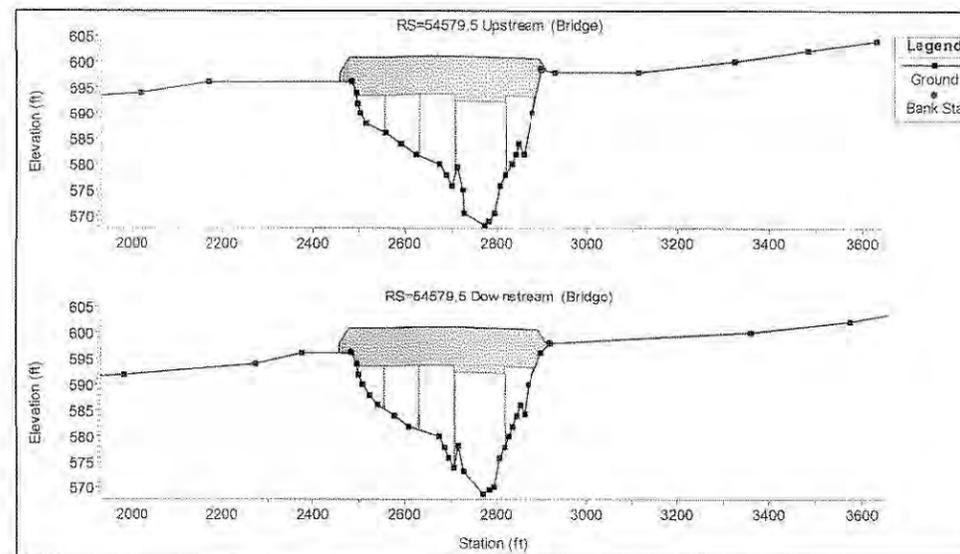
PROPOSED ULTIMATE

River Sta	Prof	Q (cfs)	Min EL	W.S. EL	Crit W.S.	E.G. Elev	E.G. Slope	Vel	Flow A	Top W	F no.
55210	Q100U	27600	568.70	593.93	582.69	594.28	0.003029	5.10	7282.40	1830.53	0.23
55210	Q25U	20297	568.70	592.15	580.70	592.48	0.002990	4.75	4831.42	913.17	0.22
54659	Q100U	27600	566.00	591.22	584.38	591.80	0.008016	6.27	5004.23	1182.95	0.34
54659	Q25U	20297	566.00	589.35	582.01	589.88	0.008571	5.85	3545.12	508.69	0.34
54624	Q100U	27600	568.20	590.92	584.07	591.53	0.007912	6.34	4598.01	1251.50	0.34
54624	Q25U	20297	568.20	589.06	582.31	589.59	0.008160	5.85	3467.00	364.38	0.33
54579.5		Bridge									
54535	Q100U	27600	568.80	590.90		591.32	0.005842	5.57	5527.42	1325.13	0.29
54535	Q25U	20297	568.80	589.02		589.54	0.007551	5.84	3602.29	706.29	0.33
54366	Q100U	27600	567.60	590.57	582.99	590.79	0.001422	4.30	9126.92	1841.28	0.23
54366	Q25U	20297	567.60	588.56	581.24	588.88	0.001891	4.79	5650.69	1663.32	0.27
54033	Q100U	27600	570.30	590.64	584.03	590.67	0.000075	0.78	21944.29	2303.71	0.04
54033	Q25U	20297	570.30	588.70	582.96	588.72	0.000073	0.72	17760.10	2072.55	0.04

BRIDGE DETAIL PROPOSED & EXISTING SECTIONS



B: CROSS SECTION EXISTING & PROPOSED
E: CROSS SECTION EXISTING
P: CROSS SECTION PROPOSED



No.	Revision	Drawn	Approved	Date
REVISIONS				

Figure 4-3
Page 4-15

CONSULTANT NAME
STREET NUMBER AND ADDRESS
CITY STATE ZIP CODE
TELEPHONE NUMBER FAX NUMBER INTERNET ADDRESS

CITY OF SAN ANTONIO
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT

PROJECT TITLE
**HYDRAULIC DATA SHEET
(FIGURE 3)**

DATE: _____
DRAWN BY: _____ DESIGNED BY: _____ CHECKED BY: _____ SHEET NO.: _____ OF _____

CULVERT 5

HYDRAULIC DATA FOR STRUCTURES UNDER 1500 CFS
(PIPES, PIPE ARCHES & BOX CULVERTS)

CULVERT ANALYSIS USING
(SHOW PROGRAM USED)

	STATION	FREQ. YEAR	Q (cfs)	OUTLET CHANNEL				SLOPE (ft/ft)	TW (Elev)	SIZE, LENGTH AND DESCRIPTION	SLOPE (ft/ft)	Ke	HW (Elev)	VEL OUT (fps)	REMARKS
				ALLOW HW (Elev)	W	SS	n								
EXISTING	158+00.00	10 (DES)	48	1284.02	24.5	100	0.035	0.0667	2 - 5' x 3' x 70' MBC	0.0103	0.50	1280.17	7.33		
		100	71									1280.23	8.24		
PROPOSED		10 (DES)	48	1284.02	24.5	100	0.035	0.0667	2 - 5' x 3' x 77.87' MBC	0.0103	0.20	1280.10	7.33		
		100	71									1280.16	8.24		

EXISTING CULVERT ANALYSIS

Culvert Summary - (Existing Design Storm)			
Computed Headwater	1282.19ft	Discharge	48 cfs
Inlet Control HW Elev.	1282.12ft	Tailwater Elevation	1280.17ft
Outlet Control HW Elev.	1282.19ft	Control Type	Entrance Control
Headwater Depth/Height	0.52		
Grades			
Length	70 ft	Constructed Slope	0.010286ft/ft
Hydraulic Profile			
Slope Type	Steep	Normal Depth	0.65ft
Flow Regime	Supercritical	Critical Depth	0.89ft
Velocity Downstream	7.33ft/s	Critical Slope	0.003843ft/ft
Section			
Section Material	Concrete	Span	5 ft
Section Size	5 x 3 ft	Rise	3 ft
Number Sections	2		
Outlet Control			
Ke	0.5	Entrance Loss	0.22ft
Inlet Control			
Inlet Type	90 and 15% wingwall Area Full		30 ft ^{3/4}
	flares		
K	0.061	HDS 5 Chart	8
M	0.75	HDS 5 Scale	2
C	0.04	Equation Form	1
Y	0.8		

Culvert Summary - (Existing Design Storm)			
Computed Headwater	1282.65ft	Discharge	71 cfs
Inlet Control HW Elev.	1282.58ft	Tailwater Elevation	1280.23ft
Outlet Control HW Elev.	1282.65ft	Control Type	Entrance Control
Headwater Depth/Height	0.68		
Grades			
Length	70 ft	Constructed Slope	0.010286ft/ft
Hydraulic Profile			
Slope Type	Steep	Normal Depth	0.84ft
Flow Regime	Supercritical	Critical Depth	1.16ft
Velocity Downstream	8.24ft/s	Critical Slope	0.003897ft/ft
Section			
Section Material	Concrete	Span	5 ft
Section Size	5 x 3 ft	Rise	3 ft
Number Sections	2		
Outlet Control			
Ke	0.5	Entrance Loss	0.29ft
Inlet Control			
Inlet Type	90 and 15% wingwall Area Full		30 ft ^{3/4}
	flares		
K	0.061	HDS 5 Chart	8
M	0.75	HDS 5 Scale	2
C	0.04	Equation Form	1
Y	0.8		

PROPOSED ULTIMATE CULVERT ANALYSIS

Culvert Summary - (Proposed Design Storm)			
Computed Headwater	1282.09ft	Discharge	48 cfs
Inlet Control HW Elev.	1282.09ft	Tailwater Elevation	1280.1ft
Outlet Control HW Elev.	1282.05ft	Control Type	Inlet Control
Headwater Depth/Height	0.49		
Grades			
Length	76.1ft	Constructed Slope	0.010118ft/ft
Hydraulic Profile			
Slope Type	Steep	Normal Depth	0.65ft
Flow Regime	Supercritical	Critical Depth	0.89ft
Velocity Downstream	7.33ft/s	Critical Slope	0.003843ft/ft
Section			
Section Material	Concrete	Span	5 ft
Section Size	5 x 3 ft	Rise	3 ft
Number Sections	2		
Outlet Control			
Ke	0.2	Entrance Loss	0.09ft
Inlet Control			
Inlet Type	90% headwall w 3/4 in area Full		30 ft ^{3/4}
	chamfers		
K	0.515	HDS 5 Chart	10
M	0.667	HDS 5 Scale	1
C	0.0375	Equation Form	2
Y	0.79		

Culvert Summary - (Proposed Design Storm)			
Computed Headwater	1282.52ft	Discharge	71 cfs
Inlet Control HW Elev.	1282.52ft	Tailwater Elevation	1280.16ft
Outlet Control HW Elev.	1282.48ft	Control Type	Inlet Control
Headwater Depth/Height	0.63		
Grades			
Length	76.1ft	Constructed Slope	0.010118ft/ft
Hydraulic Profile			
Slope Type	Steep	Normal Depth	0.84ft
Flow Regime	Supercritical	Critical Depth	1.16ft
Velocity Downstream	8.24ft/s	Critical Slope	0.003897ft/ft
Section			
Section Material	Concrete	Span	5 ft
Section Size	5 x 3 ft	Rise	3 ft
Number Sections	2		
Outlet Control			
Ke	0.2	Entrance Loss	0.12ft
Inlet Control			
Inlet Type	90% headwall w 3/4 in area Full		30 ft ^{3/4}
	chamfers		
K	0.515	HDS 5 Chart	10
M	0.667	HDS 5 Scale	1
C	0.0375	Equation Form	2
Y	0.79		

No.	Revision	Drawn	Approved	Date
REVISIONS				

Figure 4-4
Page 4-16

CONSULTANT NAME			
<small>STREET NUMBER AND ADDRESS</small>			
<small>CITY STATE ZIP CODE</small>			
<small>TELEPHONE NUMBER</small>	<small>FAX NUMBER</small>	<small>INTERNET ADDRESS</small>	
CITY OF SAN ANTONIO			
<small>CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT</small>			
<small>PROJECT TITLE</small>			
CULVERT NO. 5			
HYDRAULIC DATA SHEET			
(FIGURE 4)			
<small>% SUBMITTAL</small>	<small>PROJECT NO.</small>	<small>DATE</small>	<small>SHEET NO. OF</small>
<small>DRWN BY</small>	<small>DSGN BY</small>	<small>CHKD BY</small>	<small>DATE</small>

CONVEYANCE

U.S. Node	D.S. Node	Actual Length	Hyd. Length	N Value	Slope	No. Bls	Span	Rise	Fs	Sof U.S.	Sof D.S.	Inv U.S.	Inv D.S.	Unif. Dep	Unif. Vel.	Act. Vel. D.S.	Act. Dep U.S.	Act. Dep D.S.	HGL L.S.	HGL D.S.	EGL U.S.	EGL D.S.	Sum Tc	Sum Q	Sum Area	Avg C Value	Rain I	Junction Loss
Line A																												
A15	A10	22.22	24.72	0.013	0.23	1	n/a	3.5	0.011	624.35	624.30	620.85	620.80	3.50	11.97	11.67	3.50	3.50	627.01	626.70	629.12	628.81	17.15	112.23	26.25	0.68	6.39	0.78
Line B																												
B51	B50	11.39	11.39	0.013	15.28	1	n/a	2	0.153	648.74	647.00	646.74	645.00	0.23	12.20	10.14	1.00	0.26	647.74	645.26	647.74	646.87	15.01	2.39	6.33	0.67	6.71	0.52

INLET HYDRAULICS

ID	Station	Type	Profile Type	Q	Cap	By Pass Flow	By Pass Flow Intro	By Pass Node ID	Inlet Curb Length	Inlet Length Rgrl	Computed Poned Wirth	Computed Poned Depth	St slope	gutter Depth
A26	34+30.00	Curb	On Grade	3.98	3.98		0.88	A32	20	17.85	12.37	0.25	1.30	0.21
A31	35+00.94	Curb	On Grade	1.71	1.68	0.03			10	9.95	9.08	0.18	1.30	0.21
A32	35+00.94	Curb	On Grade	4.08	3.15	0.92			10	18.38	12.57	0.25	1.30	0.21
A44	33+53.50	Curb	On Grade	2.17	1.29	0.88		A26	5	11.83	9.93	0.20	1.30	0.21
A46	32+95.00	Curb	On Grade	3.91	3.91		0.11	A44	20	18.75	12.22	0.24	1.49	0.21
A51	32+36.00	Grate	Sag	8.79	3.48				n/a	n/a		0.58	n/a	n/a
A71	10+51.43	Curb	Sag	2.08	4.15				10	13.09	9.78	0.20	n/a	0.21
A72	10+52.14	Curb	Sag	8.06	20.32				10	13.09	24.20	0.48	n/a	0.21
A81	29+73.00	Curb	On Grade	0.68	0.68				10	5.04	0.25	0.13	1.49	0.21
A82	29+66.58	Curb	On Grade	5.84	5.73	0.11	0.99	A46	20	24.15	14.05	0.28	1.49	0.21
A86	28+70.00	Curb	On Grade	4.06	3.08	0.99		A82	10	18.78	12.23	0.25	1.49	0.21
A91	27+10.37	Curb	On Grade	0.85	0.85				10	5.99	6.79	0.14	1.49	0.21
A92	27+09.92	Curb	On Grade	1.30	1.30				10	8.29	7.97	0.16	1.49	0.21
A101	10+51.66	Curb	Sag	1.44	4.15				10	13.09	7.66	0.15	n/a	0.21
A102	10+52.29	Curb	Sag	16.84	20.32				10	13.09	30.90	0.62	n/a	0.21
B51	10+51.63	Curb	Sag	1.60	4.15				10	13.09	8.22	0.16	n/a	0.21
B52	10+52.05	Curb	Sag	17.68	11.06				10	13.09	34.05	0.68	n/a	0.21

DISCHARGE

No	Comp Area acres	Comp C	Tc Used	Discharge for Individual Areas			
				Existing		Ultimate	
				I25 in/hr	Q25 cfs	I25 in/hr	Q25 cfs
A26	1.03	0.67	15	4.48	3.09	6.71	4.64
A31	0.33	0.96	10	5.41	1.71	8.07	2.55
A32	1.36	0.67	15	4.48	4.08	6.71	6.11
A41	0.13	0.96	10	5.41	0.70	8.07	1.04
A42	0.41	0.96	10	5.41	2.12	8.07	3.16
A44	0.72	0.67	15	4.48	2.17	6.71	3.25
A46	1.27	0.67	15	4.48	3.81	6.71	5.70
A51	2.43	0.67	10	5.41	8.79	8.07	13.11
A71	0.57	0.67	10	5.41	2.08	8.07	3.10
A72	2.69	0.67	15	4.48	8.06	6.71	12.08
A81	0.13	0.96	10	5.41	0.68	8.07	1.01
A82	1.62	0.67	15	4.48	4.85	6.71	7.27
A86	1.35	0.67	15	4.48	4.06	6.71	6.09
A91	0.16	0.96	10	5.41	0.85	8.07	1.26
A92	0.25	0.96	10	5.41	1.30	8.07	1.94
A101	0.40	0.67	10	5.41	1.44	8.07	2.15
A102	5.89	0.67	15	4.48	17.68	6.71	26.48
B51	0.44	0.67	10	5.41	1.60	8.07	2.39
B52	5.89	0.67	15	4.48	17.68	6.71	26.49

No.	Revision	Drawn	Approved	Date
REVISIONS				

Figure 4-5
Page 4-17

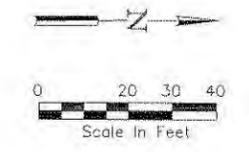
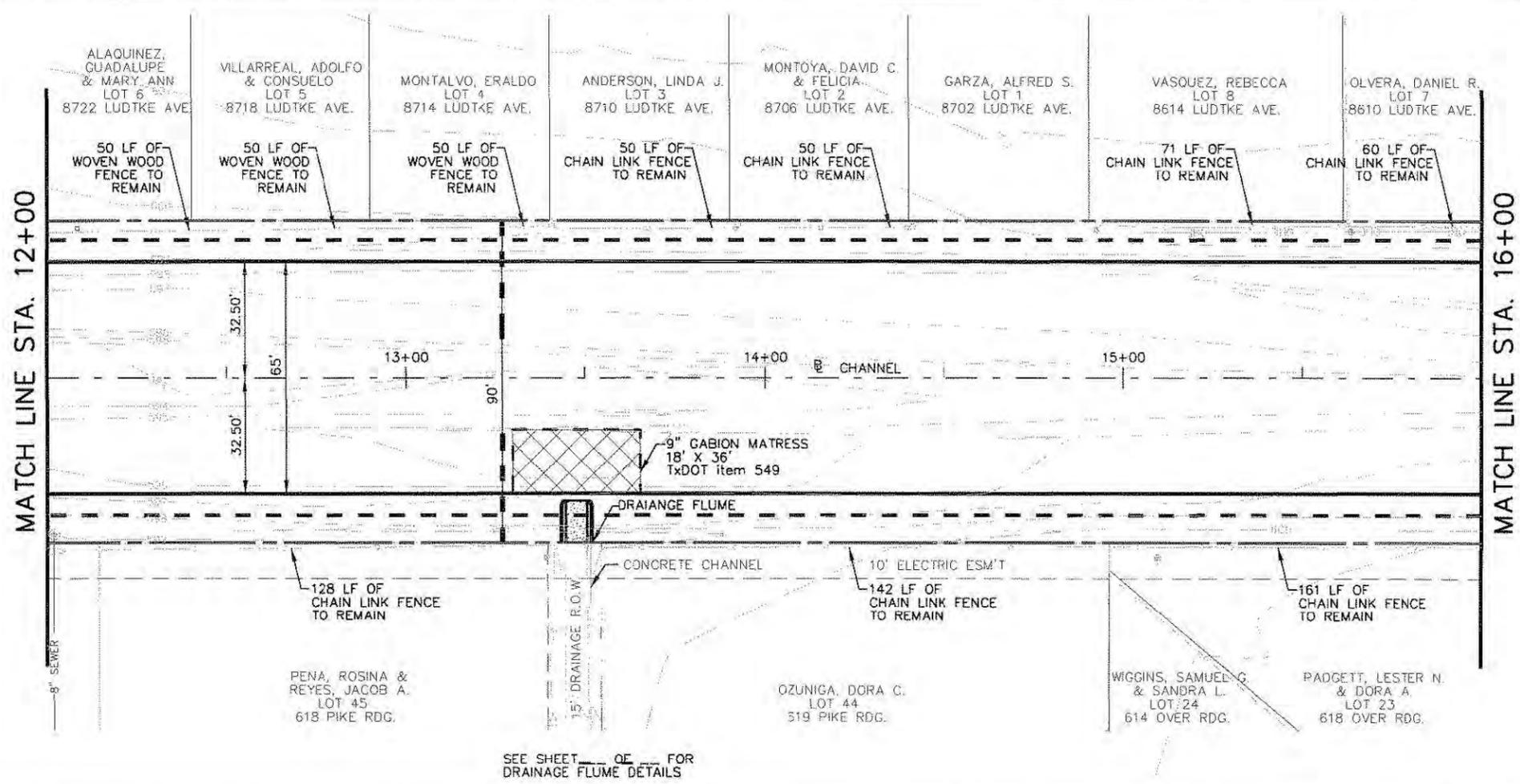
CONSULTANT NAME
STREET NUMBER AND ADDRESS
CITY STATE ZIP CODE
TEL. NUMBER FAX NUMBER INTERNET ADDRESS

CITY OF SAN ANTONIO
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT

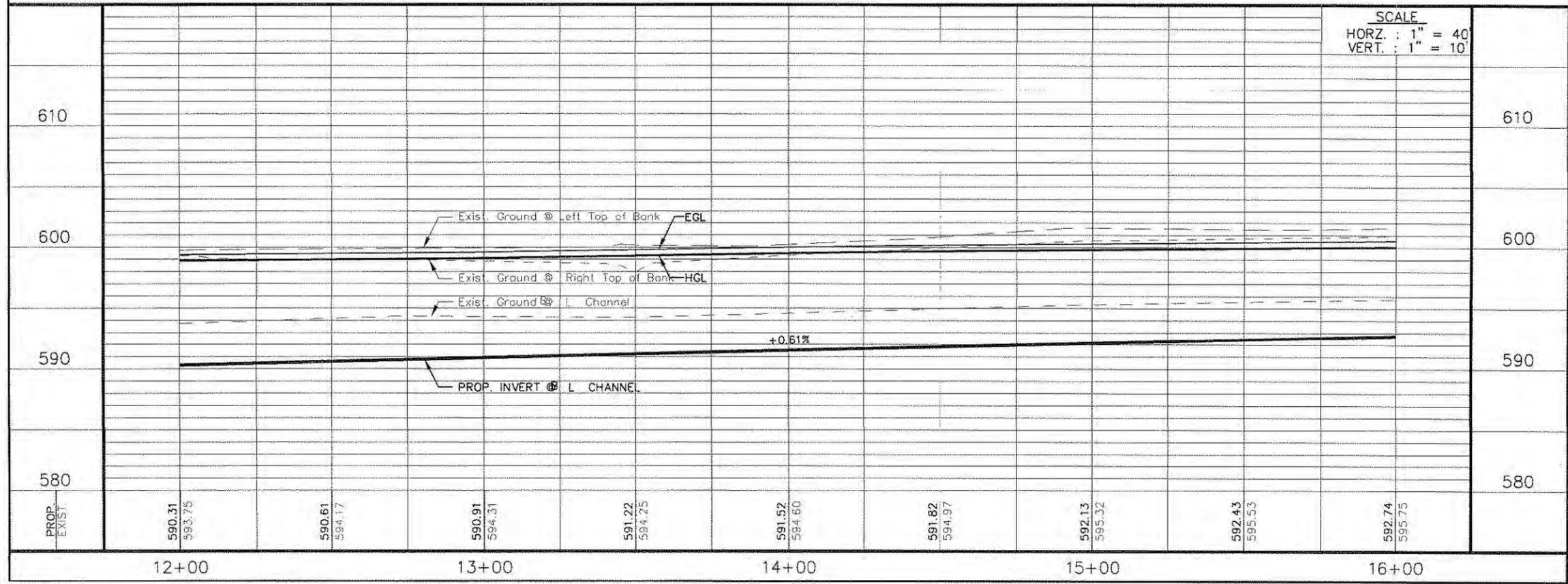
PROJECT TITLE
CLARK AVE. HYDRAULIC COMPUTATION
SYTEM A (FIGURE 5)

DATE: _____
DRAWN BY: _____ DESGN BY: _____ CHKD BY: _____ SHEET NO.: _____ OF _____

INLETS DESIGNED FOR Q₂
TRUNK DESIGNED FOR Q₁₀
STORM SEWER CALCULATION PERFORMED
IN " " (SHOW PROGRAM USED).



- NOTES:
- REFER TO PROJECT LAYOUT/ COORDINATE CONTROL PLAN FOR HORIZONTAL ALIGNMENT DATA
 - REFER TO CHANNEL CROSS SECTIONS FOR MORE INFORMATION
 - THE INFORMATION SHOWN ON THIS DRAWING CONCERNING TYPE AND LOCATION OF UNDERGROUND UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. THE CONTRACTOR IS RESPONSIBLE FOR MAKING HIS OR HER OWN DETERMINATION AS TO THE TYPE AND LOCATION OF UNDERGROUND UTILITIES AS MAY BE NECESSARY TO AVOID DAMAGE THERETO.



SCALE
 HORZ. : 1" = 40'
 VERT. : 1" = 10'

No.	Revision	Drawn	Approved	Date
REVISIONS				

Figure 4-6
Page 4-18

CONSULTANT NAME
 STREET NUMBER AND ADDRESS
 CITY STATE ZIP CODE
 TELEPHONE NUMBER FAX NUMBER INTERNET ADDRESS

CITY OF SAN ANTONIO
 CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT

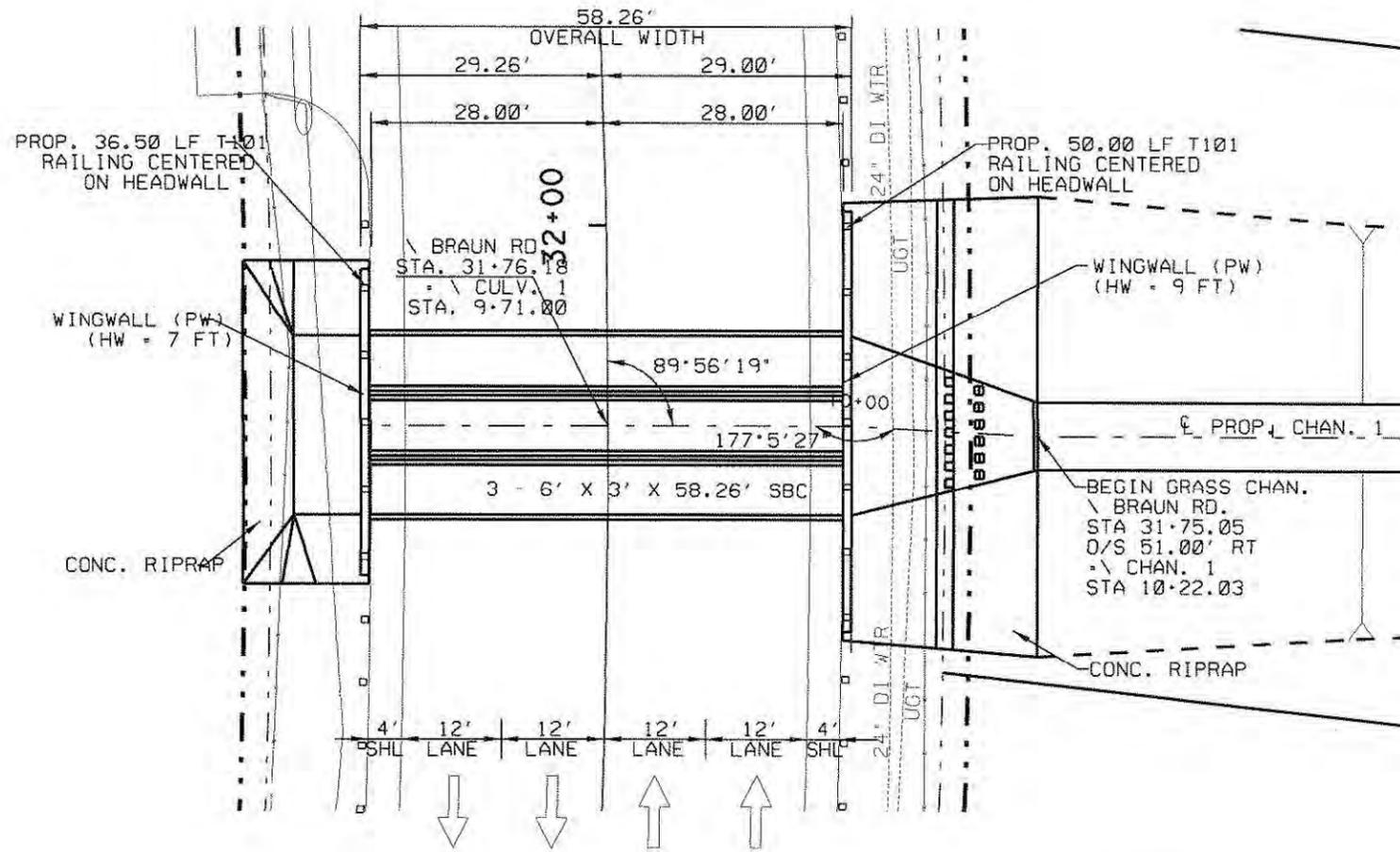
PROJECT TITLE
PLAN & PROFILE
 STA.12+00 to STA.16+00
 (FIGURE 6)

DATE	PROJECT NO.	% SUBMITTAL
DATE	DESIGN BY:	DRAWN BY:
DATE	CHECKED BY:	SHEET NO. OF

SEE MISC. DRAINAGE
DETAILS SHEET 115
FOR 12" BAFFLE BLOCK
DETAILS & CHANNEL DETAILS

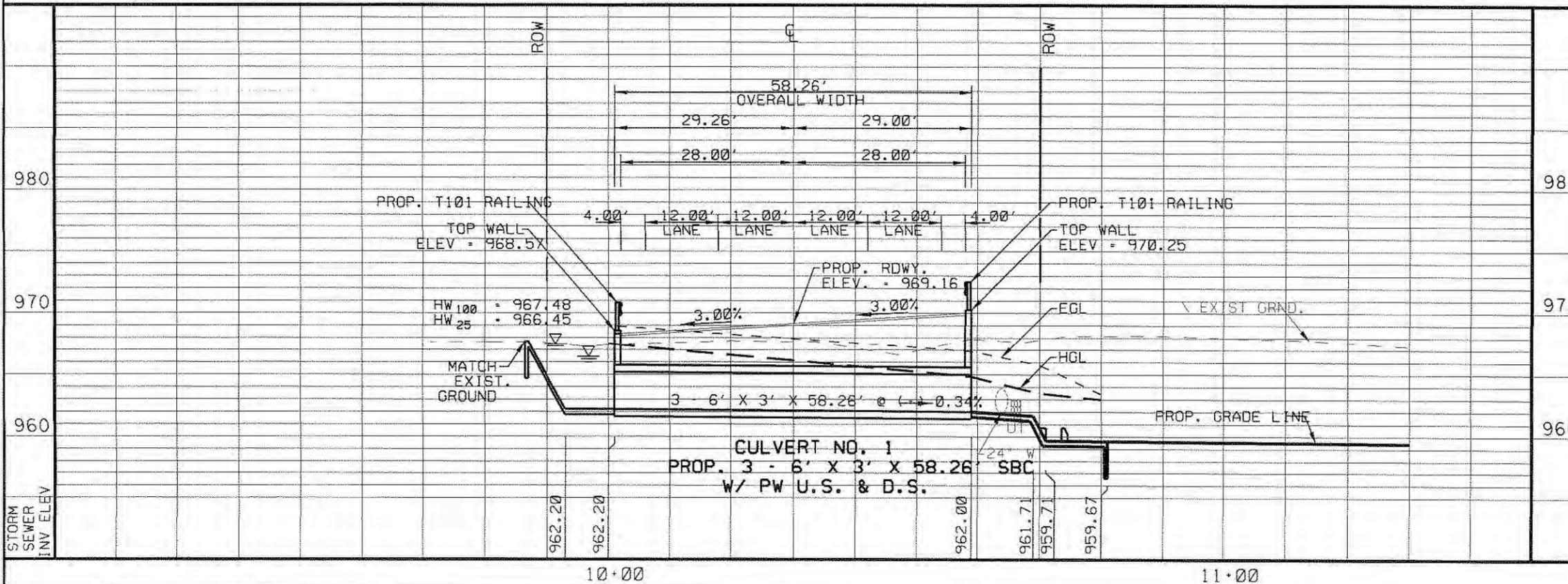
SEE CULVERT NO. 1
DETAILS SHEET 111
FOR WINGWALL & RIPRAP
DETAILS

SEE PLAN AND PROFILE
SHEET 79 FOR GUARDRAIL
LAYOUT



SCALE
HORZ: 1" = 20'
VERT: 1" = 10'

SEE SHEETS 102 - 104
FOR CHANNEL 1



EXISTING UTILITIES ARE
SHOWN AT ASSUMED DEPTHS.

No.	Revision	Drawn	Approved	Date
REVISIONS				

Figure 4-7
Page 4-19

CONSULTANT NAME
STREET NUMBER AND ADDRESS
CITY STATE ZIP CODE
TELEPHONE NUMBER FAX NUMBER INTERNET ADDRESS

CITY OF SAN ANTONIO
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT

PROJECT TITLE
CULVERT 1 PLAN & PROFILE
(FIGURE 7)

DATE: _____
DRAWN BY: _____ DESIGNED BY: _____ CHECKED BY: _____ SHEET NO. _____ OF _____

PLAN VIEW LEGEND

- CI - CURB INLET
- MH - MANHOLE
- TI - TRAFFIC INLET
- EXISTING EDGE OF ROADWAY
- PROPOSED EDGE OF ROADWAY
- RIGHT OF WAY
- EXISTING STRUCTURE
- PROPOSED STRUCTURE

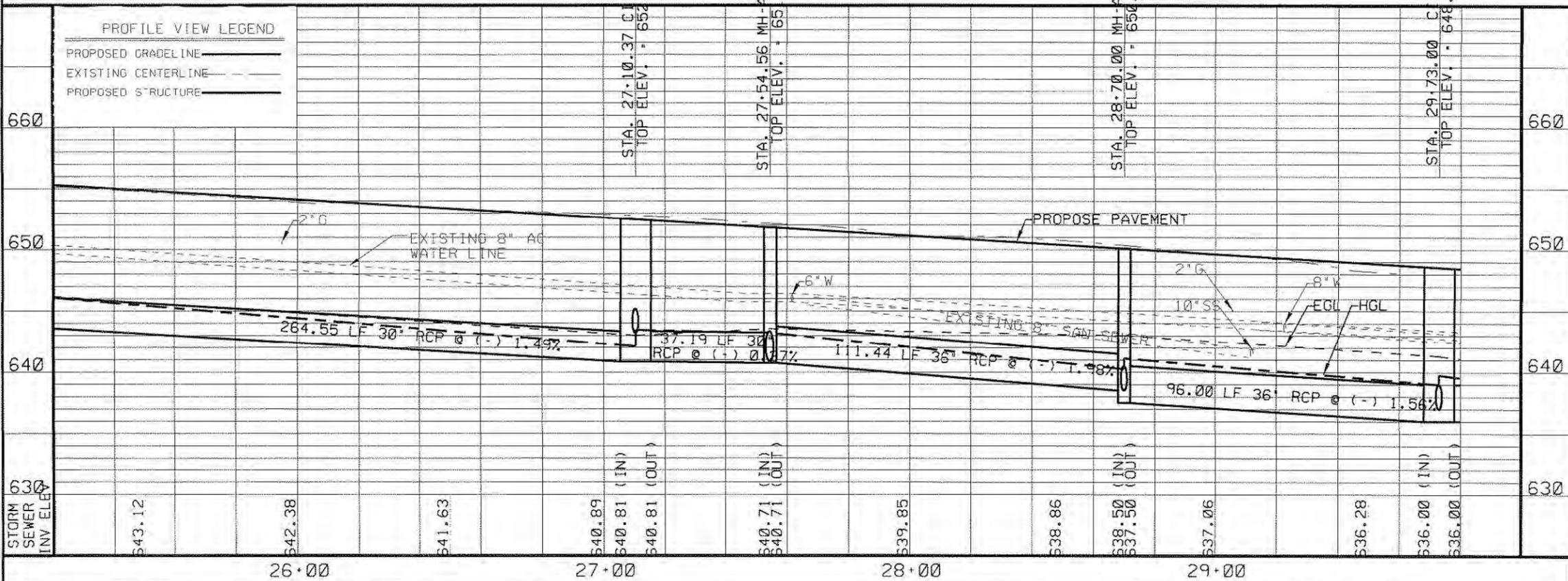
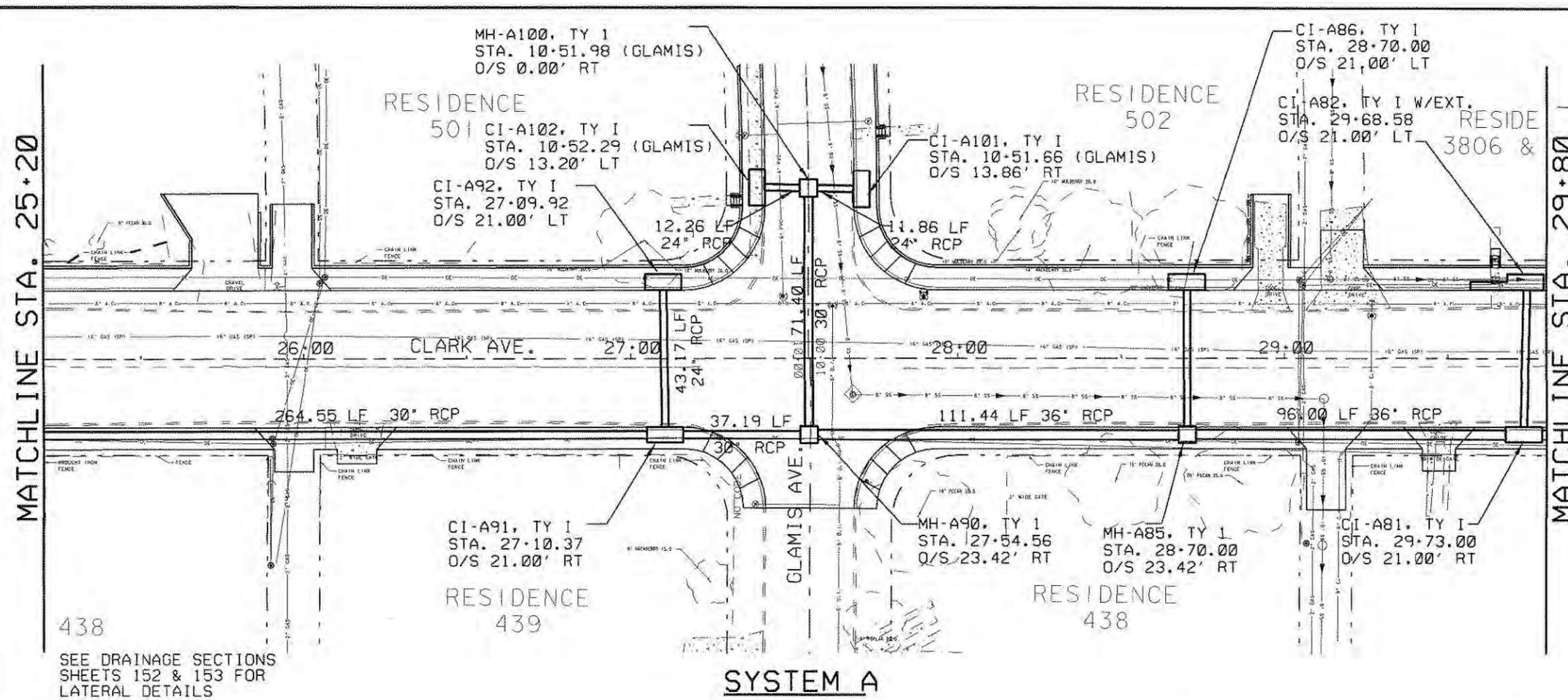
SCALE: 1" = 40'

CALL THE TEXAS STATE WIDE ONE CALL LOCATOR NUMBER 1-800-344-8377, 48 HOURS BEFORE BEGINNING ANY EXCAVATION.

DUE TO FEDERAL REGULATION TITLE 49, PART 192.181, C.P.S. MUST MAINTAIN ACCESS TO GAS VALVES AT ALL TIMES. THE CONTRACTOR MUST PROTECT AND WORK AROUND ANY GAS VALVES THAT ARE IN THE PROJECT AREA.

THE CONTRACTOR WILL BE RESPONSIBLE FOR PROTECTING C.P.S. OVERHEAD AND UNDERGROUND ELECTRIC FACILITIES IF ADJACENT TO WORK AREAS.

THE CONTRACTOR WILL BE RESPONSIBLE FOR PROTECTING ALL UTILITY POLES DURING INSTALLATION OF DRAINAGE FACILITIES. NO SEPARATE PAY ITEM.



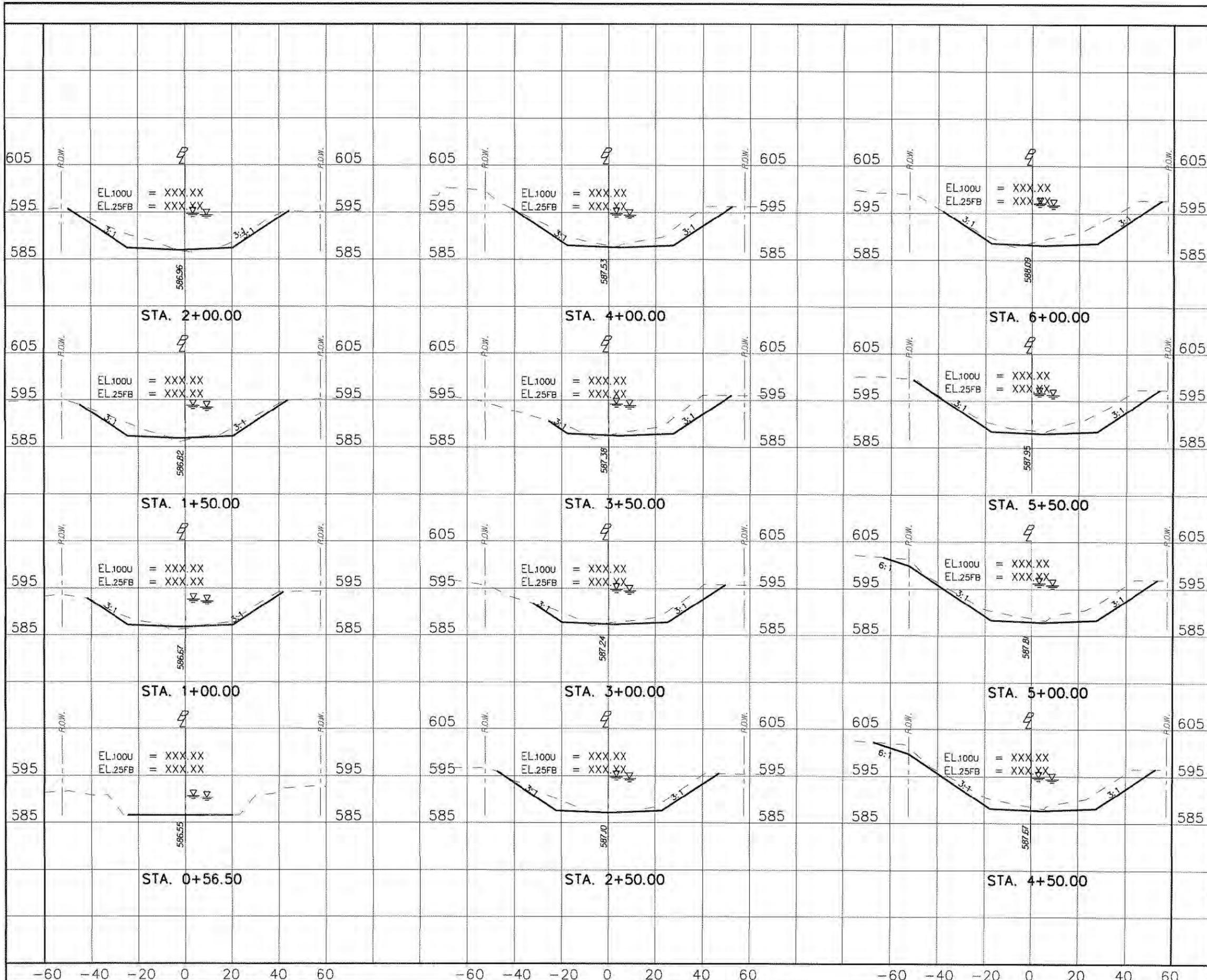
No.	Revision	Drawn	Approved	Date

Figure 4-8
Page 4-20

CONSULTANT NAME
CITY OF SAN ANTONIO
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT

PROJECT TITLE
CLARK AVE. DRAINAGE
PLAN & PROFILE
SHEET 5 OF 9 (FIGURE 8)

HORZ. SCALE 1" = 40'
 VERT. SCALE 1" = 20'



No.	Revision	Drawn	Approved	Date
REVISIONS				

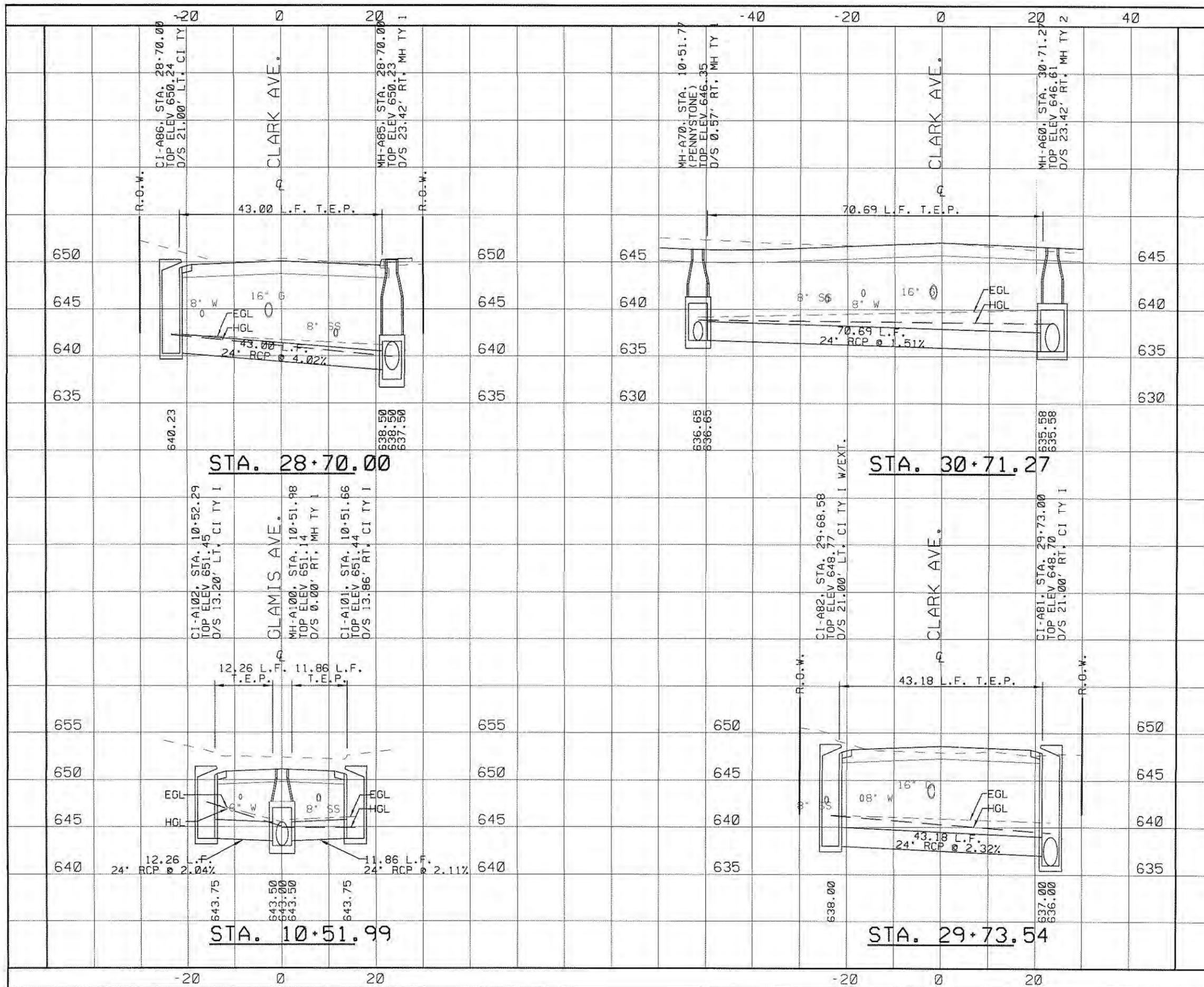
Figure 4-9
 Page 4-21

CONSULTANT NAME
 STREET NUMBER AND ADDRESS
 CITY STATE ZIP CODE
 TELEPHONE NUMBER FAX NUMBER INTERNET ADDRESS

CITY OF SAN ANTONIO
 CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT

PROJECT TITLE
 CROSS SECTIONS
 SHEET 1 OF 4
 (FIGURE 9)

DATE: _____
 SUBMITTAL PROJECT NO.: _____
 DRAWN BY: _____ DESGN. BY: _____ CHKD. BY: _____ SHEET NO. OF _____



No.	Revision	Drawn	Approved	Date
REVISIONS				

Figure 4-10
Page 4-22

CONSULTANT NAME
STREET NUMBER AND ADDRESS
CITY STATE ZIP CODE
TELEPHONE NUMBER FAX NUMBER INTERNET ADDRESS

CITY OF SAN ANTONIO
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT

PROJECT TITLE
CLARK AVE. INLET
X-SECTIONS
SHEET 7 OF 9 (FIGURE 10)

DATE: _____
DRAWN BY: _____ DESGN. BY: _____ CHKD. BY: _____ SHEET NO. _____ OF _____

SECTION 5.0

Utility Coordination

Introduction

One of the most commonly cited sources of change orders, delays, and additional costs is “utility coordination.” This term is used to describe a wide range of activities that relate generally to utilities, including mapping of existing utilities, assessment and identification of conflicts between proposed infrastructure and existing and/or proposed utilities, resolution of those conflicts, and scheduling of utility relocations and adjustments.

Improving understanding about the factors that make utility coordination a frequent cause of problems can help in effective planning to mitigate and even avoid change orders, delays, and additional costs.

- Many utilities are underground, which presents several problems. Because there is no direct access, their locations or depths cannot be determined conclusively at all locations. Moreover, the methods required to enhance and improve the quality of the location and depth information we have can be expensive and disruptive.
- The utilities are owned, operated, and maintained by entities other than the city. Some are wholly owned subsidiaries of the city, and some are private-sector, commercial enterprises. Since the city has no direct control over these entities, it must manage its relationship with them through franchise agreements, interlocal agreements, and other policy-level vehicles.

Nevertheless, the facts are that these utilities serve essentially the same customers, and those customers harbor an expectation that the city and the utility companies will cooperate within reason to minimize the overall cost and disruption of implementing capital improvement projects.

One potential implication is that design engineers should look beyond the costs of the basic infrastructure being designed and be sensitive to the *overall* costs associated with utility coordination, relocation, and adjustment, including the intangibles such as community relations. While the design engineer must optimize the design within the constraints of the project, a thoughtful, common-sense approach to these issues can benefit all entities involved, as well as the people they serve.

General Approach

In general, the design engineer’s approach to utility coordination will involve four broad categories of effort:

- Surveying the horizontal and vertical locations of the existing utility facilities;
- evaluating the impact or potential impact of the proposed infrastructure on the utilities;

- collaborating and coordinating with the affected participants and refining the infrastructure design to minimize overall project costs; and
- preparing plans for utility work or providing information to third parties to prepare these plans.

Utility work can be organized into three categories: functional replacement, relocation, and adjustment (RRA).

- *Functional Replacement* involves replacing a utility line that is not otherwise in conflict with proposed infrastructure construction due to the line's condition, obsolescence, or inadequate capacity. The line can be put back in the same place or in another location that is not in conflict with a proposed improvement. An example of this would be to replace a sewer line that is in poor condition to avoid the need to replace it three years after other improvements are complete.
- *Relocation* involves installing a new line or lines in a different location due to the existing line's conflict with proposed infrastructure construction. An example is to install a water line in a new location to facilitate construction of a large storm drainage trunk line in a street.
- *Adjustment* involves minor changes to accommodate proposed infrastructure construction. An example is the installation of a relatively short section of water line to facilitate the construction of a drainage lateral or a storm drainage inlet.

Participating Utility Companies

The utility companies that are involved in the delivery of City of San Antonio capital improvement projects include:

- *San Antonio Water System* — sanitary sewer, potable water, and recycled water;
- *CPS Energy* — natural gas and electricity;
- *AT&T* — telephone, cable television
- and internet service;
- *Time Warner* — cable television, telephone, and Internet service;
- *Grande Communications* — cable television, telephone, and Internet service;
- *Other utilities* — “cross country” pipelines, local water supply companies, and competitive local exchange carriers (CLECs), among others.

A brief look at each of these entities provides better understanding of how they are typically involved with COSA capital improvement projects.

- *San Antonio Water System (SAWS)* — SAWS is a public utility owned by the City of San Antonio. It operates water supply and distribution facilities, sewage collection and treatment facilities, and treated wastewater transmission and distribution facilities. SAWS may agree to allow the evaluation and design of any replacement, relocation, or adjustment (RRA) of its facilities to be performed by the design consultant pursuant to its professional services contract with the city

and to have any RRA work be done by the construction contractor pursuant to its construction contract with the city.

Accordingly, the design team should include engineers who are familiar with SAWS design standards. SAWS design standards are available at the governmental relocations section of the SAWS website, with the following Internet link: http://www.saws.org/business_center/specs/govtrelocation/

- *CPS Energy* — CPS Energy (CPS), the largest municipally owned energy company in the nation, provides both natural gas and electric service. CPS facilities include natural gas transmission and distribution facilities and both underground and overhead high-voltage electrical transmission. CPS may agree to allow evaluation and design of any RRA of its gas and underground electric facilities to be performed by the design consultant, pursuant to its professional services contract with the city, and may have any RRA work be done by the construction contractor pursuant to its construction contract with the city. Implied in this is that CPS staff may conduct its own design and construction for any RRA work related to its gas, overhead, and underground electrical facilities.
- *AT&T* — AT&T, Inc. (AT&T) is a holding company whose subsidiaries and affiliates provide both wireline and wireless telecommunications services and equipment. The services and products offered by AT&T that are most vulnerable to being affected by capital improvement projects include local-exchange services, long-distance services, and data/broadband and Internet services, using underground, overhead, and wireless technology infrastructure. The design consultant should ensure that both the long-distance coordinator and local coordinator are contacted.

AT&T operates many of its facilities within the rights-of-way and easements owned by the city, pursuant to a franchise agreement, some sections of which govern how AT&T's facilities are to be adjusted and relocated to accommodate capital improvement projects.

- *Time Warner* — Time Warner Cable is the second largest cable operator in the nation. It provides cable television, Internet, and digital telephone service, through a network of underground, overhead, and wireless technology infrastructure, operating within rights-of-way and easements, pursuant to a franchise agreement

with the city. The company typically manages design and construction of RRA work in advance of or concurrent with construction of capital improvement projects.

- *Grande Communications* — Grande Communications is a Texas-based communications system providing high-speed Internet, local and long-distance telephone service, and digital cable services through a fiber optic network. Grande operates its facilities within rights-of-way and easements, pursuant to a franchise agreement with the city, and typically manages design and construction of any RRA work in advance of or concurrent with capital improvement project construction.
- *Other utilities* — Other utilities that may be encountered include the following:
 - fiber optic and copper wire lines owned by entities other than AT&T, such as Sprint, Verizon, and a host of competitive local exchange carriers (CLECs);
 - underground pipelines owned and operated by a variety of entities, such as Valero and Coastal States, typically conveying petroleum products; and
 - private lines and tunnels operating in City of San Antonio ROW, both with and without benefit of a formal approval.

Design Engineers should contact 1-800-344-8377(DIG-TESS)/1-800-ONE-CALL to locate other utilities that may be in the right-of-way.

Points-of-contact for these companies can be found in [Appendix 5-A](#).

Standards

Prior to the year 2000, no standards existed for locating utilities that were shown on infrastructure plans. As a result, there were almost as many ways to locate utilities and show them on the plans as there were projects. One of the problems was (and continues to be) that it is generally difficult to distinguish the utilities that are depicted as a result of a conscientious and thorough investigative effort from those that are depicted based on less thorough methods.

In an attempt to create order in this somewhat chaotic environment, the Federal Highway Administration commissioned Purdue University to conduct a study of the costs and benefits of utility coordination efforts. That study, published in 2000, was significant for several reasons:

- It established a definition for subsurface utility engineering (SUE) — *An engineering process for accurately identifying the quality of subsurface utility information needed for [infrastructure projects], and for acquiring and managing that level of information during the development of [an infrastructure] project.*

<http://www.fhwa.dot.gov/programadmin/sueindex.cfm>

- It established a framework for identifying different levels of quality for utility information (Quality Levels A, B, C, and D).

- It provided a rational economic justification for the use of SUE. In particular,
 - that for every \$1.00 spent on SUE, savings of \$4.62 in overall project costs were realized;
 - that the cost of obtaining Quality Level A and B data on the 71 projects studied was less than 0.5 percent of the total construction costs; and
 - that using Quality Level A and B data resulted in a construction cost savings of 1.9 percent over using the traditional Quality Level C and D data.

Within a few years, The American Society of Civil Engineers (ASCE)/Construction Institute (CI), along with a host of other participants and supporters, including the Associated General Contractors, collaborated to develop and promulgate an industry standard, [CI/ASCE 38-02, Standard Guidelines for the Collection and Depiction of Existing Subsurface Utility Data](#) (ISBN 0784406456, 2002). This is the standard that will be used for COSA capital improvement projects.

In general, the standard establishes four quality levels with Quality Level A (QLA) being the highest level and Quality Level D (QLD) being the lowest quality. These quality levels are described briefly in Table 1, below.

Table 1
ASCE Quality Level Descriptions

Level Designation	Description
Level A (QLA)	Horizontal and vertical location of utility with utility size and dimensions are known to a relative certainty and accuracy of about ½ inch. With some exceptions, Level A locations are limited to individual points along a buried utility where the utility has been exposed and surveyed and/or correlated with a high degree of certainty to other QLA data points (e.g., a gravity sewer main or storm drain that is on a straight alignment and consistent slope.)
Level B (QLB)	Utility locations and depths are based on locates established using geophysical techniques. This is done in conjunction with tasks associated with QLC and QLD. Vertical information is not based on direct measurements, but geophysical methods such as use of subsurface radar, ultrasonic, or a tracing method. Locations for QLB are reproducible. Locates exceeding QLB specifications that cannot meet QLA are classified as QLB.
Level C (QLC)	Utility locations are based on a correlation of surveyed field locations of surface evidence with information derived from utility maps and/or record drawings from the utility. QLC involves horizontal correlation and inferred vertical location based on surveyed and observable surface features along the utility route, such as valve locations, trench cuts, or manholes.
Level D (QLD)	Utility locations are based solely on utility maps, record drawings, or other similar mapping information. Composite drawings depicting this level have most apparent conflicts with topographic features resolved and include utility type, owner, date of map, beginning and ending of the utility, activity status, apparent size and number of conduits, and encasement, where applicable, and where indicated, available mapping information. This level is indicated when utility information cannot meet Level C criteria due to discrepancy or other problem. This level may sometimes involve field survey or reconnaissance.

Communicating Quality Levels

An important aspect of this effort is the communication of the quality levels of the various utilities shown on the plans. There are two important things to consider in this regard: first, the quality level of the utility information shown on the plans will change and evolve during the course of the design effort and, second, the quality level at any particular phase of the design may vary from utility to utility.

More specifically, utility information relied on in preparing a preliminary engineering report will most likely be Quality Level D. At the completion of the 40 percent plans, the utility information should be a minimum of Quality Level C and in some cases may be Quality Level B. As the plans become more complete, there may be instances in which some utility information will be Quality Level C, some will be Quality Level B, and perhaps some will be Quality Level A.

The design engineer must indicate the quality level typical of the majority of the utility information for a particular utility and then indicate by note specific locations where utility information falls short of or exceeds that typical quality level. For example, show location and depth of existing utility based on pothole (QLA) information. This information must be shown on the Utility Basemap with a note that reads as follows:

“The typical quality level of the utility information shown on these plans is shown in the table below. Specific notes on the plans indicate locations where the utility information shown is known to fall short of or exceed the stated typical quality level.”

<i>Storm Drainage Mains</i>	<i>QL B</i>
<i>Sanitary Sewer Mains</i>	<i>QL B</i>
<i>Water Distribution Mains</i>	<i>QL C</i>
<i>Recycle Mains</i>	<i>QL C</i>
<i>Natural Gas Mains</i>	<i>QL B</i>
<i>Overhead Electric Lines</i>	<i>QL C</i>
<i>Underground Electric Lines</i>	<i>QL C</i>
<i>Underground CATV (Company) Lines</i>	<i>QL C</i>
<i>Underground Telecommunication Lines</i>	<i>QL C</i>
<i>All Underground Utility Service Lines</i>	<i>QL C</i>

Continuing with this same example the bid documents for this same project might contain the note shown below. The exact location (x, y and z) for Quality Level A locates must be shown on the Utility Basemap.

“The typical quality level of the utility information shown on these plans is shown in the table below. Specific notes on the plans indicate locations where the utility information shown is known to fall short of or exceed the stated typical quality level.”

<i>Storm Drainage Mains</i>	<i>QL A</i>
<i>Sanitary Sewer Mains</i>	<i>QL A</i>
<i>Water Distribution Mains</i>	<i>QL B</i>
<i>Recycle Mains</i>	<i>QL B</i>
<i>Natural Gas Mains</i>	<i>QL B</i>
<i>Overhead Electric Lines</i>	<i>QL C</i>
<i>Underground Electric Lines</i>	<i>QL C</i>
<i>Underground CATV (Company) Lines</i>	<i>QL C</i>
<i>Underground Telecommunication Lines</i>	<i>QL B</i>
<i>All Underground Utility Service Lines</i>	<i>QL C</i>

Common Mistakes to Avoid

1. Existing utilities are frequently depicted by single lines. While this may be acceptable for a 2" gas line, it may not be appropriate for a 20" water line and is clearly not appropriate for a 24" sewer line. Design consultants should show the utility line as much as possible to scale in both plan and profile views, using the outside diameter of the utility.
2. Sometimes the alignments of utilities entering and leaving the project area are not correctly shown because the features are located only within the project area and the lines are extrapolated to the project boundaries. Design consultants should locate features beyond the project boundaries in order interpolate the line locations at the project boundaries. Consultant should locate these utilities by surveying or potholing if required.

3. Not everything is shown on the plans of record. In particular, in evaluation of potential conflicts, design consultants should give due consideration to the possibility that concrete saddles, cradles, and thrust blocking were “overpoured.” When designing facilities close to concrete-steel cylinder lines, consider the approximate “diaper band” dimensions.

4. Sometimes design engineers calculate the cover on an existing utility as the distance between finished grade and the existing utility. In fact, the cover needs to be calculated as the distance between the *subgrade* and the existing utility. Design consultants should be particularly alert for utilities being installed at a shallower depth than the plans of record indicate in rocky locations.

5. In designing the profile of large-dimension box culverts and storm sewers running longitudinally in streets, design consultants sometimes fail to consider the routing of sanitary sewer service laterals to homes and businesses on the “other side” of the box or pipe. Design consultants should make sure that homes and businesses on both sides of the drainage facility can be served. In addition, where relevant, design consultants should compare the costs of running a new sanitary sewer on both sides of a shallower drainage facility with costs of a single sanitary sewer on one side of a deeper drainage facility.

Overhead Utilities

Design consultants are required to employ the same level of care in locating and evaluating overhead utilities as they use in locating and evaluating underground utilities. Particular attention should be paid to the impact of excavation close to poles or guys and the alignment of proposed pedestrian facilities and driveways relative to existing poles. Engineers should include a review of bracing procedures should excavation occur within three feet of a pole or guy and be at least three feet deep.

Process

The utility coordination process that will be used for city capital improvement projects will be based on effective communication, followed by documentation that provides a basis for the approved design. Before utility coordination can begin, the design consultant must first be able to define the project so that utility companies can understand its impact. This means that the following must be known:

- schedule;
- project limits;
- general horizontal alignment;
- general vertical alignment;
- project configuration (roadway width and number of lanes); and
- approximate pavement design (total pavement depth to include pavement thickness, base depth, and prepared subgrade depth).

With this information, the design consultant is prepared to conduct a preliminary assessment of the project’s utility condition prior to the 40 percent submittal. The assessment begins by contacting all utility companies that may have facilities within the

project limits. It's important that communications with the utility companies be documented; therefore, the design consultant will send notice of the project along with any preliminary mapping of the project to the utility companies through certified mail. At a minimum, the initial notification to the utility companies shall include the following:

- request of available utility block/system maps, and record drawings;
- a description of the design engineer's requested procedure for delineating existing facilities, providing disposition of utilities and resolving conflict;
- a statement that attendance at meetings and cooperation of the affected utilities is encouraged and expected;
- a statement that the private utility is ultimately responsible for any conflicts in design by its own organization which result in uncovered or unresolved conflicts;
- a statement that any utility that has no facilities within the limits of the project, or determines that its facilities are not affected by the proposed work, will furnish a letter of "NO CONFLICT/NON-INVOLVEMENT" to the project manager.

A Utility Kickoff Meeting is then scheduled with all utility companies to inform them of the work and begin to obtain any available data such as system maps and/or as-builts. After the Utility Kickoff Meeting, the design consultant must create a Utility Basemap of Quality Level C and send two copies to all utility companies for their review and comments. One copy is for their records and one is to be returned to the design consultant with comments.

At this point, the design consultant will continue their preliminary assessment by comparing the utility locations to the proposed improvements and begin to identify and assess possible conflicts. This includes, at a minimum, an initial list of SUE needs. Consultant must coordinate closely with City and utility owner to identify locations and number of "pot-holes" required to properly identify the horizontal and vertical location of the utility in question.

A 2nd utility coordination meeting is then scheduled to discuss the accuracy of the Utility Basemap, project scope, project schedule, and either how the project can be designed to reduce impact or how the utility can be modified to suit project conditions. At this time the need for additional data is discussed and agreed upon.

At this meeting, the design consultant shall, at a minimum, perform the following:

- confirm that preliminary plans (roadway and drainage) have been furnished to each utility so they may begin their reviews and designs;
- describe the project to the utility companies so they better understand the scope of the project;
- identify obvious conflicts and possible major relocations; and
- describe and discuss with all parties the possible locations and alignments of new facilities and the types of installations involved.

After the 2nd meeting, the design consultant is ready to further define existing utility alignments. This process requires close coordination among the parties. The consultant will maintain complete records of this process, so that decisions regarding proposed utility disposition and project configuration are memorialized.

If the proposed roadway and drainage improvements have been optimized to the extent possible and water, sewer and gas utilities must be adjusted, the design consultant will investigate and determine how these facilities can be configured to mitigate conflict with proposed facilities and still provide service. Close coordination with the SAWS and CPS Energy is needed to ensure the design of these systems is consistent with their goals and standards.

Upon completion of this process, the design consultant will recommend and assign utility alignments for all affected facilities with close coordination with CIMS' Utility Manager and utility representatives. The assigned alignments must be included in the Utility Coordination Report as an exhibit showing the typical street section. This report will document all changes and revisions to the assigned alignments as the plans move from preliminary to final design. This must be part of the 40 percent submittal to the city

The design consultant will then determine the need for further effort to establish utility locations. It may be necessary to conduct "pot-holing" activities to increase certainty regarding the horizontal and vertical locations of subsurface utilities.

The design consultant will then move to finalize the 40 percent design of COSA improvements and prepare construction drawings with associated specifications. Also, if required, move to finalize the water, sewer, and gas relocation work. Consultant must ensure copies of these drawings and MicroStation files are sent to SAWS, CPS Energy and utility companies for final review and comment. Any comments must be addressed by the design consultant. The design consultant will continue to coordinate the design of all other required utility adjustments so these designs are consistent with COSA plans and specifications and to ensure they are ready for implementation prior to advertising the project.

All results and coordination efforts will be documented in a utility coordination report that accompanies the 40 percent design submittal and updated in all subsequent submittals. The report should include maps, evidence of communication regarding utility locations within the project area, and a completed Utility Conflict Matrix as shown in Appendix 5-B.

Establishing survey control for non-joint bid utilities is an important part of the utility coordination process. Utility relocations that occur prior to the initiation of roadway construction must use the same control system as the road contractor. Therefore, control surveys must be completed no less than 30 days prior to utility relocation starts.

The design consultant's scope of work is further defined below in Table 2.

Table 2
Designer's Utility Coordination Scope and Check List

Designer's Utility Coordination Scope and Check List		
Design Submittal (40%)		Date Completed
1	Send notice to all utilities requesting block/system maps, including the project scope, and a project location map.	
2	Conduct utility kickoff coordination meeting.	
3	Identify apparent utilities in the project vicinity and surrounding area by topographic survey, field investigation, by requested marking on the ground, and by available record search.	
4	Prepare initial Utility Basemap (Quality Level C) sufficient to identify all utilities in the project vicinity and distribute to all utility companies.	
5	Compare utility locations to proposed project and assess conflicts.	
6	Develop preliminary roadway cross-sections and storm drain profiles and show vertical locations of existing utilities.	
7	Conduct initial utility conflict analysis for SAWS water and sewer, CPS gas, and all utilities affected by the project. Identify potential conflicts in the utility conflict matrix.	
8	Prepare initial list of SUE needs for the project required to fully characterize utilities with potential high impact on the project.	
9	Initiate coordination for design of all utilities that may require relocation and conduct 2nd utility coordination meeting.	
10	Optimize street and drainage design to minimize/avoid conflicts with utilities.	
11	Recommend/Assign utility alignments for all affected utilities.	
12	Prepare and provide Utility Coordination Report for the Project, attaching utility conflict matrix, phone log, letters, responses, emails and other correspondence related to the Utility Coordination task.	
Design Submittal (70%)		
1	Act upon 40% submittal recommendations	
2	Complete SUE related work, obtain results, and incorporate findings	
3	Coordinate design with non-joint bid utilities	
4	Complete utility basemap, resolve all known utility conflicts, and update utility conflict matrix	
5	Complete 70% cross sections to verify existing utility locations	
6	Complete utility proposed design components and incorporate into overall plans	
7	Assess remaining utility conflicts and make recommendations in the final design submittal	
8	Make recommendations for utility locates that will be deferred to the construction phase	
9	Provide Utility Coordination Report supplement to address changes since the initial submittal, including attached letters and other correspondence.	
10	In the Utility coordination Report, include a narrative with list of major design changes from previous submittal	

Submittal (95%)		
1	Address comments from prior phase	
2	Resolve remaining utility conflict resolution	
3	Finalize plans, sections, and details related to utility coordination	
4	Provide Construction Phase Utility Coordination Needs Assessment	
5	In the Utility coordination Report, include a narrative with list of major design changes from previous submittal	
Bid Set Submittal		
1	Address comments from reviewers	
2	Resolve outstanding utility coordination issues and provide plan notes	
3	Finalize outstanding utility issues in the plans and specifications	
Construction Phase and Record Drawing Submittal		
1	Update project drawings to reflect location of placed utilities, using marked up plans signed and provided by the Contractor with concurrence by the Inspector.	

SECTION 6.0

Traffic Engineering

Introduction

Traffic engineering is a branch of civil engineering that uses engineering techniques to achieve the safe and efficient movement of people and goods. It focuses mainly on accommodating traffic demands within the constraints of available infrastructure through traffic-flow management techniques, including the application of traffic control devices (signs, signals, and pavement markings).

For capital improvement programs, traffic engineering involves analysis of existing and projected traffic and roadway conditions on project roadways to assess traffic demands, roadway capacity, and the traffic engineering measures necessary to provide an acceptable level of service. To the level determined by the COSA project manager, the traffic engineer is expected to review current and future traffic conditions and determine the general configuration of the project, so it provides a desired design-level of service. This includes, among other considerations, the identification of:

- lane width;
- number of lanes;
- intersection configuration;
- traffic control; and
- access management.

Traffic Engineering Design Process

The traffic engineering design process is required for every COSA roadway project. The result establishes design parameters and specific traffic engineering features for the design team to incorporate in preparing the project. The specific requirements of the traffic engineering study will be determined for each project by the COSA project manager. Following is a description of the design process required for traffic engineering.

Traffic Studies

In the early stages of a project, various studies may be required to establish critical criteria for street or roadway design, including design level of service, sight distance, and access management limitations, which are needed to establish the configuration of the primary elements of the work. Access management is particularly important in that it determines driveway locations, where medians and median openings are needed, and the types of access and turn restrictions that should be imposed to facilitate the movement of traffic and preserve the integrity of the roadway function within the infrastructure network. In some instances, it may be appropriate to employ computer simulation modeling to project the relative effectiveness of various alternatives.

The recommendations of the traffic engineering study will address such issues as the required number of through lanes, auxiliary lanes, signals and other traffic control

improvements, access management, and alternative mode improvements (i.e., bicycles, pedestrians, and buses). The recommendations will guide the design of the proposed roadway and intersections, as well as the specific design of traffic engineering features.

The traffic engineering study will comply with requirements of the most recent versions of the Texas [Manual on Uniform Traffic Control Devices](#) (MUTCD), Transportation Research Board [Highway Capacity Manual](#) (HCM), AASHTO [A Policy on Geometric Design of Highways and Streets](#) (“Green Book”), and other standards of traffic engineering practice, as appropriate. Computer simulation modeling software used in development of the traffic engineering study must be approved by the city for use. The study findings will be summarized and documented in the traffic engineering report (TER).

Deliverables

Traffic Engineering Study

- Executive Summary — A two-page (maximum) summary of key features of the report, suitable for distribution as an informational handout on the project at public open houses or meetings with citizens.
- Introduction — A general project description, location map, and aerial photo of the project, identifying significant landmarks in the vicinity.
- Existing Conditions:
 - Roadway — An inventory of existing conditions for all roadways, intersecting roadways, and intersections to be improved, including a scaled drawing of existing conditions. At a minimum the inventory will include, but not be limited to, the following:
 - ◆ roadway geometry and typical roadway cross sections including median treatments and channelization;
 - ◆ auxiliary lanes (left- and right-turn lanes);
 - ◆ inventory of traffic-control devices (signs, signals, pavement markings, school zones);
 - ◆ posted speed limits;
 - ◆ identification of existing schools and other major traffic generators, including those in development; and
 - ◆ alternative transportation modes (bus routes and existing and proposed pedestrian and bicycle facilities).
 - Traffic data — The traffic data collection schedule shall be coordinated and approved by the city. Traffic counts should be recorded only on typical weekdays (not subject to special events or incidents that could affect typical traffic patterns or volumes) during a continuous 48-hour period between 12:00 noon on a Monday and 12:00 noon of the following Friday. Data collected should include:
 - ◆ Turning movement traffic counts for critical intersections (a.m. and p.m. peak hours). Critical intersections will be determined during the project scoping

process. New data will be collected if existing data are more than two years old or, for projects located in high-growth areas, if existing data are more than one year old, as directed by the COSA project manager. The design consultant will check with the Traffic Engineering Division for existing data.

- ◆ Hourly approach traffic volume counts for one full 24-hour period at critical intersections may be needed, as determined by the city project manager. New data will be collected if existing data are more than two years old. The consultant will check with the Traffic Engineering Division for existing data.
 - ◆ Directional average daily traffic (ADT) and hourly volumes on the improvement roadway between existing signalized intersections and other intersecting major streets and side streets deemed critical. New data will be collected if existing data are more than two years old. The consultant will check with the Traffic Engineering Division for existing data.
 - ◆ At least one year of roadway and critical intersections collision data (city data) and associated collision rates, based on the most recent data available from the Police Department. Prepare a collision data summary spreadsheet and collision diagram.
 - ◆ Capacity and level-of-service analyses for existing conditions along the segments and at critical intersections (a.m. and p.m. peak-hour periods).
 - ◆ K (proportion of the ADT occurring in the peak hour) and D (proportion of the peak-hour traffic in the peak direction) factors.
 - ◆ Peak-hour factor by approach and by movement at critical intersections as determined by the COSA project manager.
 - ◆ Heavy vehicle (truck and bus) percentage during the peak a.m. and p.m. peak periods.
 - ◆ Intersection and roadway lighting.
 - ◆ Intelligent Transportation Systems (ITS) based on Traffic Management Division data.
- Projected Conditions:
 - Determine the a.m. and p.m. peak-hour volumes for all roadways, intersecting roadways, intersections, and major driveways within the limits of the project or as determined by the COSA Project Manager. These volumes shall be determined for the opening year and the design year (typically 20 years into the future). The volumes will be based on existing traffic volumes and on traffic projections prepared by the Metropolitan Planning Organization (MPO) or by the designer guided by city staff.
 - Determine capacity and level of service (LOS) for opening year and design year on the roadway and at critical intersections (a.m. and p.m. peak-hour periods).
 - Address traffic impacts on adjacent neighborhoods (both during and after construction), including traffic calming and access management issues.
 - Prepare traffic signal warrant analyses for the project opening year at critical intersections as determined by the COSA project manager and

identified in the project scoping process. Traffic signal warrant analyses will be conducted in accordance with the latest version of the Texas MUTCD.

- Complete Streets:
 - The Traffic Engineering Study and subsequent Design Summary Report shall describe how the assessment of all modes of travel (automobile, pedestrian, bicycle, and transit) leads to the proposed design of the right-of-way to best accommodate all users within the land use context. When necessary to assess to alternative design cross-sections, a multi-modal level of service (MMLOS) analysis* shall be conducted and the results provided.
- Recommendations to be provided:
 - Summary of improvements necessary to achieve the design level of service determined by the COSA project manager (typically LOS “D”) and address identified safety issues.
 - Speed zones, including school speed zones.
 - Alternative transportation modes (bus routes, pedestrian and bicycle usage, and facilities).
 - Design parameters (design speeds, design vehicle, sight distances, shoulders, access control, and clear zones).
 - Access management features.
 - Proposed roadway typical cross sections and intersection typical cross sections.
 - Auxiliary lanes (left- and right-turn lanes, acceleration and deceleration lanes), including recommended lengths per city approved methodology to achieve design LOS.
 - Critical intersection traffic control.
 - ITS based on Traffic Management Division program requirements.
 - School zone flashing beacons (roadside or overhead).
 - Conceptual improvement diagram illustrating recommended improvements.

Preliminary Engineering Report and Design Summary Report

The resulting data from these studies should be documented in a Preliminary Report, if required. At a minimum, it should include the following:

- documentation of data as specified above;
- modeling outputs and electronic simulation files; and
- tables of existing and projected measures of effectiveness (MOE) appropriate to the project, as defined by the consultant (see Table 6–1):
 - delays (control),
 - approach,
 - intersection,

- network, and
- levels of service (*Highway Capacity Manual* criteria).

Table 6–1 **Existing Delay and Levels of Service Summary**
A.M. (or P.M.) Peak Period for Current Year 20xx

Intersection	Intersection Approaches									
	Northbound		Southbound		Eastbound		Westbound		Average	
	Control Delay (Sec)	LOS	Control Delay (Sec)	LOS	Control Delay (Sec)	LOS	Control Delay (Sec)	LOS	Control Delay (Sec)	LOS
Major at Minor 1										
Major at Minor 2										
Major at Minor 3										
Major at Minor 4										

Projected Delay and Levels of Service Summary
A.M. (or P.M.) Peak Period for Design Year 20xx

Intersection	Intersection Approaches									
	Northbound		Southbound		Eastbound		Westbound		Average	
	Control Delay (Sec)	LOS	Control Delay (Sec)	LOS	Control Delay (Sec)	LOS	Control Delay (Sec)	LOS	Control Delay (Sec)	LOS
Major at Minor 1										
Major at Minor 2										
Major at Minor 3										
Major at Minor 4										

In addition the results of this report should also address the following:

- design-year traffic volumes with truck and bus traffic projections;
- identification of the design vehicle;
- identification of the design speed;
- projected level of service for the design year;
- identification of any traffic-signal improvements:
 - reconstruction of existing traffic signals,
 - modification of existing traffic signals or signal systems,
 - new traffic signal installations,
 - signal system optimization and coordination, and
 - use of flashing beacons;
- intersection improvements:
 - approach widening,
 - corner radius design, and

- turn lanes, auxiliary lanes, lane adjustments;
- bicycle/pedestrian facilities;
- access management;
- schools:
 - limits of school zones,
 - type of treatment,
 - signs and pavement markings,
 - roadside flashing beacons, and
 - overhead flashing beacons;
- railroad coordination;
- traffic handling during construction;
- traffic control plan (TCP);
- signs;
- pavement markings;
- traffic signals including communications; and
- special requirements.

In the event this work is to be done by a design engineering consultant, the issues identified above can be included in the design summary report and can be included in the consultant's scope of work.

40 Percent Design

After the preliminary engineering report is completed, it should be provided to the design consultant. The design consultant can now proceed with the street or roadway design. The first milestone in the consultant's work scope is the 40 percent design deliverable. In this deliverable the consultant should provide layouts that conform to the traffic engineer's criteria in the following areas:

- Preliminary Construction Phasing, to include an exhibit showing preliminary construction phasing/sequencing and a sequence of work narrative. Exhibit and narrative must include all proposed improvements including all joint-bid utilities.
- intersection layout, including channelization:
 - right-of-way (existing and proposed),
 - turn lanes,
 - auxiliary lanes,
 - lane assignments, and
 - wheelchair ramps;
- bicycle and pedestrian facilities layout;
- school-zone layout; and
- access management:

- driveways,
- medians and median openings, and
- access and turn restrictions.

In this deliverable, the design consultant should provide a narrative description of the conceptual sequence of work and construction phasing plan, which addresses constructability of the project.

70 Percent Design

Upon approval of the 40 percent design submittal, the design consultant will be authorized to move forward to the 70 percent design submittal. At this point, the major design decisions have been made, and the configuration of the project is known. The design team is engaged in the development of construction plans to include standard details and specifications.

Although the primary effort is directed towards construction-plan development, some design decisions remain for the traffic engineer, including traffic control during construction, signal design, signage, and intelligent transportation system implementation. Following is a list of issues to be addressed in the 70 percent design submittal:

- traffic control plan:
 - detours;
 - signage;
 - pavement markings;
 - traffic-signal plan for each phase of traffic control plan, including detection and communication to be maintained at all times;
 - roadway widening;
 - typical construction sections;
 - portable dynamic message signs (DMS);
 - transit;
 - bid items; and
 - review;
- traffic-signal layouts;
- signals:
 - equipment:
 - ◆ support system (poles and mast arms, etc.);
 - ◆ signal heads (vehicle and pedestrian);
 - ◆ vehicle detectors;
 - ◆ vehicle priority/preemption;
 - ◆ controller;

- ◆ system communications, including maintenance agency interfacing; and
- ◆ railroad pre-emption;
- layouts:
 - ◆ existing to remain utilities and proposed utility relocations required by signal layout;
 - ◆ pole and controller locations;
 - ◆ signal-head locations;
 - ◆ conduit and cable runs;
 - ◆ identification of electrical service source with written confirmation from CPS Energy;
 - conduit and conductor schedule;
 - working with Traffic Management Division, develop signal timing and phasing plan and system coordination timing plan, as required;
- signs (layouts including sign types and locations);
- pavement markings (layouts, including pavement marking types: line type, line width, color, and locations);
- flashing beacons:
 - equipment:
 - ◆ support system (poles and mast arms, etc.);
 - ◆ beacon heads and colors (red/yellow);
 - ◆ controller;
 - layouts:
 - ◆ existing utilities;
 - ◆ pole and controller locations;
 - ◆ signal head locations;
 - ◆ conduit and cable runs;
 - ◆ electrical service source; and
 - conduit and conductor schedule;
- bicycle facilities layouts;
- access management:
 - driveways;
 - medians and median openings; and
 - access and turn restrictions;
- intelligent transportation systems:
 - traffic volume counting and speed recording stations;
 - advanced traffic management system (ATMS);
 - dynamic message signs; and
 - maintenance agency interfacing;

- bid items; and
- preliminary cost estimates.

95 Percent Design

Upon completion of the 70 percent design, the resulting plans and specifications will be submitted to the city for review and comment. The design is nearly complete at this point, and the design consultant is principally engaged in addressing comments from the various permitting agencies and city departments. Satisfactory resolution of comments and suggestions from these reviewers moves the project to 95 percent completion.

100 Percent Design

Work within this phase consists of addressing any final comments and conducting a final review of the documents to assure that they are complete. Any city comments received during this period are to be addressed.

Standard Details

Standard details covering a variety of facilities are available from the City and other agencies and can be used in city projects. These details can be found on the City's website. The City's website will include web-links to TxDOT standard details as appropriate. All standard details applicable to a project will be included in the plan set. Standard details may include:

- signs:
 - warning,
 - regulatory,
 - guide, and
 - structures;
- barricade and construction traffic control;
- school zone;
- bicycle facilities;
- pavement markings/channelization;
- signals:
 - intersection,
 - equipment,
 - layouts,
 - pole and controller foundations,
 - flashing beacon, and
 - school-zone treatments;
- system communications;
- railroad pre-emption; and
- intelligent transportation systems.

Standard Specifications

In addition to standard details, standard specifications covering a variety of traffic-engineering topics are available through the city’s website. The city’s website will include web-links to TxDOT standard specifications as appropriate. Standard specifications include:

- signs;
- pavement markings;

signals:

- intersection:
 - ◆ equipment,
 - ◆ layouts,
 - ◆ pole and controller foundations,
 - ◆ flashing beacon, and
 - ◆ school zone;
- system communications;
- railroad pre-empt;
- vehicle priority/preemption; and
- intelligent transportation systems.

Plan Sheet Standard Layouts

Four traffic-related plan sheet templates are included:

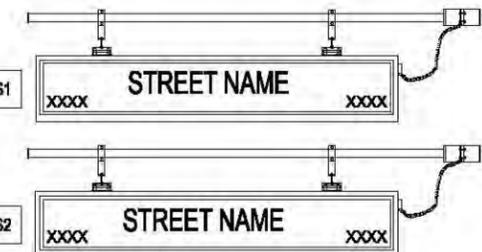
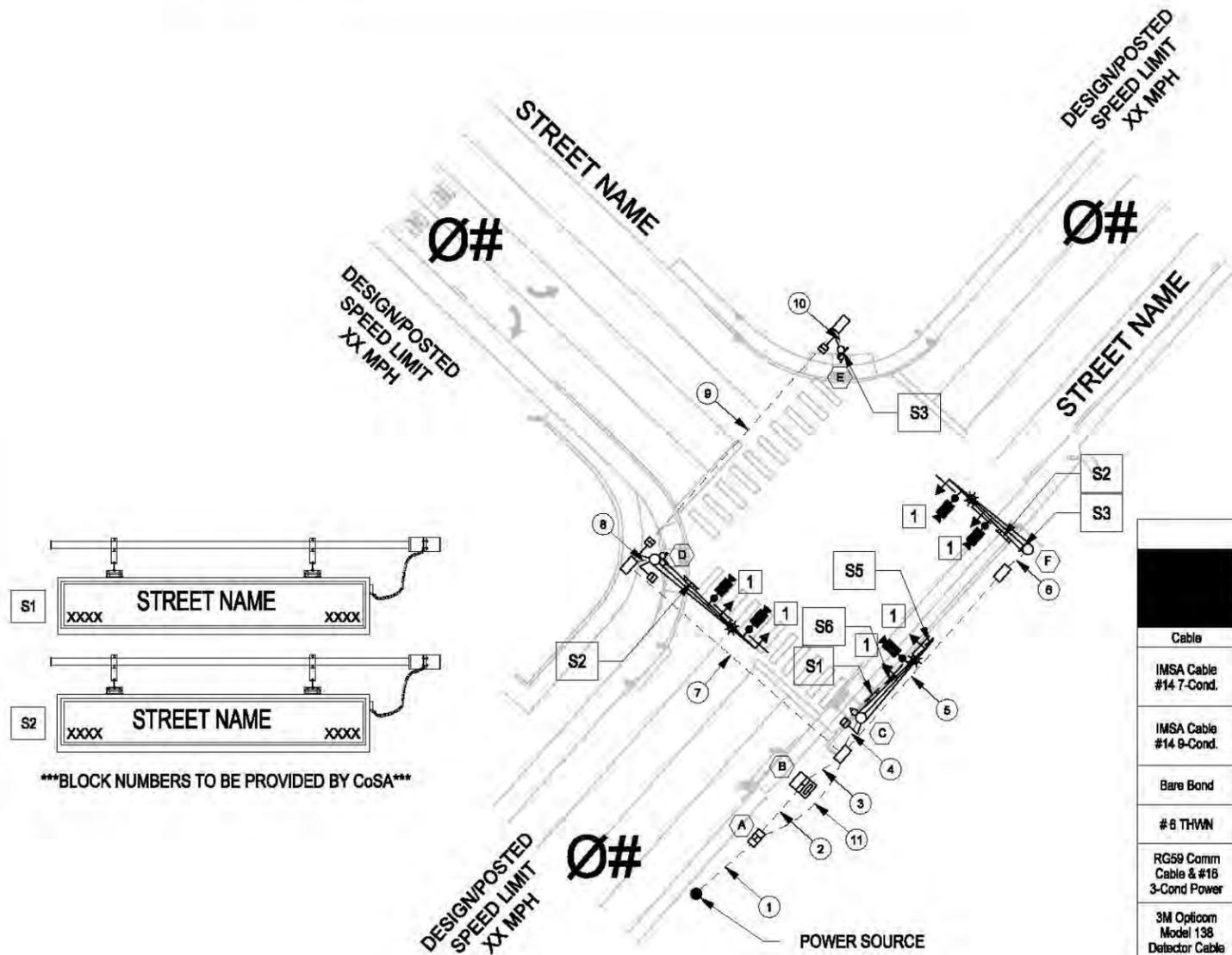
1. “Traffic Signal Layout” (figure 6–1) includes the intersection layout, locations of signal supports, controller foundation, electrical service and source, signal support-mounted signage, detectors, conduit runs, cable and conductor schedule, equipment details and identification key, and supplemental data. This sheet will include the city’s stamp for signature of approval of the traffic plans.
 2. “Traffic Signal Elevation Details” (figure 6–2) includes elevation details for each signal support structure, depicting positioning and all dimensions relevant to the installation of all support components and support-mounted equipment.
 3. “Traffic Signal Notes” (figure 6–3) includes materials and quantity estimates, foundation layout, foundation station and offset data table, traffic signal construction notes, and detailed signal component information. The latter must include descriptions of the electrical service, controller, controller cabinet, cabinet foundation, and, for each support structure individually, descriptions of the pole, mast arm, pole foundation, signal heads, pedestrian heads, detectors, signage, and other signal support-mounted equipment.
- “Pavement Markings — Signing” (figure 6–4) includes the intersection layout, pavement markings layout specifying types of pavement markings for each application, materials and quantity estimates, and signs and markings details, as needed for clarity of the design.

TRAFFIC ENGINEERING SUPPLEMENTAL DATA

1. TRAFFIC SIGNAL WARRANTS X, Y, Z MET FOR THE PROJECT OPENING YEAR 20XX
2. EXISTING SCHOOLS AND OTHER MAJOR TRAFFIC GENERATORS
3. SCHOOL SPEED ZONES
4. ACCESS MANAGEMENT FEATURES
5. HEAVY VEHICLE (TRUCK AND BUS) PERCENTAGE DURING THE PEAK A.M. AND P.M. PEAK PERIODS
6. BUS ROUTES, EXISTING AND PROPOSED PEDESTRIAN AND BICYCLE FACILITIES
7. INTELLIGENT TRANSPORTATION SYSTEMS (ITS)
8. INTERSECTION AND ROADWAY LIGHTING
9. UTILITIES

LEGEND

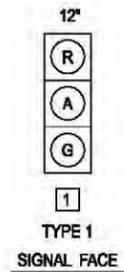
- | | | | |
|--------------------------|--|---|--|
| #3 1/2 PULLBOX | | GAS LINE | |
| #5 PULLBOX | | CABLE T.V. LINE U.G. | |
| #7 PULLBOX | | CABLE T.V. LINE O.H. | |
| WOOD POLE | | WATER LINE | |
| STEEL POLE | | STREET LIGHT W/ARM | |
| STEEL POLE W/ARM | | SIGNAL W/BACK PLATE | |
| CONTROLLER ON FOUNDATION | | POLE IDENTIFIER | |
| SERVICE PEDESTAL | | CABLE RUN IDENTIFIER | |
| SIGNAL CONDUIT | | SIGNAL HEAD IDENTIFIER | |
| TELEPHONE LINE U.G. | | PED. BUTTON ON SIGNAL POLE | |
| TELEPHONE LINE O.H. | | PEDESTRIAN SIGNAL | |
| SEWER LINE | | MAST ARM MOUNTED SIGN | |
| STORM DRAIN LINE | | VIDEO IMAGING VEHICLE DETECTION SYSTEM (VIVDS) CAMERA | |
| ELECTRIC LINE U.G. | | | |
| ELECTRIC LINE O.H. | | | |



BLOCK NUMBERS TO BE PROVIDED BY CoSA

			CABLE AND CONDUCTOR SCHEDULE											
			Conduit Run No.	1	2	3	4	5	6	*7	8	*9	10	11
			Conduit Size in Inches											
			Number of Conduits											
			Run Length in Feet											
Cable	Circuit		TO BE INSTALLED BY CPS											
IMSA Cable #14 7-Cond.	Signals	Ø #												
		Ø #												
		Ø #												
IMSA Cable #14 9-Cond.	Ped Signals	Pole C												
		Pole D												
		Pole E												
Bare Bond	# 6 Bare Bond Ground													
	# 8 Bare Bond Ground													
# 6 THWN	120 VAC Power	Hot												
		Common												
RG59 Comm Cable & #18 3-Cond Power	VIVDS	Ø #												
		Ø #												
		Ø #												
3M Opticom Model 138 Detector Cable	Opticom Detectors	Ø #												
		Ø #												
		Ø #												
IMSA Cable #14 4-Cond.	ILSN Signs	Pole C												
		Pole D												
		Pole F												

* CONDUIT TO BE BORED



APPROVED

BY: _____

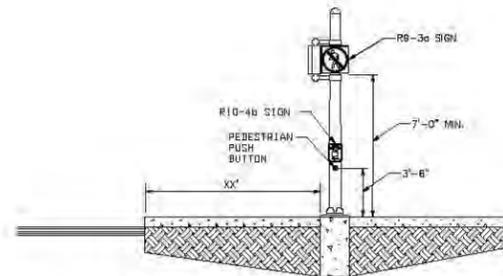
DATE: _____

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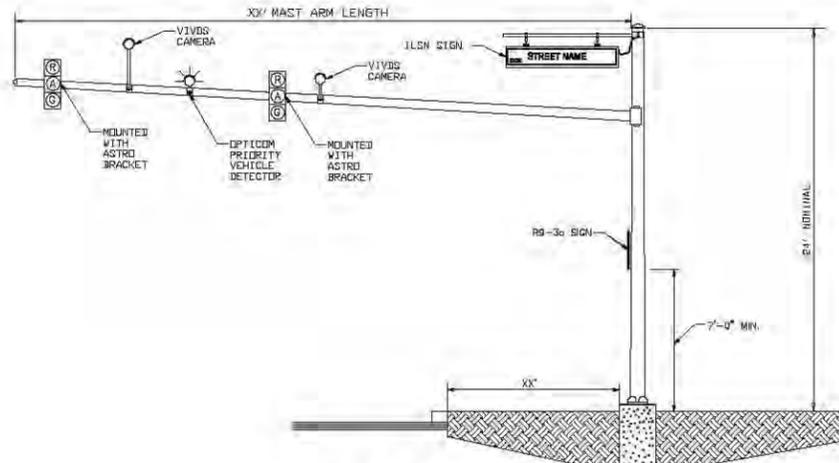
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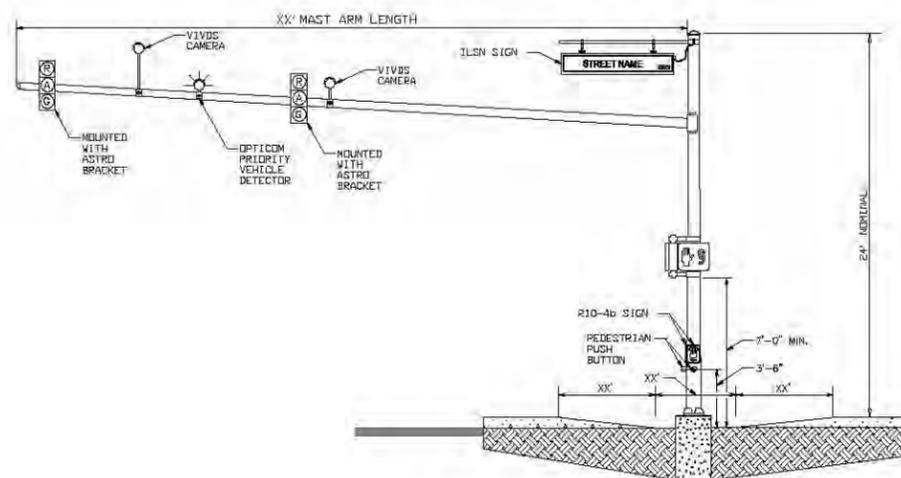
CONSULTANT LOGO



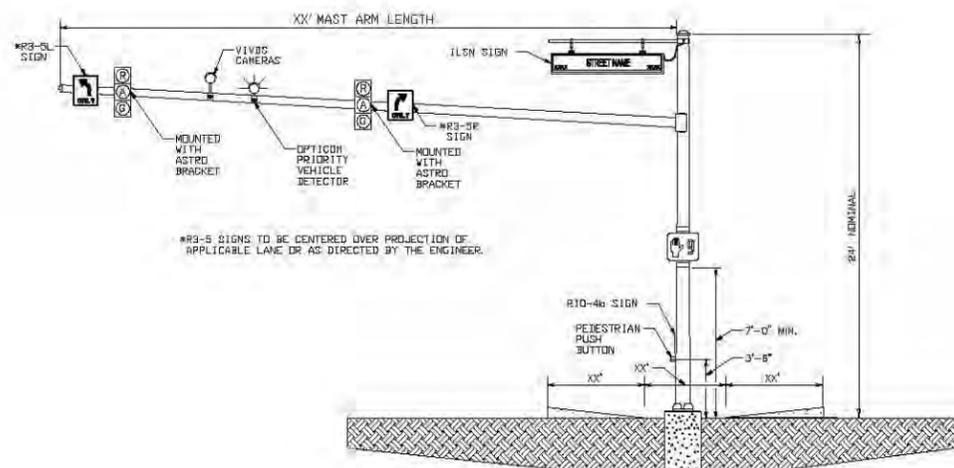
POLE E
PEDESTAL POLE
ELEVATION DETAILS
N.T.S.



POLE F
MAST ARM POLE
ELEVATION DETAILS
N.T.S.



POLE D
MAST ARM POLE
ELEVATION DETAILS
N.T.S.



POLE C
MAST ARM POLE
ELEVATION DETAILS
N.T.S.

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				#

TRAFFIC SIGNAL MATERIALS TO BE FURNISHED & INSTALLED BY CONTRACTOR			
ITEM	DESCRIPTION	UNIT	QUANTITY
531.11	R3-6 Left Only	EA	X
531.11	R3-6 Right Only	EA	X
531.14	R3-8 LR (Galv Sq Sign Post)	EA	X
531.24	R8-3a Pedestrian Crossing Prohibited	EA	X
600.01	Traffic Signal Conditions	PI	X
601.01	CPS Insurance	PI	X
603.03	#7 Pull Box	EA	X
605.01	Pedestrian Signal, Count Down	EA	X
607.01	Traffic Signal Head Type 1	EA	X
613.01	Pedestrian Pushbutton and Sign	EA	X
615.01	Type 2070 Controller and 332 Cabinet	EA	X
619.01	Type 332 Controller Foundation	EA	X
624.07	Maast Arm Pole 28 feet (8.5 m) w/ 24" Pole	EA	X
624.09	Maast Arm Pole 36 feet (11 m) w/ 24" Pole	EA	X
624.35	Type I Signal Pole; 10 feet (3 m)	EA	X
626.01	Pole Foundation Type 30-A	EA	X
626.03	Pole Foundation Type 36-A	EA	X
626.04	Pole Foundation Type I Pole	EA	X
628.03	Conduit Trenched 2 inches (50 mm) PVC	LF	X
628.04	Conduit Trenched 3 inches (76 mm) PVC	LF	X
628.21	Conduit Bored 3 inches (76 mm) PVC	LF	X
630.02	Traffic Signal Cable	LF	X
632.01	Electrical Service Pedestal	EA	X
16266.1	VIVDS Processor System	EA	X
16266.2	VIVDS Camera Assembly	EA	X
16266.3	VIVDS Communication Cable (Coaxial)	LF	X
16266.4	VIVDS Set-up System	EA	X
XXXXXX	Opticom Priority Vehicle Detector	EA	X
XXXXXX	Opticom Communication Cable	LF	X
XXXXXX	ILSN Sign	EA	X
XXXXXX	ILSN Cable - (MESA Cable #14 4-Cond.)	EA	X

* TxDOT SPECIFICATION AND BID ITEM NUMBERS

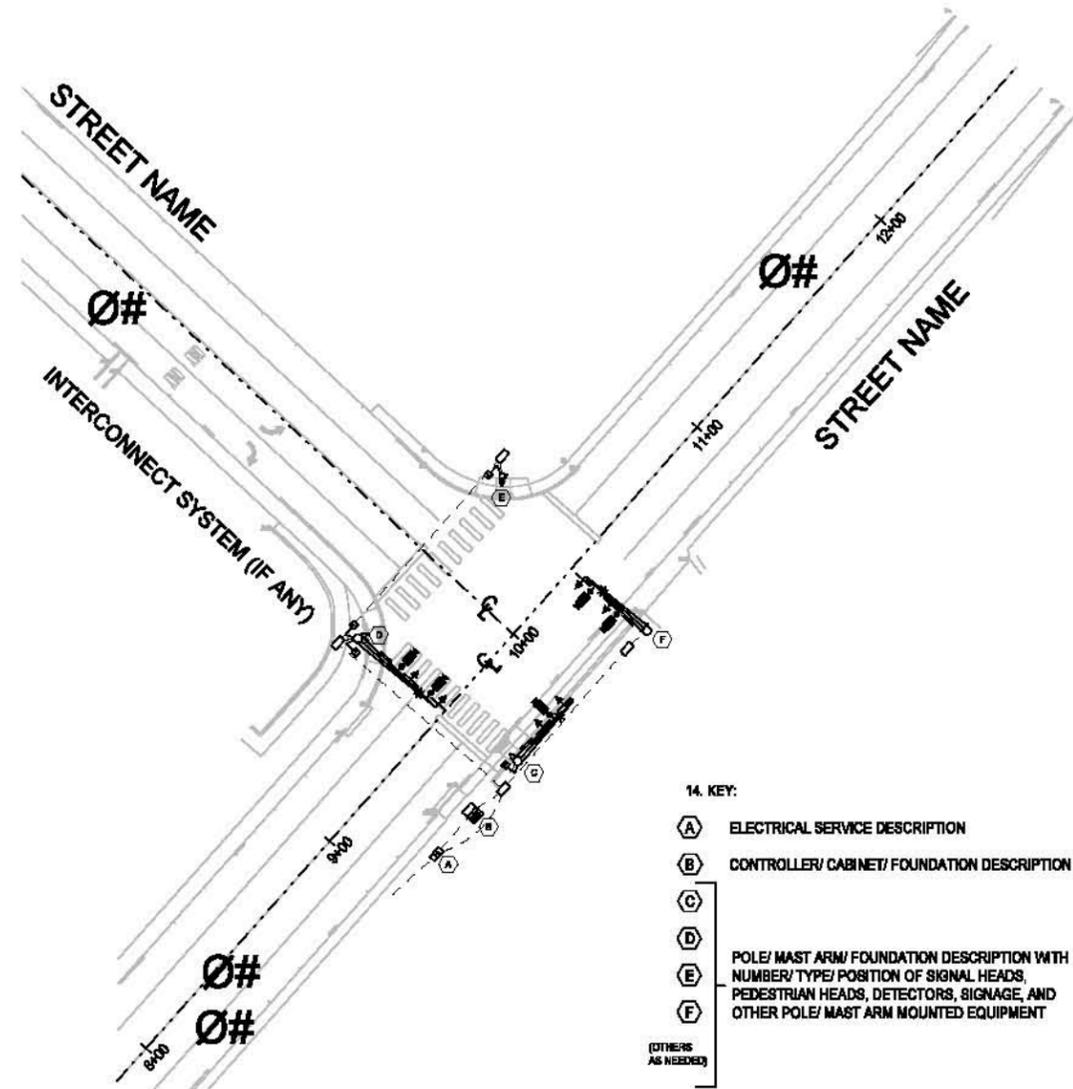
CONSTRUCTION NOTES:

- CONTRACTOR SHALL NOT BEGIN CONSTRUCTION WITHOUT WRITTEN AUTHORIZATION ISSUED BY THE CITY TRAFFIC SIGNAL ENGINEER (THE ENGINEER).
- CONTRACTOR SHALL FURNISH ALL INSURANCE DOCUMENTATION TO THE ENGINEER IN ACCORDANCE WITH SPECIAL SPECIFICATION ITEM 600 - TRAFFIC SIGNAL GENERAL CONDITIONS INSURANCE.
- CONTRACTOR SHALL ATTEND A PRE-CONSTRUCTION MEETING WITH THE ENGINEER PRIOR TO INITIATING ANY TRAFFIC SIGNAL RELATED WORK.
- CONTRACTOR SHALL CONTACT THE ENGINEER AT LEAST SEVEN (7) DAYS PRIOR TO BEGINNING ANY CONSTRUCTION. THE CITY WILL PROVIDE ALL ON-SITE INSPECTION OF CONSTRUCTION AND SHALL BE THE SOLE AUTHORITY TO DETERMINE ADEQUACY OF MATERIALS AND CONSTRUCTION.
- CONTRACTOR SHALL UNCOVER AND LOCATE ALL MARKED UNDERGROUND FACILITIES PRIOR TO EXCAVATING FOR DRILLED SHAFT FOUNDATIONS. UTILITIES SHOWN ARE BASED ON INFORMATION PROVIDED BY UTILITY AGENCIES AND VISUAL FIELD OBSERVATION. PROPERTY LINES SHOWN ARE APPROXIMATE, TAKEN FROM BEKAR APPRAISAL MAPS.
- CONTRACTOR SHALL PROVIDE RED-LINE MARKUPS OF CONSTRUCTION TO THE ENGINEER WITHIN SEVEN (7) WORKING DAYS OF PROJECT ACCEPTANCE.
- CONTRACTOR SHALL INSTALL TRAFFIC SIGNALS CENTERED OVER LANES WHEN POSSIBLE (MINIMUM 8' APART) OR AS DIRECTED BY THE ENGINEER.
- CONTRACTOR SHALL INSTALL SIGNAL PHASING/TIMING AND CHANNELIZATION AS DIRECTED BY THE ENGINEER.
- CONTRACTOR SHALL INSTALL ONE ADDITIONAL 2 INCH CONDUIT STUBBED OUT 2 FEET FROM EACH FOUNDATION AND CAPPED. FURNISHING AND INSTALLATION OF THIS CONDUIT SHALL BE SUBSIDIARY TO THE POLE FOUNDATION.
- ALL SIGNS MOUNTED ON TRAFFIC SIGNAL EQUIPMENT SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR AS SHOWN ON THE PLANS AND SHALL BE SUBSIDIARY TO ITEM 600 "TRAFFIC SIGNAL CONDITIONS".
- REMOVAL OF EXISTING SIGNS SHALL BE SUBSIDIARY TO ITEM 600 "TRAFFIC SIGNAL CONDITIONS".
- THE CONTRACTOR SHALL PROVIDE THE FOLLOWING EQUIPMENT FOR COMMUNICATION TO THE SIGNAL:

Part Number *	Description	Qty
Fixed Port Switches		
WS-C2955S-12	2955 12 TX w/Single Mode Uplinks	1
PWR-2955-AC=	AC to 24 V DC Din Rail Power Brick	1
STK-RACKMNT-2955=	19 in Rack mount kit for Catalyst 2955	1
Mobile Access Router		
C3230-24-49-K9	3230 bundle with (1) 2.4GHz WMIC + (1) 4.9GHz WMIC	1
MA-WC49-5X	Mars MA-WC49-5X 4.9 GHz 17 dBi 60 Degree Sector Antenna - Public Safety	1

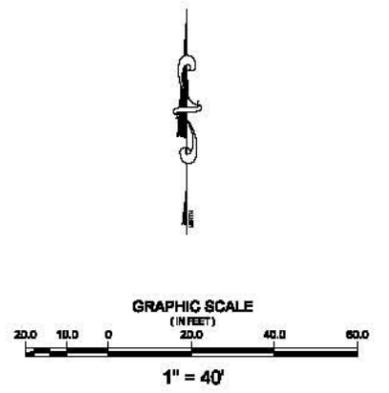
* All part numbers refer to Cisco products.

13. THE CONTRACTOR SHALL FURNISH AND INSTALL AN ENCLOSED PHOTOCCELL IN THE ELECTRICAL SERVICE TO POWER THE ILSN SIGNS. FURNISHING AND INSTALLATION OF THE PHOTOCCELL SHALL BE SUBSIDIARY TO ITEM 632.01 "ELECTRICAL SERVICE PEDESTAL".



14. KEY:
- (A) ELECTRICAL SERVICE DESCRIPTION
 - (B) CONTROLLER/ CABINET/ FOUNDATION DESCRIPTION
 - (C)
 - (D)
 - (E) POLE/ MAST ARM/ FOUNDATION DESCRIPTION WITH NUMBER/ TYPE/ POSITION OF SIGNAL HEADS, PEDESTRIAN HEADS, DETECTORS, SIGNAGE, AND OTHER POLE/ MAST ARM MOUNTED EQUIPMENT
 - (F)
- (OTHERS AS NEEDED)

LOCATIONS		
POLE	STATION	OFFSET
A		
B		
C		
D		
E		
F		



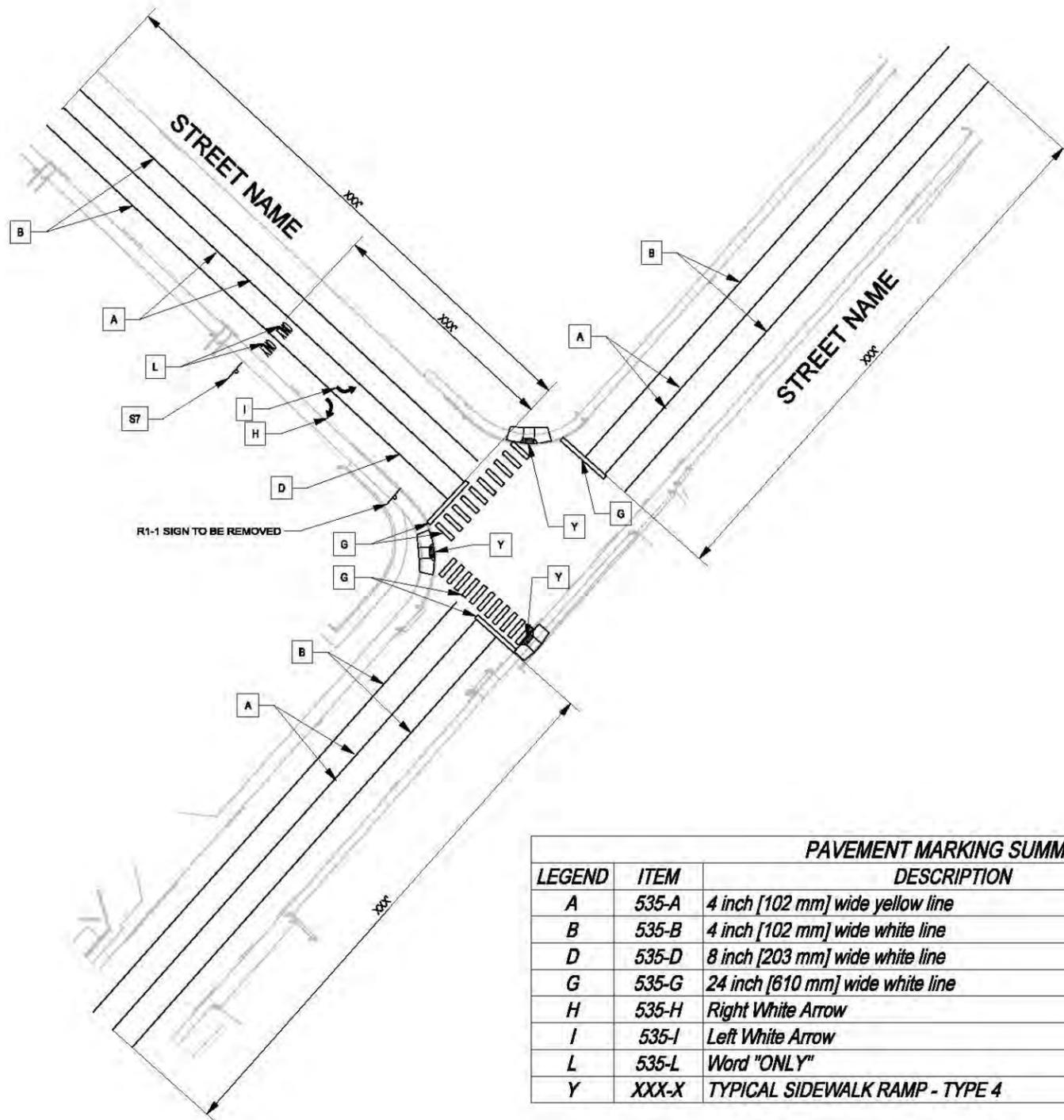
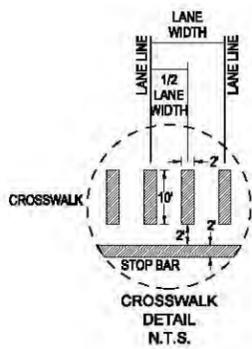
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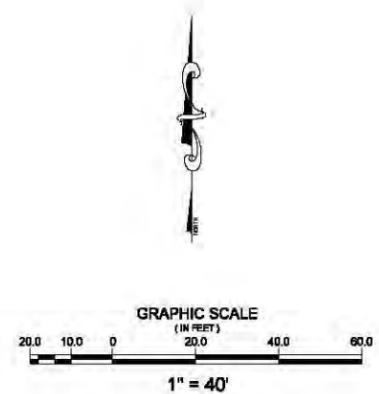
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IMPROVEMENTS MANAGEMENT SERVICES

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PAVEMENT MARKING SUMMARY				
LEGEND	ITEM	DESCRIPTION	UNIT	QUANTITY
A	535-A	4 inch [102 mm] wide yellow line	LF	
B	535-B	4 inch [102 mm] wide white line	LF	
D	535-D	8 inch [203 mm] wide white line	LF	
G	535-G	24 inch [610 mm] wide white line	LF	
H	535-H	Right White Arrow	EA	
I	535-I	Left White Arrow	EA	
L	535-L	Word "ONLY"	EA	
Y	XXX-X	TYPICAL SIDEWALK RAMP - TYPE 4	EA	



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SECTION 7.0

Roadway, Bicycle, and Pedestrian Design

Overview

As roadway designers, engineers strive to satisfy the needs of the driving public, while minimizing the impact of the roadway on the surrounding environment. Unique combinations of often conflicting requirements will result in special solutions. The guidance provided in this section is based on established practices conducted at local and state levels. It's intended to provide general guidance in administering, planning, and designing roadways in the City of San Antonio.

Roadway design typically encompasses all aspects of the project development process. Within the roadway design process, tasks associated with preliminary design conferences; data collection; coordination with stakeholders; execution of agreements; geometric design criteria; traffic data collection; ownership data; utility mapping and information; associated plans, studies, and reports; hydraulic data; and survey data must be researched and documented for successful project delivery. Roadway design must also incorporate bicycle and pedestrian criteria to appropriately address needs for all modes of travel (See **Complete Streets** on page 7-9).

Tasks

Following are tasks a design consultant typically undertakes to successfully design a roadway:

- conduct an Initial scope meeting (ISM);
- Discuss Complete Streets requirements;
- acquire all available topographic survey data, including aerial, field, and photogrammetric data;
- identify appropriate roadway classification and design speed;
- identify available or needed right-of-way for the intended facility usage;
- define geometric design criteria for roadway, bicycle lanes, and pedestrian components;
- develop typical sections;
- develop pavement designs, including geotechnical survey needs;
- consider drainage design in roadway design development;
- consider bridge and retaining wall needs;
- determine average daily traffic (ADT) and projected traffic volumes;
- determine intersection design considerations, including bus pad designs;
- determine access needs for adjacent properties;
- identify pedestrian considerations;
- determine bicycle design considerations;
- identify safety considerations in plan development (vehicle crash analysis);

- identify and coordinate environmental permits, issues, and commitments (EPIC) with COSA Environmental Management Division (EMD); and
- prepare cost estimates.

Preliminary Design Conference

The preliminary design conference—sometimes referred to as a design kickoff meeting—is a meeting of key individuals for the purpose of establishing fundamental aspects of a project. Before the conference, an agenda following the format of a design summary report (DSR) should be prepared and distributed to the COSA project manager and management staff, design consultant project manager, and design task leaders to document the criteria and decisions to be made regarding project development.

The minutes of this meeting should be documented, reduced to a Microsoft Word document, and distributed to all attendees. A copy of the minutes should be kept in the project files.

This meeting should include discussion of all design criteria to be used in roadway geometrics, based on roadway classification, traffic volumes, and design speed. Its purpose is to establish and agree on fundamental aspects, concepts, and preliminary design criteria of the project. Supporting documents constitute an understanding by COSA, TxDOT, and other local entities of the basic features of the project. See [Appendix 7–A](#).

Data Collection

Data collection for project development includes topographic survey, aerial mapping, record drawings of previous plans, related studies and reports, existing utility maps, property plats, traffic and accident data, FEMA maps, and drainage studies. Information in these various source materials can be valuable when determining an appropriate scope for the project. Adjustments during design and accommodations during construction can help avoid delays and promote successful completion of most projects.

Appropriate Design Criteria

All roadways within the city limits will be classified as principal arterial, minor arterial, collector, or local streets. The San Antonio–Bexar County Metropolitan Planning Organization (MPO) has identified all roadways that are eligible for federal funding and classified them accordingly. All other streets and roadways will be considered local streets, with improvement funding coming from the city’s allocation.

The American Association of State Highway and Transportation Officials (AASHTO) published [A Policy on Geometric Design of Highways and Streets](#). This manual is updated periodically and contains design considerations and criteria applicable to roadway design.

Design Characteristics

The following characteristics should be considered in optimizing roadway design controls for various roadway classifications:

- Vehicle Types — Each roadway should be evaluated to determine the type(s) of vehicles that could influence the design criteria most appropriate for the candidate project. The majority of vehicles that use roadways comprise passenger cars, buses, commercial vehicles, and recreational vehicles. The following characteristics should be known when determining design factors:
 - vehicle size;
 - turning radii;
 - driver performance; and
 - operating characteristics.
- Pedestrians — Each roadway should be evaluated for existing or potential pedestrian usage. Elements such as sidewalks, walking trails, shared use trails, and cross walks should be investigated for appropriate inclusion in roadway plans. Pedestrian facilities should consider aesthetics and enhancements to conform to or provide improvements to the surroundings of the project site. When pedestrian facilities are anticipated for a particular project, the pedestrian elements shall be designed to accommodate requirements associated with the Americans with Disabilities Act (ADA): [Revised Draft Guidelines for Accessible Public Rights-of-Way](#). The Texas Department of Licensing and Regulation (TDLR) also published [Architectural Barriers Texas Accessibility Standards](#) (TAS) for all facilities with public access. Where there is a code conflict between the ADA and TDLR standards, the ADA standards shall prevail. TDLR coordination is required during design and post construction. At the completion of design and final plans, the designer shall submit plans for review by TDLR or an approved TDLR accessibility consultant. After construction, the COSA will notify TDLR to request a final inspection and review of the pedestrian features that are complete and in operation. This should be done before the contractor is released.
- Design Criteria — The following items, listed in Table 1, along with desirable and minimum values, have specific criteria:
 - traffic volume;
 - design speed;
 - sight distance;
 - grades;
 - horizontal and vertical alignment;
 - cross slope;
 - superelevation;
 - number and width of lanes;
 - parking requirements; and
 - median design.

Table 1
Geometric Design Criteria for Urban Streets

Criteria	Roadway Classification	Desirable	Minimum
Design Speed (mph)	Local Collector Arterial	45	30
Minimum Horizontal Radius	All	Note 1	
Design Speed (mph)	All	45	30
Minimum Horizontal Radius	All	Note 1	
Maximum Gradient (%)	Arterial Collector Local	Note 2 Note 3 8%	0.4%
Maximum Algebraic Difference (%)	All	1%	
Stopping Sight Distance	All	Note 4	
Width of Travel Lane (ft)	Arterial Collector Local	12 12 12	11 10 10
Curb Parking Lane Width (ft)	Arterial Collector Local	12 10 9	10 7 7
Shoulder Width (Uncurbed)	All	Note 5	
Width of Speed Change Lanes (ft)	Arterial Collector Local	12 12 12	10 10 9
Offset to Face of Curb (ft)	All	2	1
Median Width (ft)	All	18	4
Border Width (ft)	Arterial Collector Local	12 11 10	8 8 5
Right-of-Way Width	All	Varies Note 6	
Clear Sidewalk Width (ft)	All	6	4
Bicycle Lane Width (ft)	All	8	5
Superelevation	All	Note 1	
Horizontal Clearance Width (Curbed)(ft)	All	3	1.5
Horizontal Clearance Width (Uncurbed)	All	10	
Vertical Clearance (ft)	All	16.5	14.5
Turning Radii	All	Note 7	

Notes:

Notes 1–5 below refer to exhibits in the AASHTO [Policy on Geometric Design of Highways and Streets](#) (2004), which also contains a more detailed explanation of each element in Table 1 above, to provide the designer with established practices. The *Policy* is supplemented by recent research.

1. Minimum horizontal radius depends on design speed and superelevation for specific roadways. Use Exhibits 3–15, 3–16, and 3–.
2. Maximum gradients for urban arterials can be found in Exhibit 7–10.
3. Maximum gradients for urban collectors can be found in Exhibit 6–8.
4. Stopping sight distance values can be found in Exhibits 3–1 and 3–2.
5. Shoulder width values can be found in Exhibit 6–5.

6. Right-of-way width is dependent upon roadway cross sectional elements and specific conditions related to the roadway.
7. Minimum turning radii should be selected based on anticipated vehicle usage for a specific roadway. Vehicle turning radii are included in AASHTO's publication, *A Policy on Geometric Design of Highways and Streets*. Commercially available computer programs that simulate turning movements are also available to assist in selecting appropriate radii for various roadways

Other factors that affect the design of roadway facilities include:

- drainage requirements (see section 4 of this manual);
- erosion control and storm water runoff;
- driveway and access issues;
- intersection design;
- bridge geometric considerations;
- vertical clearance;
- horizontal clearance to obstructions;
- right-of-way width;
- border widths;
- provisions for utilities (see section 5);
- railroad–roadway grade crossings;
- street and safety illumination;
- traffic-control devices;
- landscaping and design enhancements; and
- environmental issues and permits.

When developing roadway plans and details, the designer should give appropriate consideration of each item in the preceding list.

Drainage Design — Proper drainage requires the designer to consider design frequency inlet locations, sizes, and types when coordinating with roadway details. Drainage criteria become the basis for all drainage-related designs and details. However, roadway designs can conform to specific drainage improvements depending on the need. Likewise, drainage design can be influenced by roadway design restrictions.

Erosion Control and Storm Water Runoff — These considerations are important during design, construction, and post-construction to reduce loss of soils and sediment deposits into receiving waters. Best management practices (BMPs) for the city can be found in section 3.0 of this manual.

Driveways and Intersections — Access to roadways through driveways and intersections is an important consideration in the development of roadway plans. The roadway being designed can be influenced by driveway locations, grades, and size. Driveway design should consider the profile grade of the access area, penetration distance, if any, into private property, width, and prevailing vehicle usage when developing details. Typically, a

maximum grade of 14 percent will provide most vehicles with adequate ingress and egress to adjacent properties. If the driveway or intersection will experience a high number of vehicles with trailers attached, special consideration may need to be given at the intersecting grades (maximum algebraic difference) between the roadway and driveway to decrease a “dragging” effect, causing damage to the equipment.

Bridge Geometrics — In most cases, bridge geometrics should match the approach roadway regarding overall pavement width. Minimum structural loading capacity and clear roadway widths for new bridges and existing bridges to remain in place are shown in Tables 6–6 and 6–7, respectively, of AASHTO’s publication, *A Policy on Geometric Design of Highways and Streets*. A bridge is considered to be any structure, including supports, erected over a depression or an obstruction (e.g., water, a highway, or a railway), having a roadway or track for carrying traffic or other moving loads and having an opening measured along the center of the roadway of more than 20 feet between faces of abutments, spring lines of arches, or extreme ends of openings for multiples box culverts.

Horizontal Clearance and Border Widths — Roadside obstructions should be located at or near the right-of-way lines and outside of the sidewalks to accommodate safety and sight distance requirements. Horizontal clearance to obstructions for curbed roadways should be a minimum of 1.5 feet, but desirably 3 feet or greater. Border widths can depend upon available right-of-way. Sidewalks, storm drainage, retaining walls, traffic control devices, and utilities should be accommodated in these areas.

Utilities — Utilities can affect roadway design, as well as construction sequencing and scheduling. Utility coordination is addressed in section 4.0 of this manual. Communication between the city, utility owners, designer, and construction contractor provides the opportunity for appropriate decisions and direction when developing roadway plans. Following the utility coordination process will minimize problems and delays during project development.

Railroad Crossings — Early identification of rail crossings and coordination with railroad owners may be required during plan development. Railroad agreements that include details for crossing replacements, roadway typical section, and cost assignment should be executed as early as possible in plan development. In some cases, these agreements can take up to nine months to execute. Early communication between the city, railroad owners, and designers can reduce delay in beginning construction for roadways crossing rail facilities.

Illumination — Street and safety illumination requires coordination with CPS Energy. Selecting the appropriate design criteria for illumination in urban areas can depend on traffic volume, adjacent property uses, and the type of lighting desired. For most street projects, CPS Energy will provide appropriate lighting using overhead and underground electric facilities. In special cases, ornamental or aesthetic lighting may be desired for special projects. Coordination between the city, CPS Energy, and the designer should be accomplished as early in the plan development process as possible.

Traffic Control Devices — Signs, pavement markings, signals, intelligent traffic systems (ITS), and other traffic control devices are required to conform to the Texas [Manual on Uniform Traffic Control Devices](#) (MUTCD). In addition, the city has standard details available to the designer for use in plan preparation. Selection of proper traffic control devices provides effective messages to drivers that improve safety and efficiency.

Landscaping and Design Enhancements — Landscape and design enhancements are dependent upon the project type and, sometimes, the funding source. Plantings, architectural treatments, colors, art, etc., can enhance the roadway design to provide a finished product that users can enjoy. Along with beautification items, consideration for native plants, establishing and maintaining plants through irrigation, and impact of the vegetation at maturity to the roadway, in the form of sight distance, should be included in the development of plans. In some cases, properly placed vegetation can provide a buffer and delineate travel ways for the various forms of traffic that use the public rights-of-way, such as separation between motor vehicles and pedestrians and bicyclists. If feasible, Low Impact Development (LID) principles shall be applied to allow natural vegetation to be used as drainage design and stormwater management, as well as design amenity.

Retaining Walls — Retaining walls should be considered on projects to maximize useable right-of-way when attempting to fit urban features into a narrow corridor. Controlling grades, cross slopes, ADA requirements, and width restrictions for lanes and sidewalks provide opportunities to place various types of retaining walls. Conventional gravity walls, monolithic sidewalk/retaining wall alternatives, concrete block walls, mechanically stabilized earth walls, soil nail/anchor walls, and landscape walls all provide opportunities to overcome steep slopes and narrow rights-of-way if applied properly. When proposing retaining walls, consideration should be given to the surface finish, such as texturing, or surface treatment for easy cleaning that tends to deter graffiti placement and reduce maintenance effort.

Bicycle Accommodation — Accommodating bicycles is an important consideration for projects under development. All roadways, except those where cyclists are legally prohibited, should be designed and constructed under the assumption that they will be used by cyclists. Therefore, bicycles should be considered in all phases of transportation planning, new roadway design, roadway reconstruction, and capacity improvement and transit projects. The AASHTO [Guide for the Development of Bicycle Facilities](#) (1999) provides information on the development of facilities to enhance and encourage safe bicycle travel and guidance to help accommodate bicycle traffic in most riding environments.

Environmental Coordination — Environmental coordination must be done with the Environmental Management Division (EMD) and environmental activities associated with the project should be included in the design schedule. Depending on the history of the project site, environmental investigations can reveal common or very complex issues, time consuming delays, and mitigation related solutions to the proposed improvements. Close coordination between designers and city environmental scientists help monitor specific environmental issues and develop accurate and detailed studies and reports concurrently with roadway plans.

Environmental coordination and communication with the COSA Environmental Division is extremely important when it comes to addressing environmental issues in accordance with applicable federal, state, and local regulations and establishing the design schedule. Environmental assessments will be conducted to determine potential environmental impacts that could affect the proposed projects. Some assessments may require permitting, remediation strategies, additional environmental studies (i.e., archeological, cultural resources, endangered species, etc.), or other environmental monitoring or mitigation.

Plans, Specifications, and Estimates (PS&E) — This is the final product the design effort achieves. Application of the design criteria to the various roadways results in a set of construction plans and details. Plan set format, components, plan sheet examples, and details are described in more detail in section 9.0, CAD Standards, of this manual.

Specifications provide direction to the designer regarding the item description, measurement, and payment details. For the contractor, it specifies the construction methods, construction materials that must be used, and the basis of how the item should be bid. Quantities are developed based on each bid item as described in the specification. The city has developed [Standard Specifications for Public Works Construction](#) that are to be used for all capital improvement projects. Other sources of specifications include TxDOT's [Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges](#), and the San Antonio Water System (SAWS) [Construction and Materials Specifications](#), depending on the funding source of individual projects.

Construction cost estimates are developed by the designer based on final quantities, type of project, and nature of the overall scope of construction work. In addition to a total cost for the bid items, other items with costs associated include mobilization, force account items (signals, RR crossings, electrical, etc.), and contingency accounts (a fund intended to cover costs of items that have changed or were beyond the original scope). The COSA maintains a history of unit prices for various bid items taken from bid tabulation data for recent projects that have been let for construction. This should be used as the basis for cost estimates, with consideration given to project-specific conditions that can affect the individual unit prices.

Section 1.0 of this manual includes a defined process for plan development, including a standard design scope, milestone checklists, and review checklists that contract managers, project managers, design engineers, and reviewers can use in providing effective, successful project delivery for the city.

The use and application of checklists by the project manager and design personnel provides a guide for proper delivery of plan sets at the various stages or milestones during project development. The following checklists are intended to provide guidance to the preparer of plans and the project reviewers to achieve complete plan submittals and improve quality for the city. See [Appendix 7-B](#) for Preliminary Engineering Report, [Appendix 7-C](#) for 40% Design, [Appendix 7-D](#) for 70% Design, and [Appendix 7-E](#) for 95% Design.

Complete Streets

The City of San Antonio adopted a Complete Streets Policy on September 29, 2011. (http://www.sanantonio.gov/planning/regionalplanning/pdf/CS%20Policy_2011.09.15_v8.pdf) The Policy is applicable to all new construction and full reconstruction of City roadways. Complete Streets are defined as streets that accommodate the needs of all users (including differing ages and abilities) and all modes of travel (including vehicles, pedestrians, cyclists and transit users).

An important consideration for Complete Streets is that all streets are not the same (e.g. not all streets will have separate bike lanes). As roadway projects are scoped, an early task is to assess the adjacent neighborhood and land use context to identify opportunities for Complete Streets.

In some cases, maximizing the roadway for all user groups may generate design recommendations that differ from the minimum criteria for the typical roadway. For example, a collector street traveling through a business district may have a need for on street parking, a wider planting strip, and/or wider sidewalks.

Many of the components necessary to achieve Complete Streets are already included in this manual. The update is that all projects must be assessed to maximize the available right-of-way within the land use context to achieve Complete Streets and maximize the public investment in the community.

Complete Street References

Recent policy guides for multimodal travel and urban streets:

- 2010 ADA Standards for Accessible Design, US Department of Justice
- AASHTO Guide for the Planning, Design and Operation of Bicycle Facilities (Draft) February 2010
- Institute of Transportation Engineers (ITE) Urban Street Geometric Design Handbook 2008
- Transportation Research Board (TRB) Highway Capacity Manual (HCM) 2010
- San Antonio LID Guidelines, August 2011

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SECTION 8.0

Environmental Coordination / Permitting

Introduction

Environmental Coordination and Permitting are important elements when completing the design and implementation of a capital improvement project. As part of the planning and design process, the Environmental Management Division (EMD) works closely with the engineers to identify and address environmental challenges during the process. Effective communication between the engineers and EMD is key for the success of all capital improvement projects.

Permitting is one of the fundamental tools regulators used to protect human health, property, and the environment. Through permits city, county, state, and federal agencies specify and enforce many of the requirements that govern regulated facilities. In a sense, permits represent the “contract” establishing the relationship between a facility and its surrounding community.

Therefore, permits are of great importance and, as a result, can have significant influence on the final configuration of a project. It is in the interest of all project participants to find ways of drafting and implementing permits that achieve the greatest benefit possible, while minimizing both environmental impact and the cost of implementation.

This section of the *Design Guidance Manual* is intended to provide guidance to the design consultant and others involved in the design and construction of horizontal city projects. It is also intended to outline the environmental process and the roles and responsibilities of both EMD and design consultants.

Process

The environmental coordination process that will be used for capital improvement projects will be based on effective communication, followed by documentation that provides a basis for effective coordination and environmental study strategies. The following process outlines the role and responsibility of EMD during the design phases.

Initial scope meeting

Once the proposed project information and potential design layout are provided, EMD will conduct the necessary environmental studies to identify environmental challenges associated with the proposed project. EMD will conduct a Phase I Environmental Site Assessment (ESA) on the proposed project area. The purpose of the ESA is to identify known and potential recognized environmental conditions within or adjacent to the project limits. EMD will complete and provide the report to the design consultant and project manager by the 40 percent design review meeting.

EMD also conducts other environmental studies during this phase. EMD assesses cultural resources, natural resources, endangered species, vegetation, and other potential

environmental impacts. Specifically, EMD conducts a jurisdictional determination study, if necessary, and background studies for both historical and archeological during this phase. Results of these investigations will also be provided during the 40 percent design phase.

Additionally, if the plane of ordinary high water mark is established in the field, it is important that the design engineer surveys and incorporates this information into the 40 percent design plans. This information is needed to determine the acreage of impact within the jurisdictional area, and determine appropriate 404 permitting for this project.

40 Percent Design Phase

Once plans are received and reviewed, EMD determines whether additional studies are required based on the proposed street and utility alignments. Therefore, it's important that the design consultant provides clear utility layout and profiles for drainage, sanitary sewer, gas and water improvements. Generally this information will be reviewed, compared with the environmental studies completed, and assessed to determine whether the proposed project may be impacted by known environmental issues or potentially impact environmental resources. EMD will make this determination during this phase.

Upon approval of this design phase, EMD conducts the necessary studies to determine whether the project will be impacted by known environmental concerns or impact environmental resources. EMD will conduct a Phase II subsurface investigation along the project to determine if the project will be impacted by potential impacted media from known or suspect recognized environmental conditions. The investigation includes drilling and sampling of soil and ground water samples for potential impacts. Results of this investigation are generally completed by the beginning of the 70 percent design phase.

Other environmental surveys are also conducted once the design consultant has staked the proposed storm sewer outfall alignment. It is important to have this information, especially if right of way acquisition is known or anticipated. Archeological investigations are coordinated with Texas Historical Commission (THC) and the necessary permits are obtained prior to beginning this work. Findings and recommendations of this investigation are provided during the 70 percent design phase.

In the event design information or mitigation is required for 404 permitting purposes, EMD will work closely with the design consultant and project manager to obtain the necessary information to prepare the 404 permit application. EMD will consult with the design consultant on mitigation opportunities within the project and request their assistance to provide the necessary information to satisfy the USACOE requirements. EMD will complete and submit the 404 permit application to the USACOE if all the necessary information is provided by the design consultant.

70 Percent Design Phase

Once plans are received and reviewed, EMD will ensure that the design alignment is consistent with the 40 percent design plans, compare our investigative results with the

proposed improvements, and determine whether additional assessment for hazmat, cultural resources, water quality or other necessary environmental studies is required for obtaining additional information to complete the necessary environmental studies, permitting and special specifications.

Design consultant may need to work with EMD to finalize mitigation plans for Section 404 permitting or other environmental studies. Design consultant may need to provide additional design detail for studies that may still be required. EMD will notify design consultant on level of detail and information needed to continue and complete the environmental assessment and permitting processes.

EMD will begin preparing special specifications for plans and construction documents. EMD will also begin to draft the environmental permits, issues and commitment (EPIC) sheet based on the available design and environmental information. These documents will be completed after the submittal of the 95 percent design plans.

95 Percent Design Phase

Once plans are received and reviewed, EMD will verify that plans have not changed and confirm that EPIC, environmental permitting, special specifications, etc are still valid for incorporation into the construction plans and specifications. In the event that plans are different, additional environmental studies may be required. EMD will finalize and incorporate the necessary environmental requirements in the EPIC sheet after the submittal of the 95 percent design plans.

Design consultant may need to provide estimated soil quantities and figures for impacted media that will need to be managed during construction. Consultant may need to provide estimated construction schedules for environmental planning and budgeting purposes. Other assistance may require special notes in the plans to address other environmental impacts, such as Section 404 permitting, cultural resources, endangered species, storm water pollution prevention measures, Edwards Aquifer requirements, etc. EMD will verify that the information is completed and incorporated as part of the plans and specifications prior to construction advertisement.

Advertisement and Construction

Prior to construction advertisement, it is highly recommended that the design consultant contact the EMD representative to ensure all applicable plans and specifications have been incorporated into the final construction plans and specifications. Effective communication and coordination will minimize addendums during the construction advertisement phase.

Responsibilities

The responsibility for obtaining permits for city projects will normally be shared between the design consultant and EMD. The division of responsibility is typically based on the level of the agency that requires the permit. Federal permits, such as those required by the U.S. Environmental Protection Agency (USEPA), the U.S. Army Corps of Engineers

(USACE), and the Federal Highway Administration (FHWA) and other Federal permits, will usually be processed through the EMD. The design consultant will need to work closely with EMD to understand project requirements imposed by the federal permitting process. EMD will also coordinate environmental permits required by the Texas Commission on Environmental Quality (TCEQ), the Texas Historical Commission (THC), Texas Department of Transportation (TxDOT), and any other agency requiring permits associated with environmental activities.

There may be some projects where this division of responsibility is inappropriate. In these cases, the design consultant may have responsibilities that require federal or state permit acquisition. Close coordination with EMD is still required as the consultant must keep EMD informed of progress and, if issues develop, seek guidance from EMD as to how to proceed.

The design consultant will be responsible for coordinating and obtaining local permits for the project. These will typically include permits from the local district office of the Texas Department of Transportation, the Infrastructure Services Department of Bexar County, and other permits as may be required from the city.

Permitting Agencies

Permitting agencies are divided into four categories: federal, state, local, and private. The following is a brief synopsis of these groups and the particular agencies within each. This list is not intended to be exhaustive, but representative of permitting typically involved in a capital improvement project in San Antonio and the surrounding area.

Federal Regulatory/Permitting Agencies

U.S. Army Corps of Engineers

The USACE is responsible for regulating discharges of dredged or fill material into U.S. waters, as well as stream channelizations or modifications of water bodies. Its authorization is specified under the provisions of [Section 404 of the Clean Water Act](#). Individual permits must be applied for, and the resulting process can take considerable time, depending upon the complexity of the project. Nationwide permits are a type of general permit issued by the Chief of Engineers and are designed to regulate with little, if any, delay or paperwork certain activities having minimal impacts. An activity is authorized under an NWP only if that activity and the permittee satisfy all of the NWP's terms and conditions. Some nationwide permits may require pre-construction notification to the USACE based on the proposed activity and the level of disturbance. Mitigation efforts are typically required for all individual permits and some nationwide permits.

When necessary, the EMD will have the jurisdictional areas marked for survey and will coordinate the timing of the marking with the design consultant. It is the responsibility of the design consultant to conduct the actual survey and to display the jurisdictional areas on the design plans. It is necessary for the design consultant to keep this survey data on hand as the EMD will typically require the assistance of the design consultant in determining the exact acreage and/or linear feet of impacts to the jurisdictional areas.

Additionally, when developing a Section 404 permit application, the design consultant will be asked to provide the volume of fill within the jurisdictional area.

The EMD will be responsible for all permitting negotiations with the USACE and all other natural resources agencies associated with the Section 404 permit. The design consultant will be responsible for designing (with the guidance and assistance of the EMD) any necessary mitigation features and inputting them into the design plans.

Department of Defense

The Department of Defense (DOD) may be involved in projects adjacent to federal installations in the San Antonio area. Permits are not known to be required for this activity, but there may be a need to coordinate the facility design regarding drainage, utilities, traffic control, or other issues that could affect the operation of federal facilities. The design consultant shall be cognizant of the potential impact of construction and of certain design decisions around federal facilities and make inquiries during planning and design so permitting issues are addressed.

National Park Service

The National Park Service (NPS) administers the National Park Register of Historic Places Program. Projects that fall under Section 106 regulations, 36 CFR Part 800 (“Protection of Historic Properties”), of the [National Historic Preservation Act](#) (Section 106) must submit eligibility to the NPS, and the agency is the purview agency for the national register properties. Additionally, projects on lands owned by the National Park Service fall under Section 106, so there are regulatory procedures that must occur between the contractor, the NPS, the THC, and other interested parties. The design consultant, working with EMD, shall contact the NPS to request, document, and verify whether there are issues involving the NPS. Locally, this includes projects that may impact the San Antonio Missions National Historical Park.

State and Regional Permits

Texas Department of Transportation

The Texas Department of Transportation (TxDOT) requires that all projects located in or crossing TxDOT rights-of-way have permits. It is the design consultant’s responsibility to determine which areas of the project TxDOT governs and to coordinate to obtain the appropriate permits. Typically, TXDOT permits expire if construction activity is not initiated within six months, so careful timing of the application will be required. The design consultant shall submit 40 percent, 70 percent, and 95 percent plans to TxDOT for review and comment. The permit application shall be submitted to TxDOT during 70 percent review. Representatives from both the District’s Permit Office and the Area Engineer’s Office should be asked to attend all utility coordination meetings associated with projects involving a TXDOT interests and/or permits. In addition, TXDOT permit applicants are required to conduct environmental investigations within TXDOT rights-of-way. The design consultant must fully coordinate the needs of the work with TXDOT to ensure the project permit is obtained in an expeditious manner.

Within the TxDOT permitting, access permits to perform environmental investigations in TxDOT right-of-way also apply. In San Antonio, the local TxDOT office must be contacted. Depending on the project location, different requirements must be met before the investigation takes place.

Texas Historical Commission

The Texas Historical Commission is responsible for enforcing standards and regulations associated with the protection and study of historic properties that may be affected by federal activities. Also, they are responsible for laws and rules pertaining to the protection, landmark designation and study of historic properties on non-federal public lands in the state. They oversee compliance with the National Historic Preservation Act of 1966 as Amended (NHPA) (16 USC 470 et seq.); Protection of Historic Properties (26 CFR Part 800), National Environmental Policy Act of 1969, as Amended (NEPA) (42 USC 4321 et seq.), Native American Graves Protection and Repatriation Act (NAGPRA) (25 USC 3001 et seq. 43 CFR Part 10); Archaeological Resources Protection Act of 1979, as Amended (ARPA) (16 USC 470aa-mm); Curation of Federally owned and Administered Archeological Collections (36 CFR Part 79); Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation (48 FR 44716); National Register of Historic Places (36CFR Part 60); Certified Local Government Regulations (36 CFR 61.6). State Statutes and Rules include the Antiquities Code of Texas (Texas Natural Resource Code Title 9, Chapter 191); General Provisions Relating to Cemeteries (Texas Health and Safety Code, Chapter 711; also, Texas Administrative Code, Title 13, Part 2, Chapter 22; also Texas Penal code, Section 31.03 and Section 42.08; Historic Preservation by Counties (Texas Local Government Code, Chapter 318.

All projects must comply with the federal, state, and local laws, rules and regulations as outlined above as they are applicable. This includes projects involving federal funding, including grants or loans, or projects requiring federal permitting, licensing, or oversight require compliance with the NHPA. In addition, the City of San Antonio is a political subdivision of the State of Texas and must comply with the Antiquities Code of Texas.

Therefore, the design consultant must work with EMD to understand these requirements, so the provisions of these permits are incorporated into the design plans.

The EMD shall coordinate all federal, state, and local cultural resources compliance responsibilities with the respective federal, state, and local agency. If necessary, the design consultant may be asked to assist with the design of mitigation for historic structures.

Texas Commission on Environmental Quality

The Texas Commission on Environmental Quality (TCEQ) is responsible for administering the [Texas Pollutant Discharge Elimination System](#) (TPDES). For city projects, the San Antonio Water System (SAWS) is the authority designated to handle compliance with the TPDES permit. The design consultant shall be responsible for preparing and submitting a Storm Water Pollution Prevention Plan (SW3P) to the City

for review and approval. The design consultant will also be responsible to ensure that the contractor's best management practices adhere to the approved SW3P plan and permit requirements. Information on the application for a TPDES permit can be found on the [TCEQ website](#).

The TCEQ also regulates construction activities over the Edwards Aquifer. Rules regarding the Edwards Aquifer can be found in Texas Administrative Code [Chapter 213](#). These rules will require the development of a water pollution abatement plan (WPAP) in the event that elements of the project would potentially affect, or directly affect the Edwards Aquifer. It will be the responsibility of the design consultant to develop the WPAP, obtain acceptance by the TCEQ, and ensure that the contractor is in compliance with the approved WPAP.

Texas Department of Licensing and Regulation

The Texas [Architectural Barriers Law](#) was first adopted by the state legislature in 1969. The [Architectural Barriers Texas Accessibility Standards](#) (TAS) were adopted in 1993 by the Texas Department of Licensing and Regulation (TDLR) as a result of amendments to the Act in 1991. Compliance with the Architectural Barriers Law and TAS is separate from compliance with the Americans with Disabilities Act (ADA) and the [ADA Accessibility Guidelines](#) (ADAAG).

The federal government enforces ADA and the Rehabilitation Act of 1973. TDLR enforces the Texas Architectural Barriers Law. COSA has adopted the Texas Accessibility Standards as the design standard for city projects.

The design consultant shall assure that the requirements of TDLR are included in the project, including application for review by TDLR or their designee, requisite approval of the construction plans prior to construction, and approval coordination prior to support project close out. If there is a conflict between the TDLR design standards and ADA design standards, the ADA design standards shall prevail.

Texas Department of State Health Services

The Texas Department of State Health Services (TDSHS) administers the [National Emissions Standards for Hazardous Air Pollutants](#) (NESHAP) program. The guidelines of this program will apply to city projects that include at least 260 linear feet or 35 cubic feet or 160 square feet of asbestos disturbance. NESHAP applies when asbestos cement (AC) pipe becomes or will become "regulated asbestos-containing material" (RACM). This means that if at least 260 linear feet of AC pipe has become crushed, crumbled, or pulverized, then the project is subject to NESHAP. If the TDSHS's limit of 260 linear feet is exceeded, the contractor is responsible for the TDSHS administrative fee. The consultant or its representative shall be responsible for submitting the TDSHS 10-day notification with the proper application fee, with copies of the documentation being sent to SAWS and to the city.

Local Permits

Bexar County

Bexar County requires permits for all utilities placed in or crossing their right-of-ways. It shall be the design consultant's responsibility to determine which areas of the project fall within Bexar County right-of-ways and to obtain the appropriate permits.

City of San Antonio

Street Cut Permit

The City of San Antonio Public Works Department is responsible for permitting construction within the city limits except for interstate and state highways. No street cut permit is required for a city-initiated project. Non-city projects require permits.

City Right-of-Way Use Permits

These types of permits are required when modifications are needed to existing facilities within the right-of-way or when the development of the project might affect the flow of traffic. For a geotechnical drilling or an environmental project, the consultant is responsible for obtaining this permit before field activities begin. This permit is issued by the Public Works Department, Right-of-Way Management Division, and normally includes payment of a fee. More information regarding right-of-way use permits can be found at <http://www.sanantonio.gov/publicworks/row/index.asp>. Municipally owned utilities, such as SAWS and CPS Energy, require only notification.

Floodplain Development Permit

The design consultant is responsible for initiating the necessary applications and documentation to obtain a floodplain development permit during design. Whenever a project is within a 100-year floodplain zone, a floodplain development permit application must be submitted to the COSA Storm Water Division. The city is the issuing agency for all floodplain permits. The applying entity must contact the Storm Water Division office prior to the 95% submittal phase for submittal requirements.

Tree Removal

The design consultant should coordinate with the city arborist on city projects in order to determine whether permits will be required to address tree issues associated with the work. If needed, this permit is to be acquired and is to be maintained onsite by the construction contractor.

If trees will be removed or trimmed during the construction of the project, a tree survey with measurement of tree size must be performed and submitted. The design consultant may be required to assess the impact of tree removal. Tree replacement may be required to mitigate the impact of removal should there be trees that conflict with some of the projects primary elements. All removals or trimming must be completed prior to construction.

Historic Design and Review Commission

The [Historic Design and Review Commission](#) consists of fifteen members who reside in the City of San Antonio and are appointed by the city council. They review all projects related to exterior changes to properties that are designated as Historic as either an individual landmark or as part of a historic district, located within one of the six River Improvement Overlay (RIO) districts (including the Riverwalk), located within the Viewshed Protection district, or that are publicly-owned (i.e. libraries, parks, fire stations, etc).

The commission serves to assist in an advisory capacity to the City of San Antonio Directors of Planning, Parks and Recreation, Building Inspections, Code Compliance, Public Works, Arts and Cultural Affairs, and other appropriate head of municipal departments, in accordance with Section 49 of the City Charter, and the to the city manager.

For new construction projects, and/or alteration, restoration and rehabilitation of structures within historic districts, and/or river improvement overlay districts (RIO), historic landmarks, and projects on public property or right-of-way, a permit is required. The design consultant or city's project manager must submit an application to the Historic Design and Review Commission (HDRC) for project review. The HDRC must approve the application prior to the project advertisement. Prior to the start or continuance of any activities that would disturb any previously identified archeological site within the city, including either a designated or inventoried site, a study of the effect of the proposed activity on the site must be performed by a Professional Archeologist. Unidentified archeological sites will, upon discovery, be treated as inventoried archeological sites and will be reviewed by the City's Historic Preservation Officer.

Private Permits

Union Pacific Railroad

The Union Pacific Railroad (UPRR) owns most railroad rights-of-way in the city. UPRR regulates the method for utilities and roadways to encroach upon and cross Railroad property. The design consultant shall become familiar with the permitting requirements of the UPRR and, as early in the project as possible, contact UPRR to ensure the design satisfies all railroad concerns and requirements.

Prior to entering the railroad right-of-way to conduct a survey, a permit to be on railroad property must be received. Applications are available at <http://www.uprr.com/reus/attachments/group/rpermit.pdf>. It shall be the design consultant's responsibility to obtain all appropriate permits from UPRR. Insurance provisions regarding access onto railroad property are the responsibility of each permit applicant.

Right of Entry onto Private Property

Whenever access onto private property is required for any project purpose, the design consultant shall not enter that property without the written permission of the property

owner. There are exceptions to this direction when provided for by law and by prior agreement, such as with certain types of prior easements. The design consultant and all other permit task applicants are required to abide by and respect the property rights of the citizens of the San Antonio area. Direction regarding the design consultant’s role in obtaining right of entry (ROE) for access shall come from the city. Communication with the public about project issues shall be referred back to the city’s designated representative.

Permitting Contacts

[Appendix 8-A](#) contains a list of agency contacts for the permits discussed in this section.

Environmental Checklist

The following checklist will assist the consultant in the submittal process for each design phase. This list corresponds to the environmental processes and responsibilities outlined in the Environmental Process section.

Designer’s Environmental Permitting Coordination Scope and Check List		
Design Submittal (40%)		Completed
1	Confirm Phase I Environmental Site Assessment has been completed by EMD	
2	Confirm Jurisdictional Determination has been completed by EMD	
3	Ensure that the Ordinary High Water Mark has been surveyed and is incorporated into the design plans.	
4	Ensure appropriate design information has been provided for the necessary environmental studies, such as cultural resources, endangered species, etc.	
5	Ensure the proposed drainage outfall alignment has been staked out in the field for additional environmental studies	
Design Submittal (70%)		
1	Confirm Phase II Environmental Site Assessment has been completed by EMD	
2	Confirm Karst Survey has been completed by the EMD	
3	Confirm the Cultural Resources Surveys have been completed by the EMD	
4	Incorporate any environmental information provided by the EMD into the design plans (i.e. mitigation features, environmental areas of concern, etc)	
5	Check permitting status	
6	Provide design detail information that may be required to complete environmental processes and permitting.	
Submittal (95%)		
1	Finalize all environmental coordination and provide necessary design information to complete special specifications	
2	Check permitting status	
3	Incorporate EPIC Sheet provided by EMD	

4	Verify SWPPP specifications are completed accurately	
5	Incorporate special specifications	
Bid Set Submittal		
1	Provide complete package of environmental special specifications, environmental permitting, special notes, and EPIC sheet for EMD review	
2	Verify that all environmental information has been incorporated	
3	EMD will notify consultant that all pertinent environmental information has been completed and incorporated into bid specifications.	
Construction Phase and Record Drawing Submittal		
1	Update project drawings to reflect updates to locations of best management practices provided by the EMD	

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SECTION 9.0

CAD Standards

Introduction

This chapter presents computer aided drafting (CAD) standards. Conforming to these instructions is essential to produce a final document consistent in behavior, appearance, and content.

Plan Set Requirements

This section will address the required informative elements for the various plan sheets associated with a standard project. It will also cover the CAD-related standards and minimum requirements for each type of plan sheet.

All plan sheets will be MicroStation (V7 or later) format.

All plan sheets will be on 11" x 17" sized sheets (figure 9-1).

All project plan sheets will contain the following:

- A title block in the bottom, right corner of the sheet with the name of the project, or reference to the project as designated by the City of San Antonio (figure 9-2).
- The name of the design firm(s).
- Any associated Federal Project Designation, state or local information, and sheet number in title block.
- Sheet Title, which directly corresponds to the Index, with a collective sheet reference ("Sheet x of xx") per section.
- An Engineer's or Land Surveyor seal, interim or final as related to submittal, for all sheets with influence (design, modification of standard, etc.) of a licensed Professional Engineer or Registered Professional Land Surveyor.
- A note designating submittal by percent complete or milestone.
- Text adhering to minimum scaling standards.

All plan sheets showing a planimetric view of the project, or portion of the project, will require an element designating the north direction, and the sheet should be to a scale. If no scale is designated, a note must state as such. Scale should be determined by the size of the project to minimize the overall number of sheets, while still providing a clear, concise view. Preferred scale of plan views is 1" = 40'. Variances to the preferred standard may occur, but only upon approval by the city project manager.

All plan sheets will be to scale (figure 9-3).

Plans will be submitted in a hard copy and portable document format (.pdf) and Microstation V7 or later (.dgn) at every submittal.

All plan sheets will contain a page number for the overall plan set.

The following are sheet types comprising a typical set of plans. The order of these sheets is important and each project requiring drawings will be assembled in the order presented below in Table 1. Not all sheet types are applicable to every project but should be used when necessary.

Table 1
Standard Order of Plan Sheets

Item No.	Plan Sheet Description
1	City Title Block
2	Index of Sheets
3	Project Layout/Control Points
4	Typical Sections
5	General Notes
6	Estimated Quantities Sheet
7	Traffic Control Plan
8	Roadway Plans
9	Drainage Plans
10	Bridge Layouts
11	Storm Water Pollution Prevention Plan
12	Landscaping Plan
13	Traffic Items
14	Joint-bid Utility Plans

Title Sheet

LAM Title Sheet

Information required on LAM (local area management) title sheets (figure 9–4):

- the City of San Antonio and TxDOT logos;
- project name, limits, length, and layman’s description;
- a location map with the limits of the project clearly defined with major street or highway names/designations;
- signature blocks for all relevant personnel;
- names/logos of each design firm responsible for plans;
- engineer’s seal of project manager;
- TDLR number (if required);
- fields for final plans letting date, contractor begin date, accepted date, final contract cost, and contractor completed;

Final plans statement note with signature block.

FIGURE 9-1
PAGE 9-3

CONSULTANT NAME			
<small>STREET NUMBER AND ADDRESS</small>			
<small>CITY</small>		<small>STATE</small>	<small>ZIP CODE</small>
<small>TELEPHONE NUMBER</small>	<small>FAX NUMBER</small>	<small>INTERNET ADDRESS</small>	
CITY OF SAN ANTONIO			
<small>CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT</small>			
<small>PROJECT TITLE</small>			
SHEET TITLE			
<small>SHEET SUBTITLE</small>			
<small>% SUBMITTAL</small>	<small>PROJECT NO.</small>	<small>DATE</small>	
<small>DRWN. BY:</small>	<small>DSGN. BY:</small>	<small>CHKD. BY:</small>	<small>SHEET NO. OF</small>

EXAMPLE TITLE BLOCKS

CONSULTANT NAME			
STREET NUMBER AND ADDRESS			
CITY	STATE	ZIP CODE	INTERNET ADDRESS
TELEPHONE NUMBER	FAX NUMBER		
CITY OF SAN ANTONIO			
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT			
PROJECT TITLE			
GENERAL NOTES			
GENERAL NOTES, TREE NOTES & ACCESSIBILITY REQUIREMENTS			
% SUBMITTAL	PROJECT NO.:	DATE:	
DRWN. BY:	DSGN. BY:	CHKD. BY:	SHEET NO.: OF

CoSA (CIMS) PROJECT

(CS) CLARK AVENUE

TEXT BLOCK

SHEET OF

CITY OF SAN ANTONIO
DEPARTMENT OF CAPITAL
IMPROVEMENTS MANAGEMENT SERVICES



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CONSULTANT LOGO

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.	
6	STP 99(791)MM	#	
STATE	DIST.	COUNTY	
TX	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
0915	12	354	CLARK AVE.

LAM PROJECT

Figure 9-2

EXAMPLE NORTH ARROW AND SCALE:

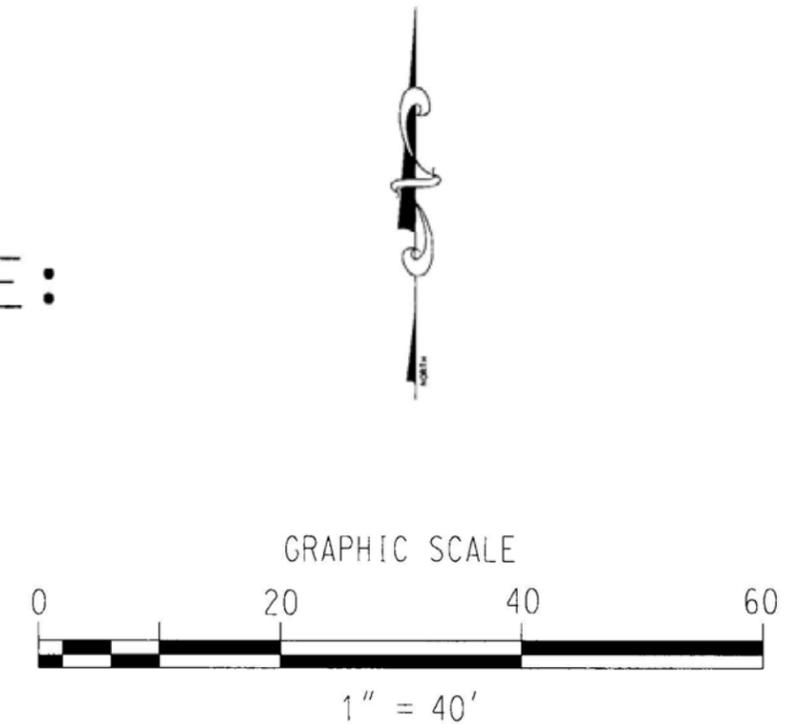


Figure 9-3

INDEX OF SHEETS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	SUPPLEMENTAL INDEX

(NOTE: FOR ALL OTHER SHEETS SEE SUPPLEMENTAL INDEX)

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION



CITY OF SAN ANTONIO
DEPARTMENT OF CAPITAL IMPROVEMENTS MANAGEMENT SERVICES

PROJECT NO.	SECTION OF PROJECT NO.	SHEET NO.
6		1
STATE	SECTION	DATE
TX	SAI	01/20/17
CDL	SECT.	JOB
000	17	100000000

CLASSIFICATION:
DESIGN SPEED:
AVERAGE DAILY TRAFFIC:
AREA OF DISTURBED SOIL:

PROJECT NAME

FINAL PLANS

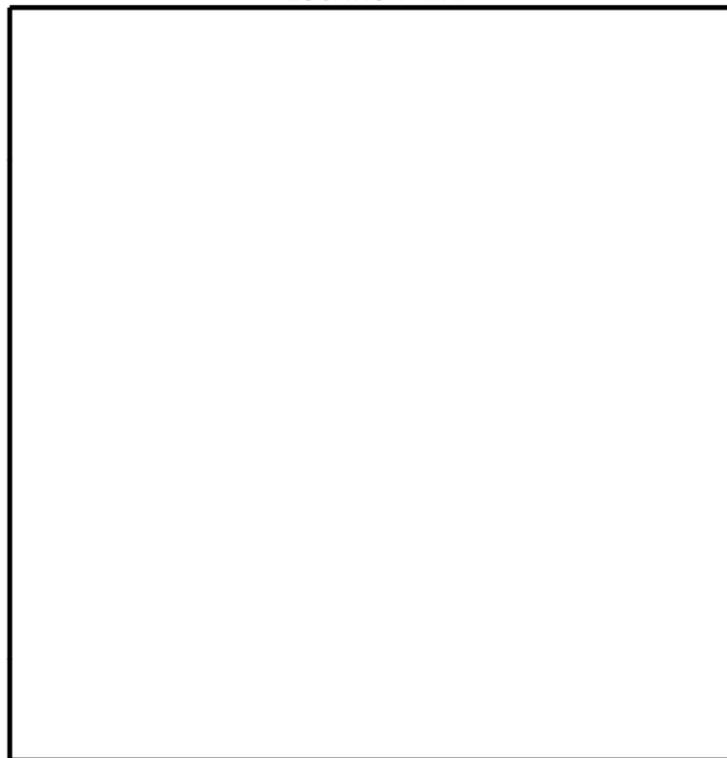
PROJECT NO.:
CONTROL NO.:
C.S.:
LIMITS:
PROJECT LENGTH: MILES

LETTING DATE: _____
DATE CONTRACTOR BEGAN WORK: _____
DATE WORK ACCEPTED: _____
FINAL CONTRACT COST: \$ _____
CONTRACTOR: _____

PLANS PREPARED BY:



LOCATION MAP

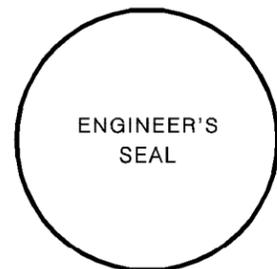


EXCEPTIONS:
EQUATIONS:
RAILROAD CROSSING:

SCALE:

"TDLR INSPECTION REQUIRED"
"TDLR NO.: _____"

FIGURE 9-4
PAGE 9-5



The seal appearing on this document was authorized by

Engineer's Name
P.E. #
Date

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, JUNE 1, 2004 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRE CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273).

CITY OF SAN ANTONIO			
RECOMMENDED FOR LETTING:	<input type="text"/>	APPROVED FOR LETTING:	<input type="text"/>
<input type="text"/>		<input type="text"/>	
ASSISTANT CITY ENGINEER		CITY ENGINEER / DIRECTOR CAPITAL IMPROVEMENTS MANAGEMENT SERVICES	
TEXAS DEPARTMENT OF TRANSPORTATION			
SUBMITTED FOR LETTING:	<input type="text"/>	APPROVED FOR LETTING:	<input type="text"/>
<input type="text"/>		<input type="text"/>	
DISTRICT DESIGN ENGINEER		DIRECTOR, TRAFFIC OPERATIONS DIVISION	
RECOMMENDED FOR LETTING:	<input type="text"/>	APPROVED FOR LETTING:	<input type="text"/>
<input type="text"/>		<input type="text"/>	
DISTRICT ENGINEER		DIRECTOR, DESIGN DIVISION	

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City Project Title Sheet

Information required on city project title sheets (figure 9–5):

- the City of San Antonio logo;
- project name;
- a location map with the limits of the project clearly defined with major street or highway names/designations;
- names/logos of each design firm responsible for plans;

Index

The index will list each section of plan sheets with page numbers (figure 9–6).

Project Layout and Survey Control Sheets

The project layout will contain the following information:

- scaled plan view(s), based on project size, project alignment(s), ROW, existing features and proposed improvement features;
- beginning and ending limits of project with any areas of incidental work;
- control points to be used for the project during construction;
- benchmarks and description of their location, and
- Geometric data with horizontal and vertical alignment data;

Typical Sections: Existing and Proposed

Typical section sheets will be scaled at either 1" = 10' or 1" = 20' (figure 9–7). Provide vertical scale if used.

The existing typical section sheets will show the following:

- existing lane widths;
- ROW widths;
- cross slopes;
- existing pavement section (top and bottom of pavement, bottom of base, bottom of prepared subgrade);
- existing curb;
- sidewalk and other cross sectional elements;
- centerline location;
- traffic flow arrows; and
- stationing for each condition.

The proposed typical sections sheets will show:

- proposed lane widths;
- border widths;
- ROW widths;
- cross slopes;
- pavement section (top and bottom of pavement, bottom of base, bottom of prepared subgrade);

- curb;
- sidewalk;
- other cross sectional elements;
- baseline location;
- traffic flow arrow;
- stationing for each condition; and
- proposed subsurface utility locations.

General Notes

The general notes shall contain all specific instructions, specifications, and details for the project (figure 9–8), including notes for joint-bid utilities or a referral to those notes in plans. Consultant will use City’s general notes and will not modify without project manager’s consent. If modifications or additions are required, they must be included in a supplemental general notes sheet.

Estimated Quantities

The consultant shall include an estimated quantities sheet (figure 9-8a) as part of the construction plans for each submittal. This sheet shall include all bid items, bid item descriptions, units, a quantity breakdown per sheet, and total quantities.

Data should be pasted into sheet files as “linked” documents, never “embedded.” Linked refers to extraction of data from other programs, such as Microsoft Word or Excel, for use in CAD files for associated item sheet and project totals.

No quantity boxes (Q-Box) are required at each plan and profile sheet.

Summary Sheet

A driveway summary sheet will be standard for COSA projects (figure 9-8b). However, LAM projects will require the following summary sheets: grading, earthwork, traffic control plan (TCP), storm water pollution prevention plan (SW3P), landscape, driveway, drainage, signing and pavement markings, summary of small signs, traffic signals, joint-bid utilities, and tree summary.

Summary sheets will contain the following information:

- name designating type of summary;
- a table format for the item numbers, descriptions, units, and sheet totals in columns corresponding to the associated plan sheets in rows;
- project totals for each item; and
- any additional notes required for items or exceptions for the contractor below the table(s).

Construction Phasing Sheet or Traffic Control Plan Sheets

Typically, these sheets will be at 1" = 20' or 1" = 40' and contain information regarding the following:

- sequence of work narrative, to include general construction phasing;

- traffic control and advanced warning devices;
- detour layouts;
- traffic control plan typical sections;
- temporary signal layouts; and
- traffic control plan phasing layouts.

The general construction phasing sheet(s) will contain a scaled plan view(s) of the project with a clearly defined area of construction, alignment(s), ROW, existing features, and proposed improvement features to be built during phase.

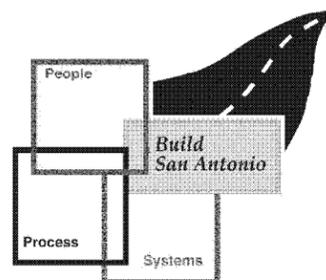
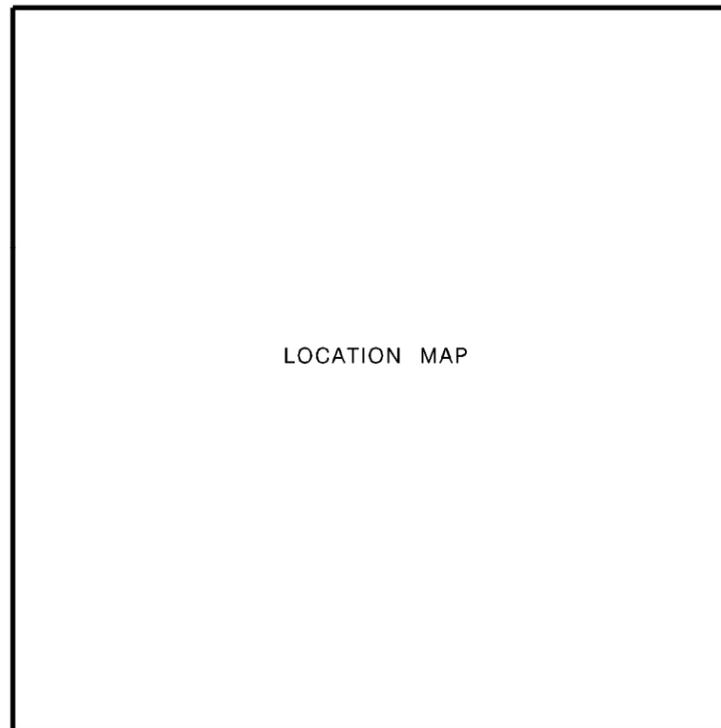
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CITY OF SAN ANTONIO

DEPARTMENT OF
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES

PROJECT NAME



OUR MISSION: TOGETHER, DEDICATED TO OUR COMMUNITY... BUILDING A GREAT SAN ANTONIO

INDEX OF SHEETS:

SHEET NO. GENERAL

- 1 CITY TITLE BLOCK
- 2 INDEX OF SHEETS
- 3-4 PROJECT LAYOUT / CONTROL POINTS
- 5-6 TYPICAL SECTIONS
- 7-8 GENERAL NOTES
- 9 ESTIMATED QUANTITIES SHEET

SHEET NO. TRAFFIC CONTROL PLAN

- 10 SEQUENCE OF WORK NARRATIVE
- 11 CONSTRUCTION PHASING PLAN
- 12 TRAFFIC CONTROL PLAN TYPICAL SECTIONS
- 12a TEMPORARY TRAFFIC SIGNALS
- 13-19 TCP LAYOUTS
- 20-23 DETOUR LAYOUTS
- 24-29 TRAFFIC CONTROL STANDARD DETAILS (AS REQUIRED)

SHEET NO. ROADWAY PLANS

- 30 UTILITY BASE MAP
- 31-53 PLAN & PROFILE SHEETS
- 54-57 INTERSECTION LAYOUTS
- 58-60 DRIVEWAY SUMMARY
- 61-64 MISCELLANEOUS ROADWAY DETAILS
- 65-74 STREET CROSS SECTIONS

SHEET NO. DRAINAGE PLANS

- 75 DRAINAGE AREA MAP
- 76-78 INTERIOR DRAINAGE AREA MAPS
- 79-81 HYDRAULIC COMPUTATIONS
- 82-90 DRAINAGE PLAN AND PROFILE
- 91-93 INLET CROSS SECTIONS
- 94-102 DRAINAGE CROSS SECTIONS
- 103-105 MISC DRAINAGE DETAILS

SHEET NO. SWPPP & ENVIRONMENTAL PLAN

- 106-110 STORMWATER POLLUTION PREVENTION PLAN LAYOUT
- 111 STORMWATER POLLUTION PREVENTION PLAN NARRATIVE
- 112-113 ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC)

SHEET NO. LANDSCAPING PLAN

- 114 TREE SURVEY LIST
- 115 TREE PRESERVATION LIST
- 116-117 TREE PROTECTION DETAILS
- 118 LANDSCAPE LAYOUT

SHEET NO. TRAFFIC ITEMS

- 119-121 TRAFFIC SIGNAL LAYOUTS
- 122-124 WIRING LAYOUTS
- 125-127 SIGNING AND PAVEMENT MARKING LAYOUTS
- 128-130 MISCELLANEOUS TRAFFIC AND SIGN DETAILS

SHEET NO. SAWS WATER AND SANITARY SEWER PLANS

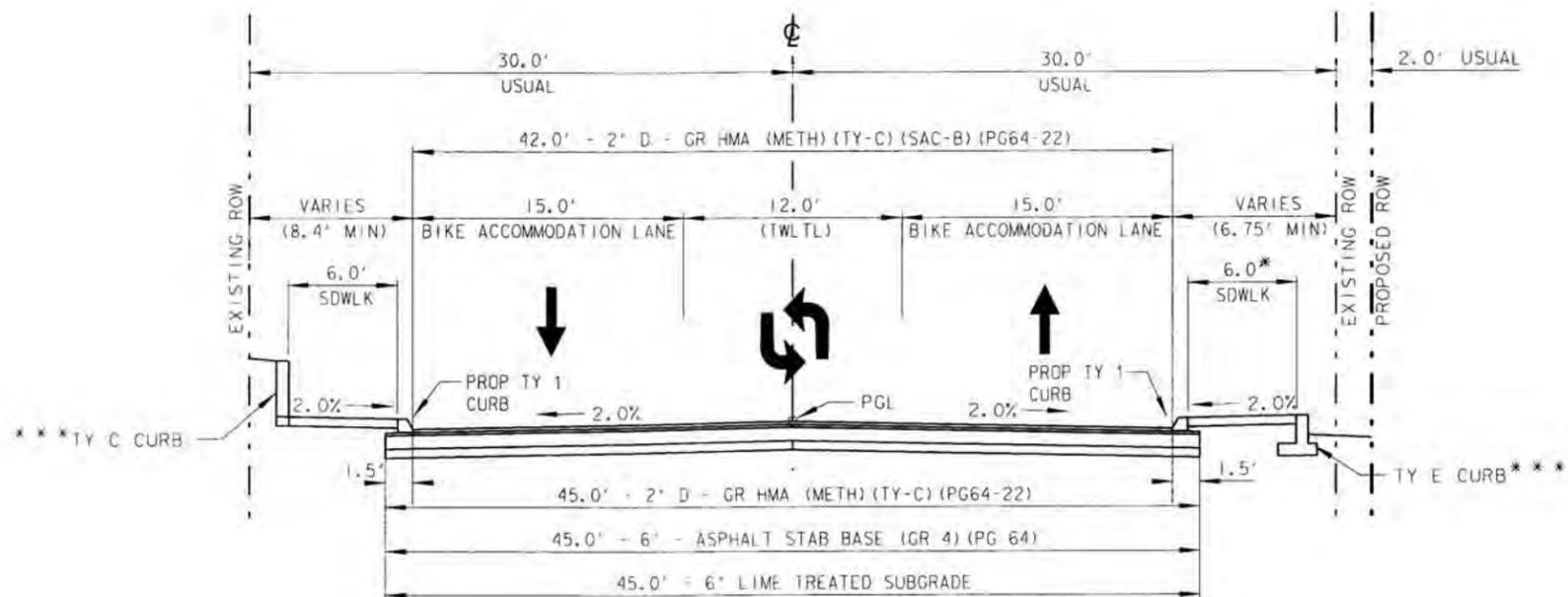
- 131 TITLE SHEET WATER PLANS
- 132 GENERAL NOTES
- 133 WATER SUMMARY SHEET
- 134 OVERALL WATER LAYOUT
- 135-142 WATER PLAN SHEETS
- 143-147 MISCELLANEOUS WATER DETAILS
- 148 TITLE SHEET SANITARY SEWER
- 149-150 GENERAL NOTES
- 151 SEWER SUMMARY
- 152 OVERALL SEWER LAYOUT
- 153-159 SANITARY SEWER PLAN/PROFILES
- 160-162 SANITARY SEWER DETAILS

SHEET NO. CPS GAS LINE PLANS

- 163 GAS LINE GENERAL NOTES
- 164 GAS LINE DETAILS/QUANTITIES
- 165-173 GAS LINE LAYOUTS

Figure 9-6

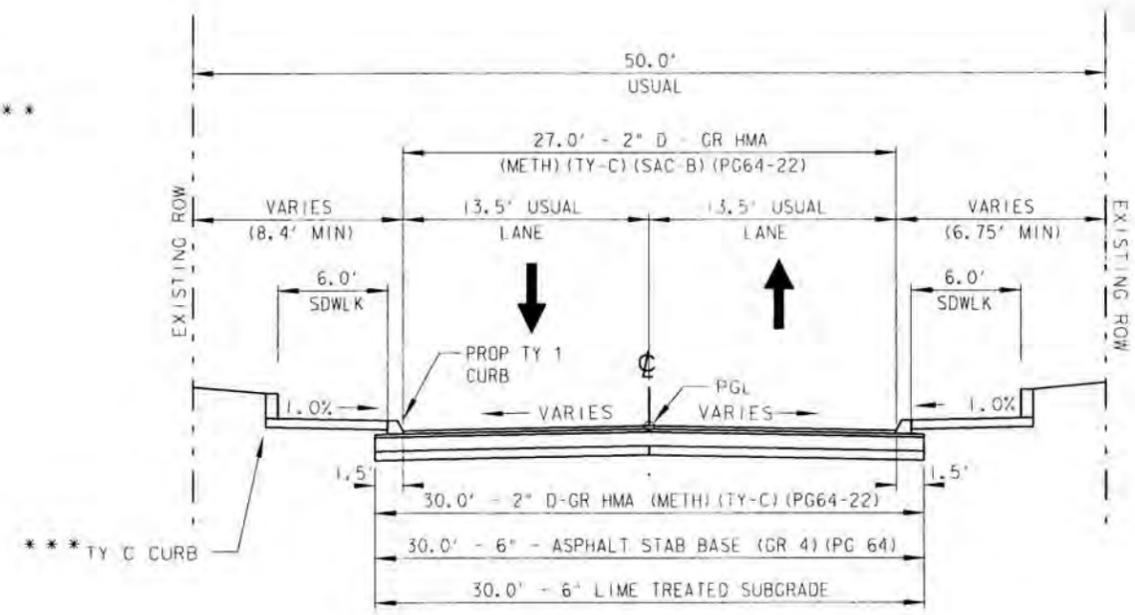
CONSULTANT NAME			
<small>STREET NUMBER AND ADDRESS</small>			
<small>CITY</small>		<small>STATE ZIP CODE</small>	
<small>TELEPHONE NUMBER</small>	<small>FAX NUMBER</small>	<small>INTERNET ADDRESS</small>	
CITY OF SAN ANTONIO			
<small>CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT</small>			
<small>CLARKSON AVE.</small>			
INDEX OF SHEETS			
<small>% SUBMITTAL</small>	<small>PROJECT NO.:</small>	<small>DATE:</small>	
<small>DRWN. BY:</small>	<small>DSGN. BY:</small>	<small>CHKD. BY:</small>	<small>SHEET NO.: OF</small>



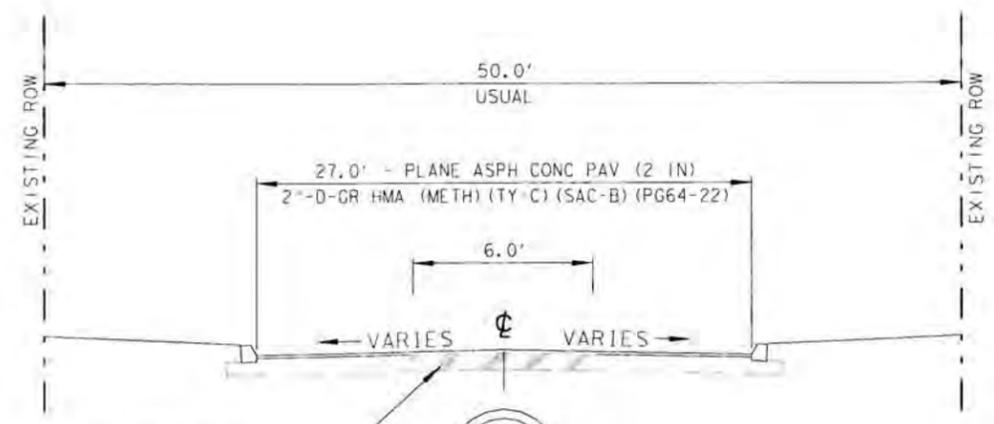
CLARK AVENUE
 **STA 7+56.70 TO STA 36+87.07
 (FULL RECONSTRUCTION)

**MILL AND OVERLAY ONLY (STA 7+56.70 - STA 9+00.00)
 *** WHERE SHOWN ON PLAN/PROFILE SHEETS

*SIDEWALK WIDTH = 4 FT. AT
 STA 19+75 TO STA 20+80
 STA 21+65 TO STA 22+51



INTERSECTING STREETS



LYRIC
 STA 10+48.00 TO STA 15+30.00



Figure 9-7

CONSULTANT NAME			
STREET NUMBER AND ADDRESS			
CITY	STATE	ZIP CODE	INTERNET ADDRESS
TELEPHONE NUMBER	FAX NUMBER		
CITY OF SAN ANTONIO			
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT			
CLARK AVE			
TYPICAL SECTIONS (PROPOSED)			
% SUBMITTAL	PROJECT NO.	DATE	
DRWN BY	DSGN BY	CHKD BY	SHEET NO. OF

GENERAL NOTES

1. ALL CONSTRUCTION SHALL CONFORM TO THE CITY OF SAN ANTONIO STANDARD SPECIFICATIONS FOR CONSTRUCTION JUNE 2008, OR LATEST.
2. NO EXTRA PAYMENT SHALL BE ALLOWED FOR WORK CALLED FOR ON THE PLANS, BUT NOT INCLUDED IN THE BID PROPOSAL. THIS INCIDENTAL WORK WILL BE REQUIRED AND SHALL BE INCLUDED IN THE PAY ITEM TO WHICH IT RELATES.
3. THE CONTRACTOR SHALL PROVIDE ACCESS FOR THE DELIVERY OF MAIL BY THE U.S. POSTAL SERVICE.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RESTORING TO ITS ORIGINAL OR BETTER CONDITION ANY DAMAGE DONE TO EXISTING FENCES, CONCRETE ISLANDS, STREET PAVING, CURBS, SHRUBS, BUSHES OR DRIVEWAYS. (NO SEPARATE PAY ITEM).
5. IT IS THE CONTRACTOR'S RESPONSIBILITY TO SEE THAT ALL SIGNS AND BARRICADES ARE PROPERLY INSTALLED AND MAINTAINED. ALL LOCATIONS AND DISTANCES WILL BE DECIDED UPON IN THE FIELD BY THE CONTRACTOR, USING THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES". THE CITY'S CONSTRUCTION INSPECTOR AND TRAFFIC ENGINEERING REPRESENTATIVE WILL ONLY BE RESPONSIBLE TO INSPECT BARRICADES AND SIGNS, IF, IN THE OPINION OF THE TRAFFIC ENGINEERING REPRESENTATIVE AND THE CONSTRUCTION INSPECTOR, THE BARRICADES AND SIGNS DO NOT CONFORM TO ESTABLISHED STANDARDS OR ARE INCORRECTLY PLACED OR ARE INSUFFICIENT IN QUANTITY TO PROTECT THE GENERAL PUBLIC, THE CONSTRUCTION INSPECTOR SHALL HAVE THE OPTION TO STOP OPERATIONS UNTIL SUCH TIME AS THE CONDITIONS ARE CORRECTED.
6. IF THE NEED ARISES, ADDITIONAL BARRICADES AND DIRECTIONAL DEVICES MAY BE ORDERED BY THE TRAFFIC ENGINEERING REPRESENTATIVE AT THE CONTRACTOR'S EXPENSE.
7. DUE TO FEDERAL REGULATIONS TITLE 49, PART 192.171 C.P.S. MUST MAINTAIN ACCESS TO GAS VALVES AT ALL TIMES. THE CONTRACTOR MUST PROTECT AND WORK AROUND ANY GAS VALVES THAT ARE IN THE PROJECT AREA.
8. CONTRACTOR SHALL NOTIFY THE CITY INSPECTOR TWENTY FOUR (24) HOURS PRIOR TO BACKFILL OF ANY UTILITY TRENCHES TO SCHEDULE FOR DENSITY TEST AS REQUIRED.
9. CONTRACTOR SHALL PRESERVE ALL CONSTRUCTION STAKES, MARKS, ETC. IF ANY ARE DESTROYED OR REMOVED BY THE CONTRACTOR OR HIS EMPLOYEES, THEY SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.
10. CONTRACTOR SHALL NOTIFY ALL UTILITY COMPANIES PRIOR TO CONSTRUCTION TO DETERMINE THE LOCATION OF EXISTING UTILITIES. CONTRACTOR SHALL NOTIFY THE FOLLOWING AT LEAST FORTY-EIGHT (48) HOURS PRIOR TO EXCAVATION OPERATION:

SAN ANTONIO WATER SYSTEM (SAWS)	233-2010
BEXAR METROPOLITAN WATER DISTRICT (BEXAR MET)	354-6538 /357-5741
COSA DRAINAGE	207-8048
COSA SIGNAL OPERATIONS	207-3951
TEXAS STATE WIDE ONE CALL LOCATOR	1-800-344-8377
- CITY PUBLIC SERVICE ENERGY	
- TIME WARNER	
- AT&T	
- MCI	
11. THE EXISTENCE AND LOCATION OF UNDERGROUND UTILITIES INDICATED ON THE PLANS ARE TAKEN FROM AVAILABLE RECORDS AND ARE NOT GUARANTEED, BUT SHALL BE INVESTIGATED AND VERIFIED BY THE CONTRACTOR BEFORE STARTING WORK. THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR ANY DAMAGE TO AND FOR THE MAINTENANCE AND PROTECTION OF THE EXISTING UTILITIES EVEN IF THEY ARE NOT SHOWN ON THE PLANS. LOCATION AND DEPTH OF EXISTING UTILITIES SHOWN HERE ARE APPROXIMATE ONLY. ACTUAL LOCATIONS AND DEPTHS MUST BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION AND HE SHALL BE RESPONSIBLE FOR PROTECTION OF SAME DURING CONSTRUCTION.
12. ALL WASTE MATERIAL SHALL BECOME PROPERTY OF THE CONTRACTOR AND SHALL BE HIS SOLE RESPONSIBILITY TO DISPOSE OF THIS MATERIAL OFF THE LIMITS OF THE PROJECT. NO WASTE MATERIAL SHALL BE PLACED IN EXISTING LOWS THAT WILL BLOCK OR ALTER FLOW LIMITS OF EXISTING ARTIFICIAL OR NATURAL DRAINAGE.
13. THE CONTRACTOR SHALL NOT PLACE ANY EXCESS MATERIAL IN THE 100-YEAR FLOOD PLAIN WITHOUT FIRST OBTAINING AN APPROVED FLOOD PLAIN DEVELOPMENT PERMIT FROM THE CITY OF SAN ANTONIO PUBLIC WORKS DEPARTMENT.
14. DURING THE PRE-CONSTRUCTION MEETING, THE CONTRACTOR MUST PROVIDE THE CITY CONSTRUCTION INSPECTOR AND THE PROJECT MANAGER THE LOCATION OF THE DISPOSAL SITE FOR EXCESS MATERIAL. THE CONTRACTOR MUST ALSO PROVIDE THE CITY WITH A COPY OF ALL REQUIRED PERMITS AND AGREEMENTS WITH PROPERTY OWNERS PRIOR TO ANY HAULING OF EXCESS MATERIAL FROM THE PROJECT SITE. IF THE DISPOSAL SITE CHANGES, THE CONTRACTOR MUST NOTIFY THE CITY INSPECTOR OF THE NEW SITE PRIOR TO ANY HAULING OF EXCESS MATERIAL.
15. THE CONTRACTOR SHALL MAINTAIN ALL ADJOINING STREETS AND TRAVELED ROUTES FREE FROM SPILLED AND /OR TRACKED CONSTRUCTION MATERIALS AND /OR DEBRIS.
16. IF THE CONTRACTOR ENCOUNTERS ANY ARCHAEOLOGICAL DEPOSITS DURING CONSTRUCTION OPERATIONS, THE CONTRACTOR MUST STOP EXCAVATION IMMEDIATELY, CONTACT THE CITY INSPECTOR, AND CALL THE CITY HISTORIC PRESERVATION OFFICE AT 207-7306 OR 207-3327 FOR AN ARCHAEOLOGICAL INVESTIGATION. THE CONTRACTOR CANNOT BEGIN EXCAVATION AGAIN WITHOUT WRITTEN PERMISSION FROM THE CITY.

IF MORE THAN THREE (3) DAYS ARE REQUIRED FOR INVESTIGATION (NOT INCLUDING HOLIDAY AND WEEKENDS) AND IF THE CONTRACTOR IS UNABLE TO WORK IN OTHER AREAS, THEN THE CONTRACTOR WILL BE ALLOWED TO NEGOTIATE FOR ADDITIONAL CONSTRUCTION TIME UPON WRITTEN REQUEST WITHIN TEN (10) DAYS AFTER THE FIRST NOTICE TO THE CITY OF ARCHAEOLOGICAL INVESTIGATION FOR EACH EVENT. IF THE TIME REQUIRED FOR INVESTIGATION IS LESS THAN OR EQUAL TO THREE (3) DAYS FOR EACH EVENT, CONTRACT DURATION WILL NOT BE EXTENDED.
17. IF SUSPECTED CONTAMINATION IS ENCOUNTERED DURING CONSTRUCTION OPERATIONS, C.O.S.A. SHALL BE NOTIFIED IMMEDIATELY WHEN CONTAMINATED SOILS AND /OR GROUNDWATER ARE ENCOUNTERED AT LOCATIONS NOT IDENTIFIED IN THE PLANS. THE NOTIFICATION SHOULD INCLUDE THE STATION NUMBER, TYPE OF CONTAMINATED MEDIA, EVIDENCE OF CONTAMINATION AND MEASURES TAKEN TO CONTAIN THE CONTAMINATED MEDIA AND PREVENT PUBLIC ACCESS. THE CONTAMINATED SOIL AND /OR GROUNDWATER SHALL NOT BE REMOVED FROM THE LOCATION WITHOUT PRIOR C.O.S.A. APPROVAL. THE CONTRACTOR MUST STOP THE EXCAVATION IMMEDIATELY AND CONTACT THE C.O.S.A. INSPECTOR. THE CONTRACTOR CANNOT BEGIN EXCAVATION ACTIVITIES WITHOUT WRITTEN PERMISSION FROM THE CITY.
18. CONTRACTOR IS TO INCLUDE A MAILBOX POST BLOCKOUT FOR VACANT LOTS AND ALL RESIDENCES WHICH DO NOT HAVE MAILBOXES AT THE CURB. BLOCKOUTS ARE PROVIDED FOR FUTURE USE BY THE POST OFFICE.

19. CONTRACTOR SHALL NOT REMOVE OR ADJUST ANY VIA FACILITIES. THE CONTRACTOR MUST CONTACT VIA FOURTEEN DAYS PRIOR, FOR THE REMOVAL OF BENCHES, STOP POLES OR ANY OTHER VIA FACILITIES THAT MAY BE PRESENT. PLEASE PROVIDE THIRTY DAYS PRIOR NOTICE FOR SHELTER REMOVAL (TELEPHONE NOS: (210) 362-2155 OR (210) 362-2096). THE CONTRACTOR WILL BE LIABLE FOR ANY DAMAGES TO VIA FACILITIES NOT REMOVED BY VIA. THE CONTRACTOR IS REQUIRED TO REPLACE ALL FLATWORK REMOVED OR DAMAGED IN THE COURSE OF EXECUTING THE CONTRACT UNLESS OTHERWISE NOTED BY VIA. THE CONTRACTOR WILL BE RESPONSIBLE FOR PROTECTING VIA FACILITIES IF ADJACENT TO WORK AREA.
20. POLES SHOWN ON THE PLANS ARE BASED ON ORIGINAL SURVEY, AND MAY NOT REFLECT CONDITIONS DURING CONSTRUCTION. IF POLES ARE IN CONFLICT WITH PROPOSED IMPROVEMENTS, THE CONTRACTOR SHALL EXPECT THE POWER POLES TO BE RELOCATED BY OTHERS TO APPROXIMATELY 1' OFF THE PROPERTY LINE, OR NEW PROPERTY LINE IF ROW IS ACQUIRED. THE CONTRACTOR IS RESPONSIBLE TO TEMPORARILY BRACE/SHORE THESE POLES WHEN EXCAVATION OR TRENCHING IS REQUIRED NEAR A POLE, AND IS RESPONSIBLE TO MAINTAIN OVERHEAD LINE CLEARANCE IN LOCATIONS WHERE LARGE EQUIPMENT MAY BE USED. THIS WORK SHALL BE SUBSIDIARY TO THE WORK IN CONFLICT. DE-ENERGIZING OF PRIMARY LINES OR TRANSMISSION LINES FOR CONSTRUCTION PURPOSES WILL BE AT CONTRACTOR'S EXPENSE.

TREE PROTECTION AND PRESERVATION GENERAL NOTES

1. NO UTILITY OR STREET EXCAVATION WORK SHALL BEGIN IN AREAS WHERE TREE PRESERVATION AND TREATMENT MEASURES HAVE NOT BEEN COMPLETED AND APPROVED.
2. TREE PROTECTION FENCING SHALL BE REQUIRED. TREE PROTECTION FENCING SHALL BE INSTALLED, MAINTAINED AND REPAIRED BY THE CONTRACTOR DURING SITE CONSTRUCTION. DURING CONSTRUCTION ACTIVITY, AT LEAST A SIX-INCH LAYER OF COARSE MULCH SHALL BE PLACED AND MAINTAINED OVER THE ROOT PROTECTION ZONE (NO SEPARATE PAY ITEM).
3. THE CONTRACTOR SHALL AVOID CUTTING ROOTS LARGER THAN ONE INCH IN DIAMETER WHEN EXCAVATING NEAR EXISTING TREES. EXCAVATION IN THE VICINITY OF TREES SHALL PROCEED WITH CAUTION. THE CONTRACTOR SHALL CONTACT THE CITY INSPECTOR FOR GUIDANCE.
4. ROOTS WILL BE CUT WITH A ROCK SAW OR BY HAND, NOT BY AN EXCAVATOR OR OTHER ROAD CONSTRUCTION EQUIPMENT.
5. ALL CURB AND SIDEWALK WORK SHALL USE ALTERNATIVE CONSTRUCTION METHODS TO MINIMIZE EXTENSIVE ROOT DAMAGE TO TREES (REFER TO DETAILS).
6. EXPOSED ROOTS SHALL BE COVERED AT THE END OF THE DAY USING TECHNIQUES SUCH AS COVERING WITH SOIL, MULCH, OR WET BURLAP.
7. NO EQUIPMENT, VEHICLES OR MATERIALS SHALL OPERATE OR BE STORED WITHIN THE ROOT PROTECTION ZONE OF ANY TREE NEAR THE PROJECT. ROOT PROTECTION ZONE IS 1 FOOT OF RADIUS PER INCH OF TREE'S DIAMETER. A 10-INCH DIAMETER TREE WOULD HAVE A 10 FOOT RADIUS ROOT PROTECTION ZONE AROUND THE TREE. ROOTS OR BRANCHES IN CONFLICT WITH THE CONSTRUCTION SHALL BE CUT CLEANLY ACCORDING TO PROPER PRUNING METHODS. OAK WOUNDS SHALL BE PAINTED OVER WITHIN 30 MINUTES TO PREVENT OAK WILT.
8. SAPLINGS, SHRUBS OR BUSHES TO BE CLEARED FROM THE PROTECTED ROOT ZONE AREA OF A LARGE TREE SHALL BE REMOVED BY HAND AS DESIGNATED BY THE INSPECTOR.
9. NO WIRES, NAILS OR OTHER MATERIAL MAY BE ATTACHED TO PROTECTED TREES.
10. TREES, TREE LIMBS, BUSHES AND SHRUBS LOCATED IN THE CITY STREET OR ALLEY RIGHT-OF-WAY OR PERMANENT EASEMENTS WHICH INTERFERE WITH PROPOSED CONSTRUCTION ACTIVITIES SHALL BE PROPERLY PRUNED FOLLOWING THE ANSIA-300 STANDARDS FOR PRUNING. ALL TREE PRUNING SHALL BE COMPLETED BY A CITY OF SAN ANTONIO TREE MAINTENANCE LICENSED CONTRACTOR (ARTICLE 21-171, CITY CODE) ONLY AFTER APPROVAL FROM THE CAPITAL PROJECTS MANAGEMENT THROUGH THE INSPECTOR.
11. NO EXCESSIVE TREE TRIMMING WILL BE PERMITTED.
12. ALL DEBRIS GENERATED BY THE PRUNING AND TRIMMING OF THE TREES AND /OR BUSHES SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE DISPOSED OF PROPERLY (NO SEPARATE PAY ITEM).
13. TREES MUST BE MAINTAINED IN GOOD HEALTH THROUGHOUT THE CONSTRUCTION PROCESS. MAINTENANCE MAY INCLUDE, BUT NOT LIMITED TO: WATERING THE ROOT PROTECTION ZONE, WASHING FOLIAGE, FERTILIZATION, PRUNING, ADDITIONAL MULCH APPLICATIONS AND OTHER MAINTENANCE AS NEEDED ON THE PROJECT.
14. ANY TREE REMOVAL SHALL BE APPROVED BY THE CITY ARBORIST. (207-0278)
15. TREES WHICH ARE DAMAGED OR LOST DUE TO THE CONTRACTOR'S NEGLIGENCE DURING CONSTRUCTION SHALL BE MITIGATED TO THE CITY'S SATISFACTION.
16. TREE PLANTING FOR MITIGATION OR ENHANCEMENT: ALL PLANTED TREES SHALL BE MAINTAINED IN A HEALTHY CONDITION AT ALL TIMES. THIS INCLUDES IRRIGATION, FERTILIZING, PRUNING AND OTHER MAINTENANCE AS NEEDED ON THE PROJECT. TREES THAT DIE WITHIN TWELVE (12) MONTHS SHALL BE REPLACED WITH A TREE OF EQUAL SIZE AND SPECIES.

ACCESSIBILITY REQUIREMENTS

1. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN VEHICULAR AND PEDESTRIAN ACCESS AT ALL TIMES TO LOCAL RESIDENCES AND BUSINESSES.
2. WHEN THE WORK REQUIRES THE EXCAVATION OF THE STREET AND THE REMOVAL OF THE EXISTING DRIVEWAY APPROACHES AND SIDEWALKS, THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING TEMPORARY ALL-WEATHER ACCESS TO THE BUSINESSES AND RESIDENCES. THE TEMPORARY DRIVEWAY APPROACHES SHALL BE CONSTRUCTED WITH FLEXIBLE BASE OR GRAVEL MATERIAL AT NO SEPARATE COST TO THE CITY.
3. PRIOR TO INITIATING THE CONSTRUCTION OF NEW DRIVEWAY APPROACHES, THE CONTRACTOR SHALL GIVE ADVANCE WARNING IN PERSON, OR IN WRITING, OF AT LEAST 48 HOURS TO EACH RESIDENCE THAT WILL BE IMMEDIATELY AFFECTED, SO THAT ALTERNATE PLANS MAY BE MADE BY THE RESIDENTS.
4. FOR BUSINESSES WITH MORE THAN ONE DRIVEWAY, AT LEAST ONE DRIVEWAY SHALL REMAIN OPEN WHILE THE OTHER NEW DRIVEWAY APPROACHES ARE CONSTRUCTED. FOR BUSINESSES WITH ONLY ONE DRIVEWAY, THE NEW DRIVEWAY APPROACH SHALL BE CONSTRUCTED IN HALF WIDTHS, UNLESS A TEMPORARY ASPHALT DRIVEWAY IS FIRST INSTALLED AT NO SEPARATE COST TO THE CITY.

Figure 9-8

OCTOBER 2011			
CITY OF SAN ANTONIO			
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT			
CITY OF SAN ANTONIO			
GENERAL NOTES			
%	SUBMITTAL	PROJECT NO.:	DATE:
DRWN. BY:	DSGN. BY:	CHKD. BY:	SHEET NO.: OF

ESTIMATED QUANTITIES

CITY OF SAN ANTONIO			ROADWAY SHEETS											DRAINAGE SHEETS									SW3P SHEETS					TRAFFIC SHEETS					TOTAL
ITEM NO.	BID ITEM DESCRIPTION	UNIT	30	31	32	33	34	35	36	37	38	39	60	61	62	63	64	65	66	67	68	69	79	80	81	82	83	85	86	87	88	89	QUANTITIES
100.1	MOBILIZATION	LS	1																														1
100.2	INSURANCE & BOND	LS	1																														1
101.1	PREPARING RIGHT OF WAY	LS	1																														1
103.2	REMOVE CONC TRAFFIC BARRIER	LF	25	55	55																												135
104.1	STREET EXCAVATION	CY	65	122	124	60	53	73	44	95	65	12																					713
105.1	CHANNEL EXCAVATION	CY				100	164																										264
107.1	EMBANKMENT (FINAL) (DENS CONT) (TY A)	CY	9		12	80	24	32	56			23																					236
108.1	LIME TREAT SUBGRADE (6" COMPACTED DEPTH)	SY	123	320	320		320	320	320	375	300	189																					2587
108.2	LIME	TON	2	4	4			4	4	5	4	2																					29
203.1	TACK COAT	GAL	12	44	44			44	44	44	44	10																					286
205.2	HOT MIX ASPHALTIC PAVEMENT TYPE B (6" COMP. DEPTH)	SY	123	320	320			320	320	375	300	189																					2267
205.4	HOT MIX ASPHALTIC PAVEMENT TYPE D (2" COMP. DEPTH)	SY	120	310	310			310	310	364	231	184																					2139
208.1	SALVAGING, HAULING & STOCKPILING RECLAIMABLE ASPHALTIC PAVMT 1.5" DEPTH	SY	123																														123
307.5	ENERGY DISSIPATOR	EA													1	1																	2
401.1	REINFORCED CONCRETE PIPE (CL III) (24" DIA)	LF	48										20	100	50					50	100	35										403	
401.1	REINFORCED CONCRETE PIPE (CL V) (30" DIA)	LF	56														100	100	50														306
403.2	JUNCTION BOX (COMPLETE) 5'X5'X5'	EA	1										1	1	1			1	1	1												7	
403.8	INLET (COMPLETE) 10"	EA	3										2	2	1				2	2												12	
410.2	GRAVEL SUBGRADE FILLER	CY	30										1	4	2			4	4	4	4	2										55	
500.1	CONCRETE CURBING	LF	50	240	240			240	240	280	220	75																					1585
502.1	CONCRETE SIDEWALKS	SY	33	160	160			160	160	200	140	30																					1043
503.2	PORTLAND CEMENT CONCRETE DRIVEWAYS-COMMERCIAL	SY	31	26				52		23	36																						168
503.4	ASPHALTIC CONCRETE DRIVEWAY	SY	20									10																					30
505.1	CONCRETE RIP-RAP (6" THICK)	SY				203	186																										389
506.1	CONCRETE RETAINING WALLS-COMB. TYPE	CY	6	23	36			18																									83
515.1	TOP SOIL	CY	86	150	150			126	158	143	103	75																					991
516.1	BERMUDA SODDING	SY	86	150	150			126	158	143	103	75																					991
530.1	BARRICADES, SIGNS & TRAFFIC HANDLING	LS	1																														1
531.3	R1-1 STOP (30")(HIGH DENSITY)	EA																										2					2
531.57	9 INCH STREET NAME, BLOCK NUMBERS (VARIESx9")(HIGH DENSITY)	EA																										2					2
535.1	4 INCH WIDE YELLOW LINE	LF																										130	200	200	200	30	760
535.2	4 INCH WIDE WHITE LINE	LF																										130	200	200	200	30	760
535.7	24 INCH WIDE WHITE LINE	LF																													50	50	
537.6	TRAFFIC BUTTON (TYPE I-C)	EA																										6	11	10	10	6	43
537.8	TRAFFIC BUTTON (TYPE II A-A)	EA																										6	11	10	10	6	43
540.1	ROCK FILTER DAMS (INSTALL/REMOVE)(TYPE 2)	LF	400																			400	200	200								1200	
540.1	ROCK FILTER DAMS (INSTALL/REMOVE)(TYPE 3)	LF	55																			55	20	25								155	
540.6	CONSTRUCTION EXITS (INSTALL/REMOVE)	SY	156																			156	123	133								568	
540.9	TEMPORARY SEDIMENT CONTROL FENCE	LF	300																			300	150	150								900	
540.10	CURB INLET GRAVEL FILTERS	LF	125																			40	10	0	50							225	
TXDOT BID ITEMS			ROADWAY SHEETS											DRAINAGE SHEETS									SW3P SHEETS					TRAFFIC SHEETS					TOTAL
ITEM NO.	BID ITEM DESCRIPTION	UNIT	30	31	32	33	34	35	36	37	38	39	60	61	62	63	64	65	66	67	68	69	79	80	81	82	83	85	86	87	88	89	QUANTITIES
360 2004	CONC PVMT (CONT REINF - CRCP) (11")	SY				15	15																										30
416 2002	DRILL SHAFT (24" DIA.)	LF				270	270																										540
416 2003	DRILL SHAFT (30" DIA.)	LF				660	660																										1320
416 2031	DRILL SHAFT (TRF SIG POLE) (30 IN)	LF				5	6																										11
416 2032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF				7	6																										13
420 2003	CL C CONC (ABUT)	CY				26	26																										52
420 2004	CL S CONC (BENT)	CY				117	118.5																										235.5
420 2029	CL S CONC (SLAB)	CY				140	140																										280
420 2033	CL S CONC (APPR SLAB)	CY				60	60																										120
420 2034	CL S CONC (BRIDGE SIDEWALK)	CY				65	65																										130
425 2016	PRESTR CONC SLAB BEAM(4SB15)	LF				1050	1050																										2100
425 2017	PRESTR CONC SLAB BEAM(5SB15)	LF				735	735																										1470
432 2023	RIP-RAP (STONE PROTECTION) (24")	CY				90	90																										180
442 2005	STR STL (MISCELLANEOUS)	LB				350	350																										700
450 2166	RAIL (TY C223)	LF				250	250																										500
454 2005	ARMOR JOINT (WITH SEAL)	LF				97	97																										194
496 2010	REMOVE STRUCTURE (BRIDGE 100-499FT LENGTH)	EA				1																											1

Figure 9-8a

CONSULTANT NAME			
STREET NUMBER AND ADDRESS			
CITY, STATE, ZIP CODE			
TELEPHONE NUMBER	FAX NUMBER	INTERNET ADDRESS	
CITY OF SAN ANTONIO			
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT			
PROJECT TITLE			
ESTIMATED QUANTITIES			
SHEET SUBTITLE			
% SUBMITTAL	PROJECT NO.:	DATE:	
DRWN. BY:	DSGN. BY:	CHKD. BY:	SHEET NO. OF

(ADDITIONAL SHEET AS NEEDED)

SHEET NO.	DRIVEWAY	STATION AT CENTERLINE	SIDE	LENGTH FT.	WIDTH FT.	DRIVEWAY PENETRATIONS LENGTH FT.	503.10	503.20	503.40	503.50	503.10
							PORTLAND CEMENT CONCRETE DRIVEWAYS SY	PORTLAND CEMENT CONCRETE DRIVEWAYS-COMM. SY	DRIVEWAY PENETRATIONS (ASPHALT) SY	DRIVEWAY PENETRATIONS (GRAVEL) SY	DRIVEWAY PENETRATIONS (CONCRETE) SY
64	D1	14+82.85	RT	21.2	24.0	0.0	0	61	0	0	0
64	D2	15+26.60	RT	19.4	24.0	0.0	0	57	0	0	0
65	D3	17+36.47	LT	18.0	10.0	0.0	25	0	0	0	0
65	D4	20+07.34	LT	18.0	24.0	0.0	0	53	0	0	0
65	D5	17+80.62	RT	19.0	19.0	0.0	0	43	0	0	0
66	D6	21+30.31	LT	18.0	24.0	0.0	0	53	0	0	0
66	D7	11+01.25/MALONE	LT	5.1	24.0	0.0	0	16	0	0	0
66	D8	23+54.49	LT	18.0	30.0	0.0	0	13	0	0	0
66	D9	24+34.36	LT	18.0	30.0	0.0	0	65	0	0	0
66	D10	20+89.29	RT	18.0	30.0	0.0	0	66	0	0	0
66	D11	23+57.39	RT	18.0	30.0	0.0	0	65	0	0	0
66	D12	24+08.20	RT	18.0	24.0	0.0	0	53	0	0	0
67	D13	25+24.97	LT	18.0	93.0	0.0	0	193	0	0	0
67	D14	26+19.76	LT	18.0	12.0	0.0	0	38	0	0	0
67	D14A	26+56.92	LT	18.0	24.0	0.0	0	48	0	0	0
67	D15	27+41.60	LT	18.0	30.0	5.4	0	65	0	0	10
67	D15A	10+76/LINARES	LT	11.0	12.0	0.0	15	0	0	0	0
67	D15B	10+61/LINARES	RT	12.0	14.0	0.0	19	0	0	0	0
67	D16	24+77.67	RT	18.0	24.0	0.0	0	53	0	0	0
67	D17	10+80.26/THEO	RT	7.3	24.0	0.0	0	22	0	0	0
67	D18	26+42.08	RT	23.0	30.0	0.0	0	82	0	0	0
67	D19	27+73.53	RT	23.0	30.0	0.0	0	82	0	0	0
68	D20	29+90.79	LT	18.0	12.0	4.0	0	66	0	5	0
68	D21	32+08.37	LT	18.0	24.0	0.0	53	0	0	0	0
68	D22	32+57.84	LT	18.1	24.0	0.0	53	0	0	0	0
68	D23	32+91.81	LT	18.0	12.0	0.0	0	29	0	0	0
68	D24	33+30.83	LT	18.0	25.0	0.0	55	0	0	0	0
68	D25	29+48.51	RT	18.0	76.0	4.4	0	156	37	0	0
68	D26	30+50.72	RT	18.0	80.0	0.0	0	166	0	0	0
69	D27	10+94.38/CAVALIER	RT	6.8	12.0	0.0	16	0	0	0	0
69	D28	35+50.90	LT	18.1	20.0	4.7	44	0	10	0	0
69	D29	35+92.12	LT	18.1	12.0	0.0	0	29	0	0	0
69	D30	11+01.66/JENNINGS	RT	10.5	15.0	0.0	21	0	0	0	0
69	D31	10+94.93/JENNINGS	LT	9.4	10.0	0.0	12	0	0	0	0
69	D32	35+17.18	RT	17.9	30.0	0.0	0	64	0	0	0
69	D33	35+80.28	RT	17.9	30.0	0.0	0	65	0	0	0
70	D34	38+43.23	LT	18.0	12.0	5.6	29	0	7	0	0
70	D35	39+06.96	LT	18.0	26.0	3.1	0	57	5	5	0
70	D36	39+88.89	LT	18.0	15.0	3.8	0	35	6	0	0
70	D37	11+20.55/CARROLL	RT	15.3	24.0	0.0	0	43	0	0	0
70	D38	38+23.29	RT	18.0	20.0	10.4	0	45	23	0	0
70	D39	39+12.31	RT	18.0	20.0	11.8	0	48	26	0	0
70	D40	41+12.82	RT	17.9	30.0	2.3	0	65	8	0	0
71	D41	44+05.41	LT	19.5	27.0	0.0	0	65	0	0	0
71	D42	42+70.85	RT	18.0	30.0	0.0	0	65	0	0	0
71	D43	12+86.88/WALTON	RT	13.5	24.0	0.0	0	38	0	0	0
71	D44	12+85.06/WALTON	LT	11.5	24.0	0.0	0	33	0	0	0
71	D45	44+18.37	RT	19.7	20.0	0.0	0	44	0	0	0
		ZARZAMORA TOTALS					342	2241	123	10	10

Figure 9-8b

△			
△			
△			
NO.	REVISION	BY	DATE
CONSULTANT NAME			
CITY OF SAN ANTONIO CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT ZARZAMORA DRAINAGE PROJECT #39			
ZARZAMORA DRIVEWAY SUMMARY			
SHEET 1 OF 2			
100% SUBMITTAL	PROJECT NO. 40-00069	DATE NOV 2010	
DESIGNED: RG	DRAWN: JA	CHECKED: JA	SHEET 14 OF 381

SPWFILES 10/27/2011 9:46:14 AM

The sequence of work narrative (figure 9–9) should contain the following information:

- general notes pertaining to the TCP;
- recommended sequencing of construction activities, including all joint-bid utilities;
- descriptions of each phase of construction in detail;
- exhibit of overall construction phasing; and
- description of incidental activities.

Detour layouts (figure 9–10) should contain the following:

- map of overall area with a clearly defined project limits, construction area, detour route and street labels;
- sign designations and placement locations for the detour route; and
- arrows representing traffic direction for detour.

Traffic control plan phasing layouts (figure 9–11) should contain the following:

- scaled plan view(s) of the project with a clearly defined area of construction, alignment(s), ROW, existing features, and proposed improvement features to be built during phase;
- symbols of representative elements (such as barriers, signing, traffic direction, etc.) with corresponding legend;
- typical sections with a clear depiction of travel lanes, construction area, temporary pavement, traffic barriers, elevation differences during excavation, etc..
- any additional notes required for contractor’s information.

Environmental Details

These sheets will typically be scaled at 1" = 20' or 1" = 40' and include the storm water pollution prevention plan (SW3P) layouts; SW3P narrative; environmental permits, issues, and commitments (EPIC) sheet and all applicable standards.

The storm water pollution prevention plan (SW3P) layouts (figure 9–11) should contain the following information:

- refer to “traffic control phasing layouts” for requirements;
- SW3P measures;
- runoff directional arrows;
- sizing calculations for various SW3P items; and
- tree protection measures with accompanying details if needed.

At the engineer’s judgment, the SW3P layouts can be combined with the traffic control plan phasing layouts, if all elements can still be shown without risk of error.

The SW3P narrative (figure 9–12) should contain the following:

- general site data (project limits and description, sequence of major soil disturbing activities, existing and proposed conditions, receiving waters);
- best management practices (soil stabilization practices, structural practices, storm water management, non-storm water discharges); and

- other requirements and practices (maintenance, inspection, waste materials, offsite vehicle tracking, other items).

The environmental permits, issues, and commitments (EPIC) sheet is shown in figure 9–13. The requirements for all environmental permits, issues, and commitments should be listed on this sheet and shall be broken down into the following sections:

- Clean Water Act, Section 402;
- Clean Water Act, Sections 401 and 404;
- cultural resources;
- soil/groundwater contamination;
- federal and state endangered species, critical habitats, candidate species, and migratory birds;
- vegetation resources;
- aquifer (if present); and
- other environmental issues.

Roadway Details

Plan and Profile sheets will be at 1"=40' (Horizontal) and 1"=10' (Vertical). The Consultant can request a change of scale, horizontal or vertical, and obtain approval from city project manager as long as the ratio between the horizontal scale and vertical scale is 4:1. They will include: geometric data sheets, roadway plan/profile sheets, intersection grading plans, driveway grading plans, retaining wall layouts, utility layouts, miscellaneous roadway details, and all applicable standards.

Geometric data sheets (figure 9–14) should contain horizontal and vertical alignment names and descriptions for all referenced alignments in roadway plans.

Roadway plan and profile sheet (figures 9–15 and 9–16) information should include:

Plan View:

- scaled plan view of the project with alignment(s), ROW, existing features, and proposed improvement features;
- legend for both plan and profile view line styles and elements;
- match lines defining limits of alignment for plan sheet;
- labels for existing properties, streets, addresses, or other areas of interest;
- quantity call-out notes for pay items with corresponding quantity box (for LAM projects only);
- arrows designating lane configuration with notes for width and cross slope;
- driveway numbering coinciding with driveway summary sheet;
- station and offset from centerline notes for all curb returns and transitions;
- bearings and horizontal information for all centerlines, including angles between two alignments; and
- any additional notes required for contractor's information.

CLARK AVE (FROM FAIR TO SOUTHCROSS)

CSJ: 0915-12-354

SEQUENCE OF WORK NARRATIVE

DETOURS, BARRICADES, WARNING SIGNS AND SEQUENCE OF WORK, ETC.

I. GENERAL

COOPERATE IN THE USE OF THE RIGHT OF WAY WITH THE CITY OF SAN ANTONIO, AND VARIOUS PUBLIC UTILITIES AND THEIR CONTRACTORS, AS MAY BE REQUIRED TO ALLOW ADJUSTMENTS TO BE MADE BY OTHERS.

TRAFFIC MUST BE HANDLED OVER THE ENTIRE PROJECT DURING CONSTRUCTION.

PROVIDE A MINIMUM OF 7 DAYS PRIOR NOTICE OF INTERSECTING STREET CLOSURES SO APPROPRIATE AUTHORITIES CAN BE NOTIFIED.

PROVIDE ACCESS TO ALL ADJACENT PROPERTY THROUGHOUT ALL PHASES OF CONSTRUCTION. ADEQUACY OF ACCESS WILL BE AT THE DISCRETION OF THE ENGINEER.

RESTORE TO ORIGINAL OR BETTER CONDITION ALL DAMAGE DONE TO EXISTING FENCES.

REGULATE ALL CONSTRUCTION TRAFFIC TO MINIMIZE INCONVENIENCE TO THE TRAVELING PUBLIC. AT POINTS WHERE IT IS NECESSARY FOR TRUCKS TO STOP AND UNLOAD, PROVIDE WARNING SIGNS AND/OR FLAGGERS.

A STORM WATER POLLUTION PREVENTION PLAN (SW3P) IS INCLUDED IN THESE CONSTRUCTION DOCUMENTS. INCORPORATE THIS PLAN INTO SEQUENCE OF WORK AS NEEDED WITH THE SCHEDULE OF IMPLEMENTATION OF THESE SW3P MEASURES BEING BASED ON THE SEQUENCE OF SOIL DISTURBING ACTIVITIES. WHEREVER POSSIBLE PRESERVE THE EXISTING VEGETATION. MINIMIZE THE AMOUNT OF DISTURBED GROUND ON THE ENTIRE PROJECT.

II. SEQUENCE OF WORK

PRIOR TO BEGINNING WORK IN ANY SECTION OF THE PROJECT, PLACE ALL ROADSIDE SIGNS ON TEMPORARY SUPPORTS AT AN APPROVED LOCATION AND AS WORK PROGRESSES. INSTALL PROPOSED TRAFFIC SIGNALS (VIVDS) AS WELL AS ONE NEW SIGNAL POLE AT THE INTERSECTION OF SOUTHCROSS AND CLARK AVE.

IN ADDITION, THE FOLLOWING ADJUSTMENTS WILL BE COMPLETED BY OTHERS PRIOR TO CONSTRUCTION:

1. POWER POLES ON BOTH SIDES OF THE ROADWAY MOVED TO ROW.
2. INSTALL TEMPORARY ILLUMINATION, IF ANY.

III. ROADWAY CONSTRUCTION

PERFORM ALL ROAD WORK IN PHASES 1 AND 2 THROUGH THE TYPE C HOT MIX ASPHALT APPLICATION UNDER ONE-WAY TRAFFIC CONTROL AS SHOWN ON DETOUR LAYOUTS. THE WORK WILL BE UNDERTAKEN IN HALF WIDTHS OF THE NEW ROADWAY SECTION. PROVIDE POSITIVE GUIDANCE TO TRAFFIC THROUGH THE WORK AREA, INCLUDING TRAFFIC ENTERING THE WORK AREA FROM INTERSECTING STREETS AND DRIVEWAYS. NOTICES OF DETOURS SHALL BE PLACED AT LEAST 2 WEEKS PRIOR TO ROAD CLOSURES. WHEN ANY PROCESS OF THE WORK IS NOT COMPLETED IN ONE DAY, PROVIDE A TEMPORARY RAMP BETWEEN THE NEW SURFACE AND THE EXISTING ROADWAY SURFACE AT A SLOPE NOT TO EXCEED 8:1 TO ALLOW SAFE PASSAGE OF TRAFFIC DURING NON-WORK PERIODS. THE MATERIAL USED SHALL CONFORM TO ITEM 334 HOT-MIX COLD-LAID ASPHALT CONCRETE PAVEMENT OR MATERIAL APPROVED BY THE ENGINEER. THIS WORK WILL BE SUBSIDIARY TO VARIOUS BID ITEMS.

FOR PURPOSES OF CONSTRUCTION-SEQUENCING, THE ROADWORK IS SPLIT INTO DISTINCT AND SEPARATE PHASES AS FOLLOWS:

PHASE 1

PHASE 1 STAGE 1 - CPS GAS MAIN ADJUSTMENTS SHALL BEGIN AT SOUTH LIMIT OF CONSTRUCTION ALONG CLARK AVE. INSTALL SANITARY SEWER LINES "A" AND "B" BETWEEN STATIONS 21+33 - 24+53. MAINTAIN TRAFFIC USING DAILY LANE CLOSURES ACCORDING TO THE DETOUR LAYOUTS FOR PHASE 2, STAGES 1 AND 2 AS NECESSARY.

AS WORK PROGRESSES NORTH TO THE FAIR AVE INTERSECTION, THE PHASE 1 STAGE 1 DETOUR ROUTE SHALL BE IMPLEMENTED TO BEGIN ROADWAY CONSTRUCTION.

CONSTRUCT INTERSECTION OF CLARK AVE & FAIR AVE - CLOSE THE PORTION OF CLARK AVENUE FROM GLOVER TO FAIR AVE. PLACE DETOURS TO ROUTE CLARK AVENUE TRAFFIC FROM HIWATHA TO KIPLING VIA WALTERS AS SHOWN ON DETOUR LAYOUT SHEETS FOR PHASE 1 - STAGE 1. BEGIN CONSTRUCTION OF IMPROVEMENTS TO FAIR AVENUE, INCLUDING UTILITIES, STORM DRAIN AND ALL ROADWAY ELEMENTS.

AT THE END OF THIS STAGE, THE DETOUR SHALL BE REMOVED AND THE NEXT AREA OF CONSTRUCTION SHALL BEGIN. NO OTHER WORK SHALL BEGIN UNTIL THIS STAGE OF OPERATION IS COMPLETE AS FAIR AVENUE IS CRITICAL TO SUBSEQUENT DETOURS.

PHASE 1 STAGE 2A - CONSTRUCT OUTFALL AT GOLIAD ROAD - CLOSE GOLIAD ROAD AT LYRIC AND DETOUR TRAFFIC VIA CLARK AVENUE. GOLIAD ROAD SHALL BE CLOSED DURING DAYLIGHT HOURS ONLY. NO OVERNIGHT CLOSURE WITH DETOURS SHALL BE ALLOWED. TWO WEEKS PRIOR TO ROAD CLOSURE, CONTRACTOR SHALL PLACE NOTICES OF DETOUR AND NOTIFY VIA OPERATIONS TO ALLOW FOR IMPLEMENTATION OF BUS ROUTE DETOURS.

BEGIN OPERATIONS TO CONSTRUCT THE PROPOSED DRAINAGE OUTFALL STRUCTURE IN THE INTERSECTION. ALL CUTS IN THE ROADWAY SHALL BE BACKFILLED AT THE END OF EACH WORK DAY. IN THE EVENT CONTRACTOR IS UNABLE TO DO THIS, STEEL PLATES WILL BE USED TO COVER THE CUTS OVERNIGHT. ONCE WORK IN THE INTERSECTION IS COMPLETE, CONTRACTOR SHALL OPEN GOLIAD ROAD TO TRAFFIC.

PHASE 1 STAGE 2B - CONSTRUCT OUTFALL ALONG LYRIC - NOTIFY PROPERTY OWNERS ALONG LYRIC AT LEAST TWO DAYS PRIOR TO CONSTRUCTION. PLACE BARRICADES AT BOTH ENDS OF LYRIC AND CLOSE THE ROAD TO TRAFFIC. PROVIDE CONTINUOUS ACCESS TO PROPERTIES ALONG LYRIC DURING PERIODS OF NON-WORK. CONTRACTOR SHALL PLACE STEEL PLATES TO COVER ANY OPEN CUTS IN THE ROADWAY AT THE END OF THE WORK DAY.

PHASE 2

PHASE 2 STAGE 1 - RECONSTRUCT CLARK AVENUE (WEST SIDE) - DETOUR SOUTHBOUND CLARK AVE TRAFFIC TO GOLIAD ROAD AS SHOWN ON DETOUR LAYOUT SHEET. PROVIDE A 10 FT WIDE (MINIMUM) TRAVEL LANE ALONG CLARK AVE FOR NORTHBOUND TRAFFIC FROM SOUTHCROSS AVE TO GLOVER. SEE TRAFFIC CONTROL PLAN TYPICAL SECTIONS. CONTRACTOR SHALL MAINTAIN ACCESS TO ALL BUSINESSES AND RESIDENTIAL DRIVEWAYS DURING CONSTRUCTION.

ALL GAS LINES, WATER AND SEWER FACILITIES, DRAINAGE STRUCTURES, SIDEWALKS, VARIOUS CURBS AND DRIVEWAYS SHALL BE CONSTRUCTED ALONG THE WEST SIDE OF CLARK AVENUE AND EACH INTERSECTING STREET. STORM DRAIN LATERALS SHALL BE CONSTRUCTED IN TWO SECTIONS. CONSTRUCT DOWNSTREAM SECTION OF LATERAL TO A MINIMUM OF 2 FEET BEYOND THE CENTER OF ROADWAY AND STUB OUT. USE FLOWABLE FILL AS BACKFILL AROUND THE STUB OUT AREA AS SHOWN ON THE TRAFFIC CONTROL PLAN LAYOUT SHEETS. THIS WORK WILL BE CONSIDERED SUBSIDIARY TO VARIOUS BID ITEMS.

CONSTRUCT THE WEST SIDE OF CLARK AVE AND INTERSECTING STREETS TO THE TYPE C HOT MIX ASPHALT. CONSTRUCT INTERSECTING STREETS IN HALF-WIDTHS WHEN POSSIBLE. CONTRACTOR SHALL NOT PERFORM OPERATIONS ON TWO CONSECUTIVE INTERSECTIONS SIMULTANEOUSLY, WITH THE EXCEPTION OF KASHMUIR AND MCDUGAL AVENUES. RECONSTRUCTION OF KASHMUIR AND MCDUGAL AVENUES SHALL BE PERFORMED AT THE END OF STAGE 1. ALL OPERATIONS SHALL BE COMPLETED AS TO ALLOW ACCESS TO PROPERTIES AT THE END OF EACH WORKING DAY. DAILY CLOSURES WILL BE ALLOWED TO RECONSTRUCT INTERSECTIONS WHEN HALF-WIDTH CONSTRUCTION IS NOT POSSIBLE.

PHASE 2 STAGE 2 - RECONSTRUCT CLARK AVENUE (EAST SIDE). DETOUR NORTHBOUND CLARK AVE TRAFFIC TO GOLIAD ROAD, AS SHOWN ON DETOUR LAYOUT SHEET. CONTRACTOR SHALL MOVE ALL BARRICADES AND BARRIERS TO RECONFIGURE THE TRAVEL LANE ALONG CLARK AVE FOR SOUTHBOUND TRAVEL. SEE TRAFFIC CONTROL PLAN TYPICAL SECTIONS.

CONSTRUCT THE EAST SIDE OF CLARK AVE AND INTERSECTING STREETS TO THE TYPE C HOT MIX ASPHALT. ALL GAS LINES, WATER AND SEWER FACILITIES, DRAINAGE STRUCTURES, SIDEWALKS, VARIOUS CURBS AND DRIVEWAYS SHALL BE CONSTRUCTED ALONG THE EAST SIDE OF CLARK AVENUE AND EACH INTERSECTING STREET. CONSTRUCT UPSTREAM SECTION OF STORM DRAIN LATERAL AND TIE-IN AT STUB OUT (SEE PHASE 2 - STAGE 1).

CONSTRUCT INTERSECTING STREETS IN HALF-WIDTHS AS PROPOSED GRADE/PROFILE ALLOWS. CONTRACTOR SHALL NOT PERFORM OPERATIONS ON TWO CONSECUTIVE INTERSECTIONS SIMULTANEOUSLY. ALL OPERATIONS SHALL BE COMPLETED AS TO ALLOW ACCESS TO PROPERTIES AT THE END OF EACH WORKING DAY.

PHASE 3

PHASE 3 - FINAL OVERLAY OF CLARK AVENUE. APPLY FINAL SURFACE ALONG CLARK AVE IN HALF WIDTHS. MILL 2 INCHES OFF THE EXISTING SURFACE AT THE GLOVER/CLARK INTERSECTION TO ACCOMMODATE THE NEW OVERLAY DURING THESE OPERATIONS. PLACE PERMANENT STRIPING AND RAISED PAVEMENT MARKINGS IN ACCORDANCE WITH THE GOVERNING SPECIFICATIONS. ALL MARKER TABS INCLUDING THOSE USED AS GUIDE MARKS SHALL BE REMOVED.

IV. ROADSIDE SIGN RELOCATION/INSTALLATION

AS THE WORK PROGRESSES, SET THE EXISTING SIGNS ON TEMPORARY SUPPORTS AND WHEN ALL GRADING AND ROADWORK HAS BEEN PERFORMED IN THE AREA OF THE NEW SIGNS, INSTALL THE NEW SIGNS AT THE LOCATIONS SHOWN ON THE SIGNING LAYOUT SHEETS. PROVIDE NEW FOUNDATIONS, POSTS AND HARDWARE FOR ALL SIGNS. ALL EXISTING POSTS, FOUNDATIONS AND HARDWARE WILL BE DISPOSED OF IN AN APPROVED MANNER. ANY SIGNS TO BE REMOVED WILL REMAIN THE PROPERTY OF THE CITY. STOCKPILE THE REMOVED SIGNS IN AN APPROVED LOCATION. REPLACE ANY SIGNS DAMAGED BY THE CONSTRUCTION ACTIVITIES.

V. FINAL CLEANUP

REMOVE ALL SURPLUS MATERIALS FROM THE PROJECT. SOD ALL AREAS REQUIRING REVEGETATION IN ACCORDANCE WITH THE PLANS. COMPLETE ALL LANDSCAPE MAINTENANCE AND INSPECTION PERIODS FOR TRAFFIC SIGNALS. COMPLETE FINAL INSPECTION ITEMS AND CLEANUP.

VI. PAYMENT

UNLESS OTHERWISE INDICATED ON THE PLANS OR SPECIFICATIONS, ALL WORK AND MATERIALS REQUIRED BY THESE PROVISIONS ARE NOT PAID FOR DIRECTLY, BUT CONSIDERED SUBSIDIARY TO THE VARIOUS BID ITEMS FOR THIS CONTRACT.

Figure 9-9



CONSULTANT NAME			
STREET NUMBER AND ADDRESS			
CITY	STATE	ZIP CODE	INTERNET ADDRESS
TELEPHONE NUMBER	FAX NUMBER		
CITY OF SAN ANTONIO			
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT			
CLARK AVE			
SEQUENCE OF WORK NARRATIVE			
CLARK AVE			
% SUBMITTAL	PROJECT NO.	DATE	
DRAWN BY	DESIGN BY	CHECK BY	SHEET NO. OF

DETOUR ROUTE MAP FOR CLARK AVE (NORTHBOUND)

- | | |
|---|--|
| ① GOLIAD M4-9N
30"x 12"
DETOUR M4-9R
30"x 30"
→ | ⑩ DETOUR M4-9L
30"x 30"
← |
| ② GOLIAD M4-9N
30"x 12"
DETOUR M4-9L
30"x 30"
← | ⑪ DETOUR M4-9R
30"x 30"
↑ |
| ③ GOLIAD M4-9N
30"x 12"
DETOUR M4-9S
30"x 30"
↑ | ⑫ NO LEFT TURN R3-2
24"x 24" |
| ④ ROAD CLOSED TO THRU TRAFFIC R11-4
60"x 30" | ⑬ ROAD CLOSED R11-2
48"x 30"
W/TYPE III BARICADE |
| ⑤ LYRIC M4-9N
30"x 12"
DETOUR M4-9R
30"x 30"
→ | ⑭ NO RIGHT TURN R3-1
24"x 24" |
| ⑥ LYRIC M4-9N
30"x 12"
DETOUR M4-9L
30"x 30"
← | ⑮ END DETOUR M4-8A
24"x 18" |
| ⑦ LYRIC M4-9N
30"x 12"
DETOUR M4-9S
30"x 30"
↑ | ⑯ CLARK SOUTH M4-9N
30"x 12"
DETOUR M4-9R
30"x 30"
→ |
| ⑧ ROAD CLOSED AHEAD CW20-3D
48"x 48" | ⑰ CLARK NORTH M4-9N
30"x 12"
DETOUR M4-9L
30"x 30"
← |
| ⑨ DETOUR M4-9R
30"x 30"
→ | ⑱ ONE WAY R6-1L
36"x 12" |
| | ⑲ ONE WAY R6-1R
36"x 12" |
| | ⑳ DETOUR M4-10 R/L |
| | ㉑ RIGHT LANE MUST TURN RIGHT |



LEGEND
DETOUR ROUTE

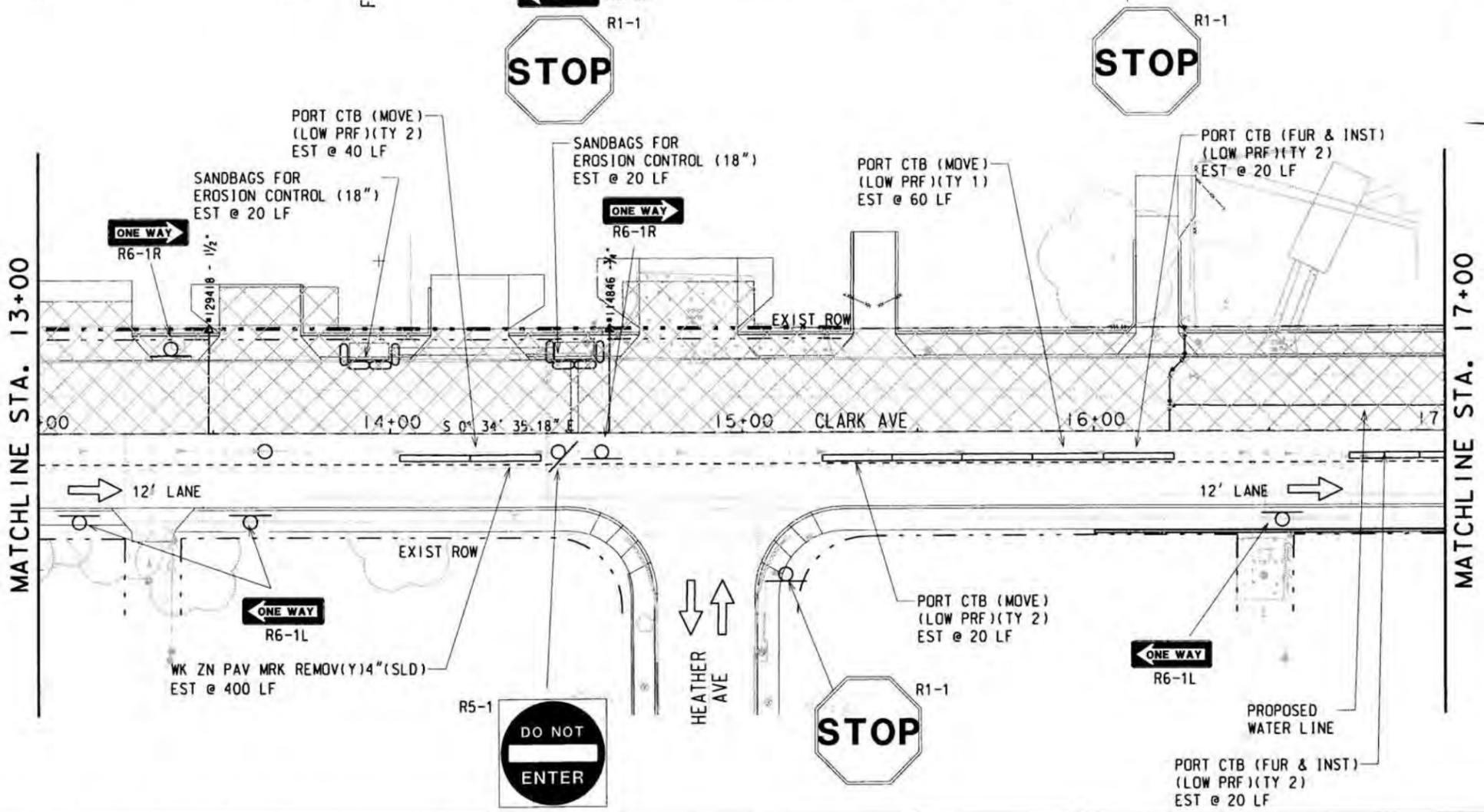
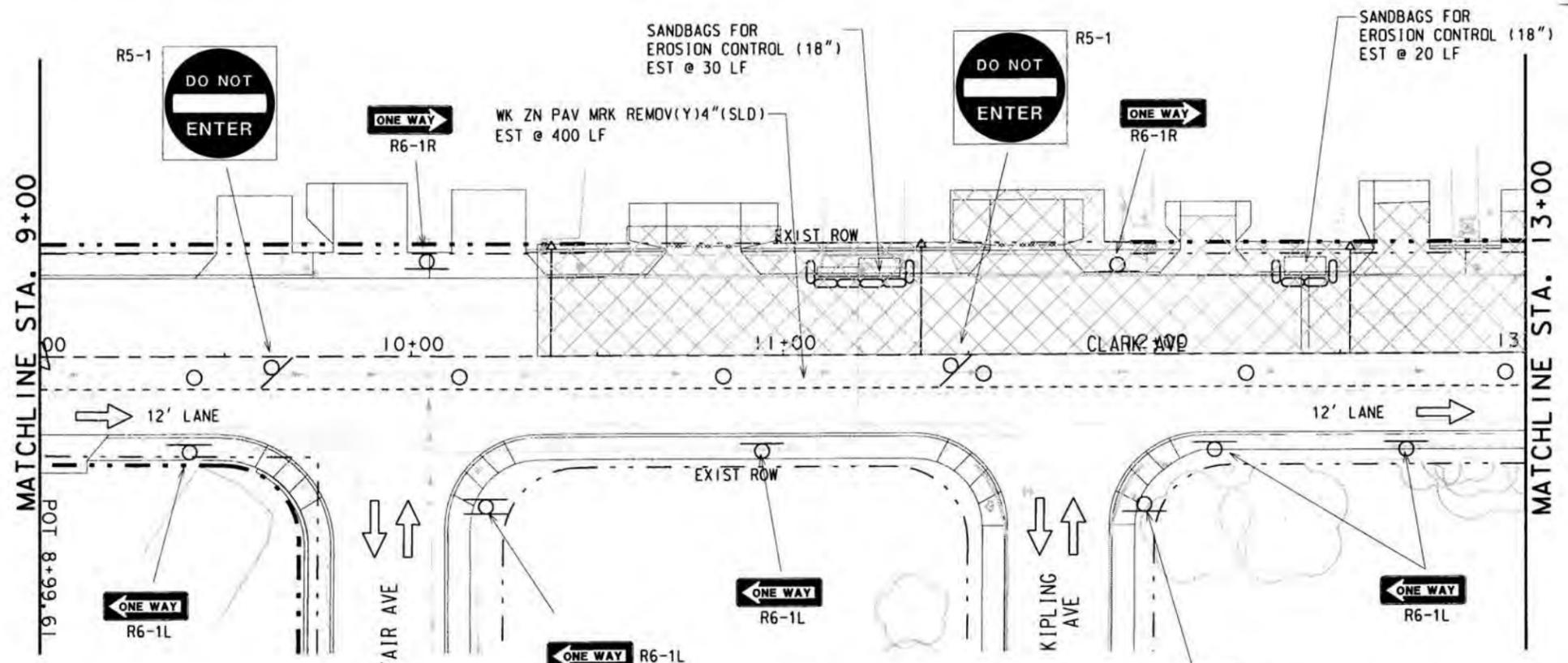
NOTES:
 STATIC MESSAGE SIGNS WILL BE PLACED 10 DAYS PRIOR TO CONSTRUCTION ON CLARK AVE.

MESSAGE SIGN TEXT:
 "CLARK AVE NORTH CLOSED. DETOUR VIA GOLIAD AND FAIR AVE"



Figure 9-10

CONSULTANT NAME			
STREET NUMBER AND ADDRESS			
CITY	STATE	ZIP CODE	INTERNET ADDRESS
CITY OF SAN ANTONIO			
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT			
CLARK AVE			
DETOUR LAYOUT			
PHASE 2 STAGE 2			
% SUBMITTAL	PROJECT NO.	DATE	
DRWN BY	CSGN BY	CHD BY	SHEET NO. OF



- LEGEND**
- DETOUR
 - EXIST PAV MRK TO BE REMOVED
 - EXIST PAV MRK TO REMAIN
 - WK ZN PAV MRK REMOV/NON-REMOV
 - DIRECTION OF TRAVEL
 - CHEVRONS
 - CHANNELIZING DEVICES (VP'S, BARRELS, CONES, ETC.)
 - SIGN
 - BARRICADES (TYPE III)
 - PORTABLE CONCRETE TRAFFIC BARRIER
 - LIMITS OF EARTHWORK DURING THIS PHASE
 - SANDBAGS
 - CONSTRUCTION EXIT
 - CONST. PERIMETER FENCE

NOTE:
 SEE DETOUR LAYOUT PHASE 2-STAGE 2 FOR ADDITIONAL SIGNING.
 DO NOT WORK ON TWO CONSECUTIVE INTERSECTING STREETS AT THE SAME TIME.
 * EXCESS TO BE REMOVED AT THE END OF PHASE 2 STAGE 2

SHEET TOTALS - CSJ: 0915-12-354

EST.	UNIT	DESCRIPTION
90	LF	SANDBAGS FOR EROSION CONTROL (18")
40	LF	PORT CTB (FUR & INST) (LOW PRF) (TY 2)
60	LF	PORT CTB (MOVE) (LOW PRF) (TY 1)
60	LF	PORT CTB (MOVE) (LOW PRF) (TY 2)
60	LF	PORT CTB (REMOVE) (LOW PRF) (TY 1)
100	LF	PORT CTB (REMOVE) (LOW PRF) (TY 2)
800	LF	WK ZN PAV MRK REMOV (Y) (4") (SLD)

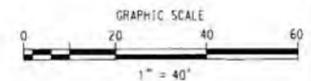


Figure 9-11

CONSULTANT NAME			
STREET NUMBER AND ADDRESS			
CITY	STATE	ZIP CODE	INTERNET ADDRESS
TELEPHONE NUMBER	FAX NUMBER		
CITY OF SAN ANTONIO			
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT			
CLARK AVE			
TCP/SW3P LAYOUT			
PHASE 2 STAGE 2			
CLARK AVE			
% SUBMITTAL	PROJECT NO.	DATE	
DRWN BY	DSGN BY	CHKD BY	SHEET NO. OF

A. GENERAL SITE DATA

- PROJECT LIMITS:** From Fair Ave to E.Southcross
- PROJECT SITE MAPS:**
 - Project Latitude N 29-22.79-83 Project Longitude W 98-26.87-82
 - Project Location Map: Shown on Title Sheet
 - Drainage Patterns: Shown on Drainage Area Maps (Sheets 131-134)
 - Approx. Slopes Anticipated After Major Gradings and Areas of Soil Disturbance: Shown on Typical Sections (Sheets 5-6)
 - Major Controls and Locations of Stabilization Practices: Shown on SW3P Sheets (Sheets 23-34)
 - Project Specific Locations: Off-site waste, borrow, or storage areas are not part of this SW3P.
 - Surface Waters and Discharge Locations: Shown on Drainage and Culvert Layout Sheets (Sheets 138-146)
- PROJECT DESCRIPTION:** Rehab & Widen Narrow Pavement (Curbs, Sidewalk & Drainage)
 - Joint-bid utilities are covered by this SW3P (Sheets 23-34)
- FOR MAJOR SOIL DISTURBING ACTIVITIES SEQUENCE OF EVENTS:**
 - Install controls down-slope of work area and initiate inspection and maintenance activities.
 - Begin phased construction with interim stabilization practices. Adjust erosion and sedimentation controls during construction to meet requirements and changing conditions and as directed/approved by the Engineer.
 - Major soil disturbing activities may include but are not limited to: right-of-way preparation, cut and/or fill to improve roadway profile, final grading and placement of topsoil and the following (if marked):
 - Placement of road base
 - Extensive ditch grading
 - Upgrading or replacing culverts or bridges
 - Temporary detour road(s)
 - Other: Storm Drainage System Construction
- EXISTING AND PROPOSED CONDITIONS:**

Description of existing vegetative cover: (Provide type and description of vegetative cover)

Percentage of existing vegetative cover: (Provide percentage)

Existing vegetative cover: (mark one) Thick or uniformly established
 Thin and Patchy
 None or minimal cover

Description of soils: (Provide classification and description of soils)

Site Acreage: 4.0 Acreage disturbed: 3.95

Site runoff coefficient (pre-construction): .785 Site runoff coefficient (post-construction): .860
- RECEIVING WATERS:** (Mark all that apply)
 - A classified stream does not pass through project.
 - A classified stream passes through project. Name _____ Segment Number _____
 - Name of receiving waters that will receive discharges from disturbed areas of the project: San Antonio River
 - USACE Wetlands are not located on project.
 - USACE Wetlands are present. Contractor shall not disturb without specific authorization.
Location/Plan Sheet info: _____
 - Project is not on Edwards Aquifer Recharge Zone or Contributing Zone.
 - Project is an Edwards Aquifer Recharge Zone.
 - Project is an Edwards Aquifer Contributing Zone.
 - No Water Pollution Abatement Plan or Contributing Zone Plan required.
 - A Water Pollution Abatement Plan or Contributing Zone Plan applies to project.

Site is in a Municipal Separate Storm Sewer System (MS4).
MS4 Operator (name): San Antonio Water System

B. BEST MANAGEMENT PRACTICES

General timing or sequence for implementation of BMPs shall be as required and/or as directed/approved by the Engineer to provide adequate controls. BMPs shown on plan sheets are to be considered "proposed" unless/until install date is shown. BMPs are to reduce sediments from road construction activities.

- SOIL STABILIZATION PRACTICES:** (Select T = Temporary or P = Permanent, as applicable)

<input type="checkbox"/> T TEMPORARY SEEDING	<input type="checkbox"/> P PRESERVATION OF NATURAL RESOURCES
<input type="checkbox"/> MULCHING (Hay or Straw)	<input type="checkbox"/> FLEXIBLE CHANNEL LINER
<input type="checkbox"/> BUFFER ZONES	<input type="checkbox"/> RIGID CHANNEL LINER
<input type="checkbox"/> PLANTING	<input type="checkbox"/> SOIL RETENTION BLANKET
<input type="checkbox"/> SEEDING	<input type="checkbox"/> COMPOST MANUFACTURED TOPSOIL
<input type="checkbox"/> P SODDING	<input type="checkbox"/> OTHER: (Specify Practice)
- STRUCTURAL PRACTICES:** (Select T = Temporary or P = Permanent, as applicable)
 - SILT FENCES
 - HAY BALES
 - ROCK FILTER DAMS
 - DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
 - DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
 - DIVERSION DIKE AND SWALE COMBINATIONS
 - PIPE SLOPE DRAINS
 - PAVED FLUMES
 - T ROCK BEDDING AT CONSTRUCTION EXIT
 - TIMBER MATTING AT CONSTRUCTION EXIT
 - CHANNEL LINERS
 - SEDIMENT TRAPS
 - SEDIMENT BASINS
 - STORM INLET SEDIMENT TRAP
 - STONE OUTLET STRUCTURES
 - P CURBS AND GUTTERS
 - P STORM SEWERS
 - VELOCITY CONTROL DEVICES
 - T OTHER: (SANDBAGS)
- STORM WATER MANAGEMENT:**

The proposed facility was designed in consideration of hydraulic design standards to convey stormwater in a manner that is protective of public safety and property. The control of erosion from the facility is inherent to the design. Additional factors affecting post-construction stormwater at the project location include: (mark all that apply)

 - Existing or new vegetation provides natural filtration.
 - The design includes provisions for permanent erosion controls provided by strategically placed pervious and impervious surfaces.
 - Project includes permanent sedimentation controls (other than grass).
 - Velocities do not require dissipation devices.
 - Velocity-dissipation devices included in the design.
 - Other: _____

NOTE: SEE SHEETS NO. 23-34 FOR TCP/SW3P LAYOUTS

- NON-STORM WATER DISCHARGES:**

Off-site discharges are prohibited except as follows:

 - Discharges from fire fighting activities and/or fire hydrant flushings.
 - Vehicle, external building, and pavement wash water where detergents and soaps are not used and where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed).
 - Plain water used to control dust.
 - Plain water originating from potable water sources.
 - Condensation from air conditioners.
 - Uncontaminated groundwater, spring water or accumulated stormwater.
 - Foundation or footing drains where flows are not contaminated with process materials such as solvents.
 - Other: _____

Concrete truck wash water discharges on the site should be prohibited or minimized, if allowed by the Engineer, they must be managed in a manner so as not to contaminate surface water. They must not be located in areas of concentrated flow. Concrete truck wash-out locations must be shown on the SW3P Layout and included in the inspections.

Hazardous material spill/leak discharges of hazardous substances shall be prevented or minimized. At a minimum, this includes asphalt products, fuels, oils, lubricants, solvents, paints, acids, concrete curing compounds and additives and chemical additives for soil stabilization. BMPs shall be implemented to the storage areas of these products. All spills must be cleaned up by the Contractor, disposed properly and reported to the Engineer. The Contractor is to immediately report any release at or above the reportable quantity during a 24 hour period to the National Response Center at 1-800-424-8802.

C. OTHER REQUIREMENTS & PRACTICES

- MAINTENANCE:**

All erosion and sediment controls shall be maintained in good working order. If a repair is necessary, it shall be performed before the next anticipated storm event but no later than 7 calendar days after the surrounding exposed ground has dried sufficiently to prevent further damage from equipment. If maintenance prior to the next anticipated storm event is impracticable, maintenance must be scheduled and accomplished as soon as practicable. Disturbed areas on which construction activities have ceased, temporarily or permanently, shall be stabilized within 14 calendar days unless they are scheduled to and do resume within 21 calendar days. The areas adjacent to creeks and drainageways shall have priority followed by protecting storm sewer inlets.
- INSPECTION:**

For areas of the construction site that have not been finally stabilized, areas used for storage of materials, structural control measures, and locations where vehicles enter or exit the site, personnel provided by the permittee and familiar with the SW3P must inspect disturbed areas at least once every fourteen (14) calendar days and within twenty four (24) hours of the end of a storm of 0.5 inches or greater. As an alternative to the above-described inspection schedule of once every fourteen (14) calendar days and within twenty four (24) hours of a storm of 0.5 inches or greater, the SW3P may be developed to require that these inspections will occur at least once every seven (7) calendar days. If this alternative schedule is developed, the inspection must occur on a specifically defined day, regardless of whether or not there has been rainfall since the previous inspection. An Inspection and Maintenance Report shall be prepared for each inspection and the controls shall be revised on the SW3P within seven (7) calendar days following the inspection.
- WASTE MATERIALS:**

All non-hazardous municipal waste materials such as litter, rubbish, trash and garbage located on or originating from the project shall be collected and stored in a securely lidded metal dumpster, provided by the Contractor. The dumpster shall be emptied as necessary or as required by local regulation and the trash shall be hauled to a permitted disposal facility. The burying of non-hazardous municipal waste on the project shall not be permitted. Construction material waste sites, stockpiles and haul roads shall be constructed to minimize and control the amount of sediment that may enter receiving waters. Construction material waste sites shall not be located in any wetland, water body or stream bed. Construction staging areas and vehicle maintenance areas shall be constructed in a manner to minimize the runoff of pollutants.
- OFF-SITE VEHICLE TRACKING:**

Off-site vehicle tracking of sediments and the generation of dust must be minimized. Excess sediments on road shall be removed on a regular basis as directed/approved by the Engineer.
- OTHER:**

See the EPIC sheet for additional environmental information.

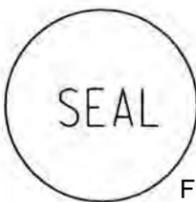


Figure 9-12

CONSULTANT NAME			
STREET NUMBER AND ADDRESS			
CITY	STATE	ZIP CODE	INTERNET ADDRESS
TELEPHONE NUMBER	FAX NUMBER		
CITY OF SAN ANTONIO			
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT			
CLARK AVE			
STORM WATER POLLUTION PREVENTION PLAN (SW3P)			
CLARK AVE			
% SUBMITTAL	PROJECT NO.	DATE	
DRAWN BY	DSGN BY	CHKD BY	SHEET NO. OF

During the design phase of project development the following environmental permits, issues and commitments have been developed during coordination with resource agencies, local governmental entities and the general public. Any change orders and/or deviations to the final design must be reported to the Engineer prior to commencement of construction activities, as additional environmental clearances may be required.

I. Clean Water Act, Section 402 National Pollutant Discharge Elimination System
(Addresses MS4 requirements)

No Action Required Required Action

Action No.	Waters of the US/Station # R/L of Centerline	Commitment
1.	7+56.70 to 36+87.07	TCEQ, TPDES, CGP and NOI
2.		
3.		
4.		
5.		

II. Clean Water Act, Section 401 and 404 Compliance

Filling, dredging or excavating in any water bodies, rivers, creeks, streams, wetlands or wet areas is prohibited unless specified in the USACE permit and approved by the Engineer.

Any material originating from a USACE jurisdictional water will be used within the project limits in an upland area. Any material to be placed in a USACE jurisdictional water is to originate from an upland area within the project limits or as approved by the Engineer.

No Permit Required 404 Permit and 401 Certification Required

The Contractor must adhere to all of the terms and conditions associated with the following permits:

Permit	Required Action	Waters of the US	Applicable Plan Sheet Title
1.			
2.			
3.			
4.			
5.			

III. Cultural Resources

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

No Action Required Required Action

Action No.	Station # R/L of Centerline	Commitment
1.		
2.		
3.		
4.		
5.		

IV. Hazardous Materials or Contamination Issues

If potentially hazardous material and/or contaminated media (i.e. soil, groundwater, surface water, sediment, building materials) are unexpectedly encountered during construction, cease work in the immediate area and contact the Engineer immediately.

No Action Required Required Action

Action No.	Station # R/L of Centerline	Commitment
1. SEE ITEM 9501 FOR REMOVAL OF AC PIPE	STA 21+00, 13' L OF CENTERLINE	SHEET NO. 199
2. SEE ITEM 9501 FOR REMOVAL OF AC PIPE	STA 32+25, 21' L OF CENTERLINE	SHEET NO. 200
3.		
4.		
5.		

V. Federal Listed, and Proposed Threatened and Endangered Species, Critical Habitat, State Listed Species, Candidate Species and Migratory Birds

No Action Required Required Action

Action No.	Station # R/L of Centerline	Commitment
1. MIGRATORY BIRD NESTS: Schedule construction activities as needed to meet the following requirements: A. Do not remove or destroy any active migratory bird nests (nests containing eggs and/or flightless birds) at any time of year. Inactive nests may be removed except on/in structures where special requirements apply. B. On/in structures, if there are any active nests, they shall not be removed until all nests become inactive. After inactive nests are removed and/or before nest activity begins, deterrent materials may be applied to the structures to prevent future nest building.		
2. See Item 5 in General Notes		
3.		
4.		

LISTED SPECIES

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests.

If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately.

VI. Vegetation Resources

No Action Required Required Action

Action No.	Station # R/L of Centerline	Commitment
1.	7+56.70 to 36+87.07	COORDINATE WITH CITY OF SAN ANTONIO ARBORIST FOR TREE REMOVAL.
2.		
3.		
4.		
5.		

VII. Edwards Aquifer

No Action Required Required Action

Action No.	Station # R/L of Centerline	Commitment
1.		
2.		
3.		
4.		
5.		

VIII. Other Environmental Issues

No Action Required Required Action

Action No.	Station # R/L of Centerline	Commitment
1.		
2.		
3.		
4.		
5.		

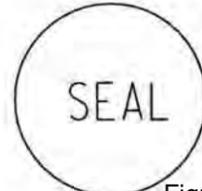


Figure 9-13

CONSULTANT NAME			
<small>STREET NUMBER AND ADDRESS</small>			
<small>TELEPHONE NUMBER</small>	<small>CITY</small>	<small>STATE</small>	<small>ZIP CODE</small>
	<small>FAX NUMBER</small>		<small>INTERNET ADDRESS</small>
CITY OF SAN ANTONIO			
<small>CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT</small>			
<small>CLARK AVE</small>			
ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC)			
<small>DATE</small>	<small>PROJECT NO.</small>	<small>DATE</small>	<small>DATE</small>
<small>DRWN BY</small>	<small>DSGN BY</small>	<small>CHKD BY</small>	<small>SHEET NO. OF</small>

CLARK AVE HORIZONTAL ALIGNMENT

Point 1000	N	13,690,190.50	E	2,144,453.71	Sta	2+04.92
Course from 1000 to 1001 S 0° 21' 25" E Dist 694.69						
Point 1001	N	13,689,495.82	E	2,144,458.04	Sta	8+99.61
Course from 1001 to 1002 S 0° 34' 35" E Dist 863.35						
Point 1002	N	13,688,632.51	E	2,144,466.73	Sta	17+62.96
Course from 1002 to 1003 S 0° 40' 16" E Dist 2,422.90						
Point 1003	N	13,686,209.78	E	2,144,495.11	Sta	41+85.86

LYRIC AVE HORIZONTAL ALIGNMENT

Point 1080	N	13,687,008.54	E	2,144,485.79	Sta	10+00.00
Course from 1080 to PC RXLYRC-1 S 89° 43' 35" W Dist 325.30						

Curve Data

Curve RXLYRC-1						
P.I. Station		14+19.07	N	13,687,006.54	E	2,144,066.72
Delta	=	37° 39' 30"	(LT)			
Degree	=	20° 50' 05"				
Tangent	=	93.77				
Length	=	180.75				
Radius	=	275.00				
External	=	15.55				
Long Chord	=	177.51				
Mid. Ord.	=	14.72				
P.C. Station		13+25.30	N	13,687,006.99	E	2,144,160.49
P.T. Station		15+06.05	N	13,686,948.89	E	2,143,992.76
C.C.			N	13,686,731.99	E	2,144,161.81
Back	= S	89° 43' 35" W				
Ahead	= S	52° 04' 05" W				
Chord Bear	= S	70° 53' 50" W				

Course from PT RXLYRC-1 to 1081 S 52° 04' 05" W Dist 71.07						
Point 1081	N	13,686,905.21	E	2,143,936.70	Sta	15+77.12
Course from 1081 to 1082 S 52° 04' 05" W Dist 158.80						
Point 1082	N	13,686,807.59	E	2,143,811.45	Sta	17+35.91

GOLIAD AVE HORIZONTAL ALIGNMENT

Point 5004	N	13,687,030.31	E	2,143,827.18	Sta	8+33.67
Course from 5004 to 5005 S 41° 30' 57" E Dist 316.62						
Point 5005	N	13,686,793.23	E	2,144,037.04	Sta	11+50.29

CLARK AVE. VERTICAL ALIGNMENT

		STATION	ELEV	GRADE	TOTAL L	BACK L	AHEAD L
VPI	1	9+00.00	660.71				
VPC		9+20.00	660.20	-2.57	K = 93.4		
VPI	2	9+75.00	658.78		110.00	55.00	55.00
VPT		10+30.00	658.02	-1.39			
VPC		11+70.00	656.07	-1.39	K = 225.2		
VPI	3	12+45.00	655.03		150.00	75.00	75.00
VPT		13+20.00	654.48	-0.73			
VPC		14+00.00	653.90	-0.73	K = 66.5		
Low Point		14+48.21	653.73				
VPI	4	14+50.00	653.54		100.00	50.00	50.00
VPT		15+00.00	653.93	0.78			
VPC		15+25.00	654.12	0.78	K = 87.2	SSD = 461.3	
High Point		15+92.93	654.39				
VPI	5	16+00.00	654.71		150.00	75.00	75.00
VPT		16+75.00	654.00	-0.94			
VPC		17+35.00	653.44	-0.94	K = 71.5		
VPI	6	17+50.00	653.30		30.00	15.00	15.00
VPT		17+65.00	653.22	-0.52			
VPC		20+45.00	651.76	-0.52	K = 55.6		
Low Point		20+74.00	651.68				
VPI	7	21+15.00	651.39		140.00	70.00	70.00
VPT		21+85.00	652.79	2.00			
VPC		23+00.00	655.09	2.00	K = 57.3	SSD = 290.5	
VPI	8	24+00.00	657.08		200.00	100.00	100.00
High Point		24+14.51	656.23				
VPT		25+00.00	655.59	-1.49			
VPI	9	33+50.00	642.92	-1.49			
VPC		35+45.00	640.40	-1.29	K = 138.8		
VPI	10	36+00.00	639.68		110.00	55.00	55.00
VPT		36+55.00	639.41	-0.50			
VPI	11	36+87.07	639.25	-0.50			

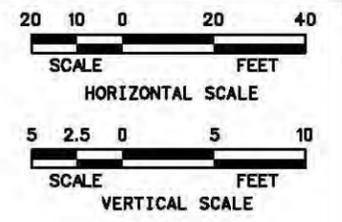
LYRIC AVE VERTICAL ALIGNMENT

		STATION	ELEV	GRADE	TOTAL L	BACK L	AHEAD L
VPC		10+20.00	642.04	-2.00	K = 11.6	SSD = 212.4	
VPI	2	10+40.00	641.64		40.00	20.00	20.00
VPT		10+60.00	640.55	-5.45			
VPC		10+60.00	640.55	-5.45	K = 8.1		
VPI	3	10+80.00	639.46		40.00	20.00	20.00
VPT		11+00.00	639.36	-0.50			



CONSULTANT NAME			
STREET NUMBER AND ADDRESS			
CITY	STATE	ZIP CODE	INTERNET ADDRESS
CITY OF SAN ANTONIO			
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT			
CLARK AVE			
HORIZONTAL AND VERTICAL CONTROL DATA			
% SUBMITTAL	PROJECT NO.	DATE	
DRAWN BY	DESIGN BY	CHECK BY	SHEET NO. OF

Figure 9-14



- NOTES:
- REFER TO "INTERSECTION LAYOUTS" FOR STREET CONSTRUCTION LIMITS AND GRADING INFORMATION.
 - ALL CURB RAMPS ARE TYPE V, UNLESS OTHERWISE NOTED.
 - THE CONTRACTOR SHALL NOT REMOVE OR ADJUST ANY VIA FACILITIES. THE CONTRACTOR MUST CONTACT VIA FOURTEEN DAYS PRIOR, FOR THE REMOVAL OF BENCHES, STOP POLES OR ANY OTHER VIA FACILITIES THAT MAY BE PRESENT. PLEASE PROVIDE THIRTY DAYS PRIOR NOTICE FOR SHELTER REMOVAL. THE CONTRACTOR WILL BE LIABLE FOR ANY DAMAGES TO VIA FACILITIES NOT REMOVED BY VIA. THE CONTRACTOR IS REQUIRED TO REPLACE ALL FLATWORK REMOVED OR DAMAGED IN THE COURSE OF EXECUTING THE CONTRACT UNLESS OTHERWISE NOTED BY VIA. THE CONTRACTOR WILL BE RESPONSIBLE FOR PROTECTING VIA FACILITIES IF ADJACENT TO WORK AREA.
 - REFER TO COSA STANDARD "CONCRETE DRIVEWAY STANDARD" FOR DRIVEWAY PENETRATION INFORMATION.
 - REFER TO COSA STANDARD "CONCRETE BUS STOP PAD" FOR BUS PAD PAVEMENT INFORMATION.
 - REFER TO SHEET 104A "MISCELLANEOUS DETAILS" FOR VIA SHELTER PAD DETAIL.

LEGEND

- CONSTRUCTION LIMITS
- TRAFFIC FLOW ARROW
- CURB RAMP
- DRIVEWAY NUMBER
- CONCRETE VIA BUS PAD
- DRIVEWAY PENETRATION
- GRAVEL TIE-IN
- ASPHALT TIE-IN
- WATER FLOW DIRECTION
- TREE PROTECTION
- TREE REMOVALS

MATCH LINE STA 15+50.00

MATCH LINE STA 20+00.00

MATCH LINE STA 15+50.00

MATCH LINE STA 20+00.00

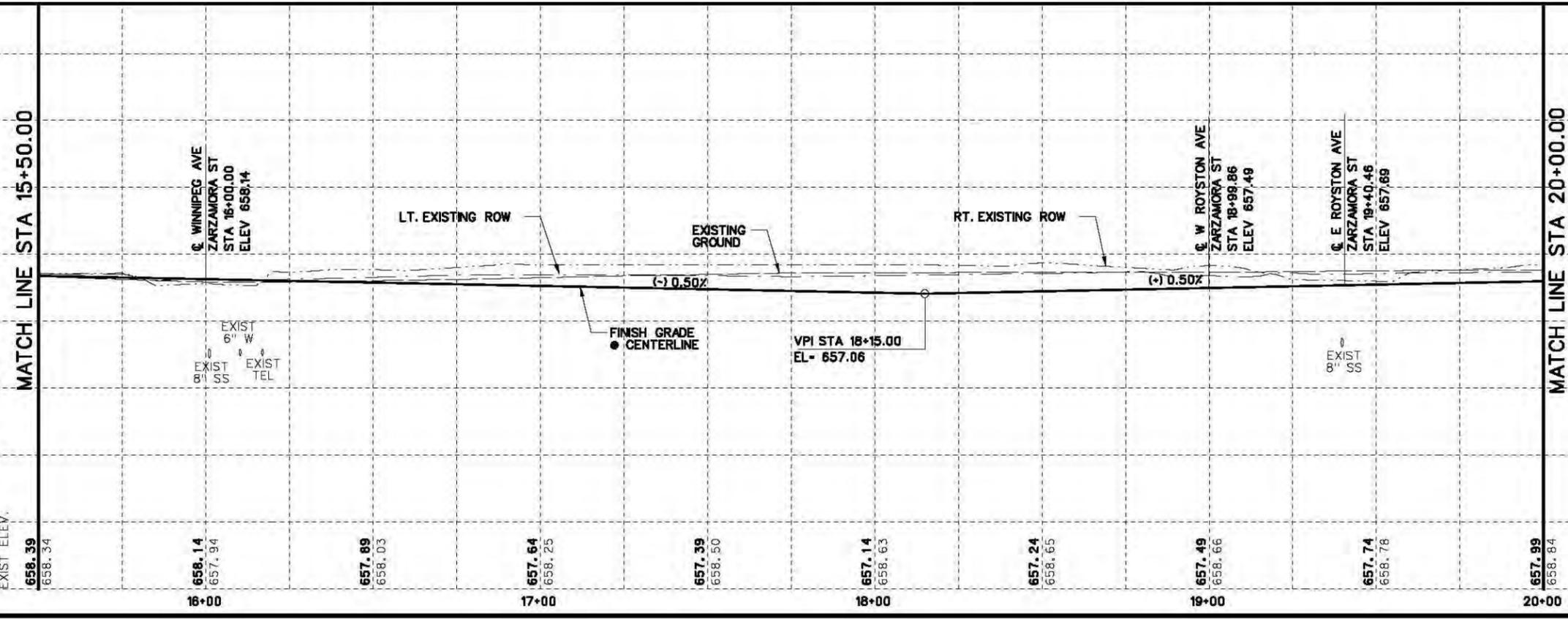
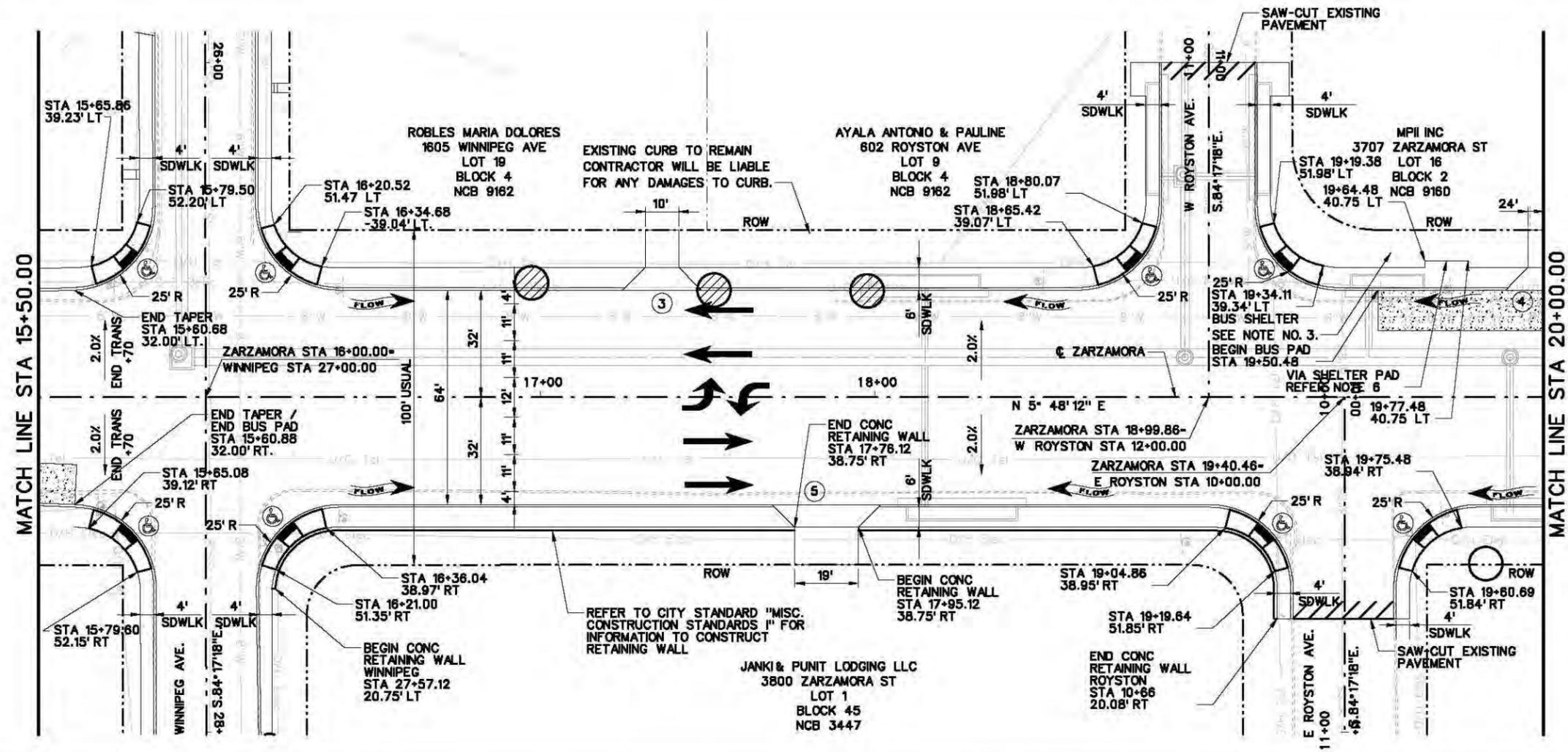


Figure 9-15

NO.	REVISION	BY	DATE

CONSULTANT NAME

CITY OF SAN ANTONIO
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT

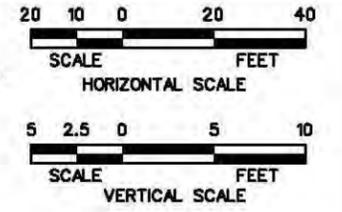
ZARZAMORA DRAINAGE PROJECT #39
(ZARZAMORA ST)

PLAN & PROFILE LAYOUT
STA 15+50.00 TO STA 20+00.00

SHEET 2 OF 18

100% SUBMITTAL	PROJECT NO: 40-00089	DATE: NOV 2010
DESIGNED: RG	DRAWN: RG	CHECKED: JA
		SHEET 65 OF 381

9:21:38 AM
 10/27/2011



- NOTES:
1. REFER TO "INTERSECTION LAYOUTS" FOR STREET CONSTRUCTION LIMITS AND GRADING INFORMATION.
 2. ALL CURB RAMP ARE TYPE V, UNLESS OTHERWISE NOTED.
 3. THE CONTRACTOR SHALL NOT REMOVE OR ADJUST ANY VIA FACILITIES. THE CONTRACTOR MUST CONTACT VIA FOURTEEN DAYS PRIOR, FOR THE REMOVAL OF BENCHES, STOP POLES OR ANY OTHER VIA FACILITIES THAT MAY BE PRESENT. PLEASE PROVIDE THIRTY DAYS PRIOR NOTICE FOR SHELTER REMOVAL. THE CONTRACTOR WILL BE LIABLE FOR ANY DAMAGES TO VIA FACILITIES NOT REMOVED BY VIA. THE CONTRACTOR IS REQUIRED TO REPLACE ALL FLATWORK REMOVED OR DAMAGED IN THE COURSE OF EXECUTING THE CONTRACT UNLESS OTHERWISE NOTED BY VIA. THE CONTRACTOR WILL BE RESPONSIBLE FOR PROTECTING VIA FACILITIES IF ADJACENT TO WORK AREA.
 4. REFER TO COSA STANDARD "CONCRETE DRIVEWAY STANDARD" FOR DRIVEWAY PENETRATION INFORMATION.
 5. REFER TO COSA STANDARD "CONCRETE BUS STOP PAD" FOR BUS PAD PAVEMENT INFORMATION.
 6. REFER TO SHEET 104A "MISCELLANEOUS DETAILS" FOR VIA SHELTER PAD DETAIL.

LEGEND

- CONSTRUCTION LIMITS
- TRAFFIC FLOW ARROW
- CURB RAMP
- DRIVEWAY NUMBER
- CONCRETE VIA BUS PAD
- DRIVEWAY PENETRATION
- GRAVEL TIE-IN
- ASPHALT TIE-IN
- WATER FLOW DIRECTION
- TREE PROTECTION
- TREE REMOVALS

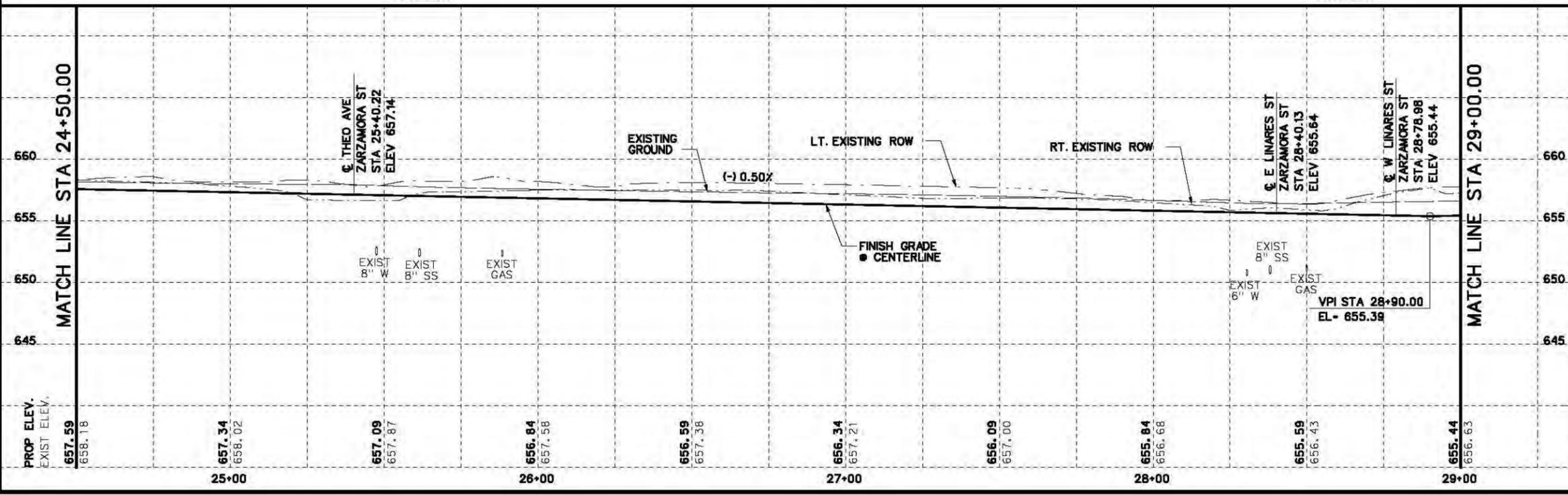
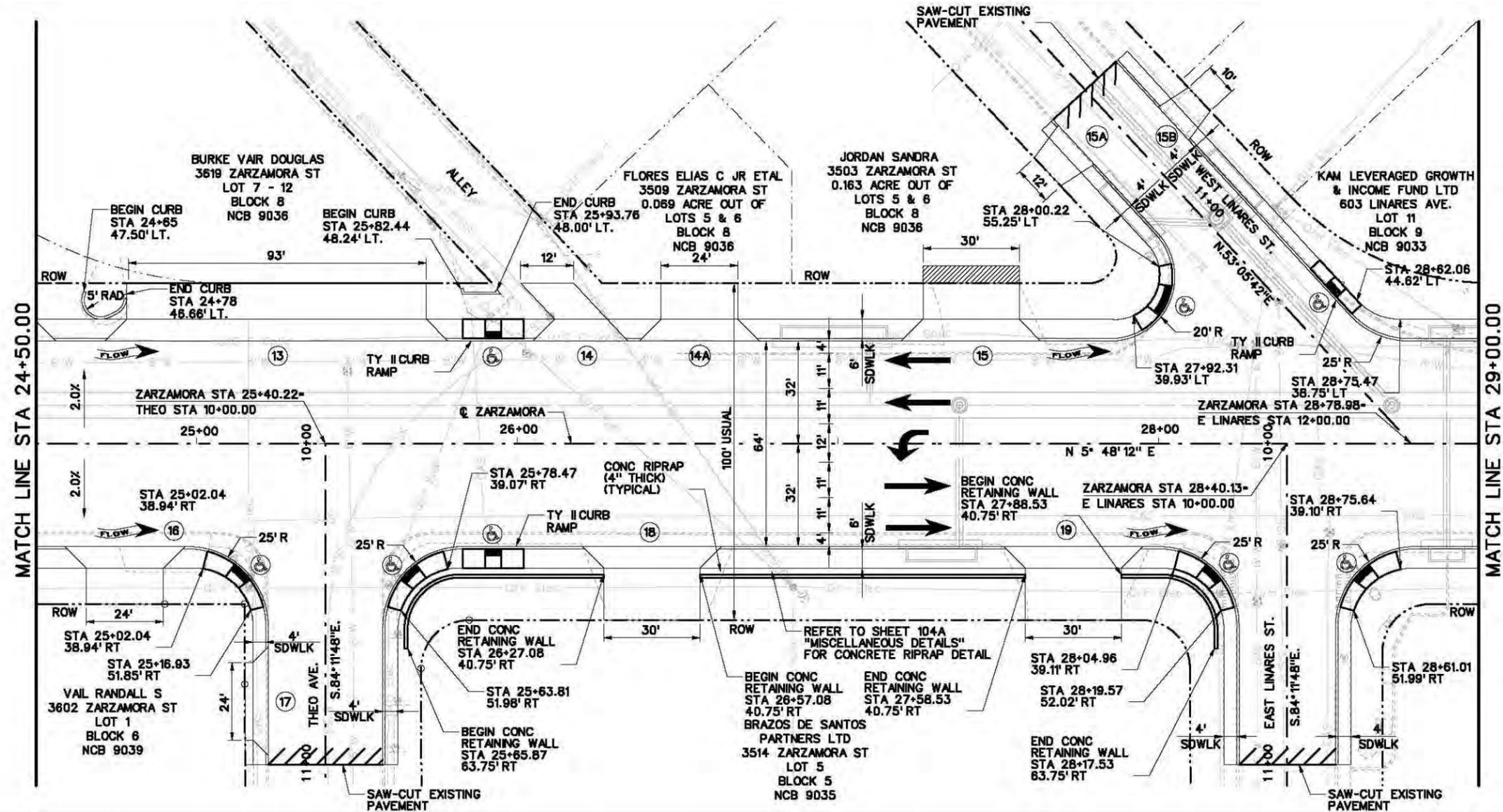


Figure 9-16

NO.	REVISION	BY	DATE

CONSULTANT NAME

CITY OF SAN ANTONIO
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT

ZARZAMORA DRAINAGE PROJECT #39
(ZARZAMORA ST)

PLAN & PROFILE LAYOUT
STA 24+50.00 TO STA 29+00.00

SHEET 4 OF 18

100% SUBMITTAL	PROJECT NO. 40-00069	DATE NOV 2010
DESIGNED: RG	DRAWN: RG	CHECKED: JA
		SHEET 67 OF 381

9:42:40 AM
 10/27/2011
 SPWFLES

Profile View:

- scaled 1" = 10' profile view of the proposed roadway, showing proposed profile(s), existing ground profiles, and ROW and centerline of roadway;
- elevations of existing centerline and proposed top of curbs. Consultant may substitute top of curbs elevations with proposed centerline elevations with approval of City's project manager ;
- stations and elevations along lowest horizontal and grid line;
- vertical data notation, including vertical points of intersection and tangency, vertical curve data, profile grade values, etc.; and
- horizontal and vertical grid lines at incremental spacings based on sheet scale.

Retaining wall layouts will require the following information:

- scaled plan view of the project with alignment(s), ROW, existing features, and proposed improvement features;
- legend for both plan and profile view line styles and elements;
- match lines defining limits of alignment for plan sheet;
- beginning and end station notes for retaining wall(s), including offset from alignment;
- scaled profile view of the proposed roadway, showing proposed top of wall, bottom of wall profiles, and existing ground profiles or finished grade at wall;
- stations and elevations;
- notes at points of interest (beginning, end, angle points, etc.) with station and elevation;
- horizontal and vertical grid lines at incremental spacing based on sheet scale; and
- typical retaining wall section with labels designating points of control on wall.

Utility layout sheets should contain information as noted in Section 5.0, Utility Coordination, and include the following:

- scaled plan view of the project with alignment(s), ROW, existing features, and proposed improvement features;
- proposed and existing utility files with clearly labeled lines and mains; and
- legend for plan view line styles and elements.

Miscellaneous roadway details will contain in-depth construction drawings, guidelines, and instructions on specific elements of interest for the project. These drawings do not have to be to scale, but must contain a set unit of measurement.

Drainage Details

Drainage details will include drainage area map, interior drainage map, hydraulic computations, storm drain plan and profile sheets, drainage cross sections, miscellaneous drainage details, and all applicable standards. Refer to Section 4.0, Drainage, and storm water pollution prevention plans for further drawing requirements and examples regarding drainage.

Signing and Pavement Marking Details

Signing and pavement marking details will be scaled at 1" = 20' or 1" = 40' and will

include pavement marking layouts, signing layouts, signing details, special sign details, and all applicable standards. Pavement marking layouts (figure 9–17) should contain the following:

- scaled plan view(s) of proposed pavement marking configurations;
- symbols of representative elements (such as lanes, cross walks, etc.) with corresponding legend;
- any additional notes required for contractor’s information; and
- station call-outs for beginning and ending of transitions, tapers, etc.

Signing layouts should contain the following:

- scaled plan view(s) of proposed signing locations with station call-outs;
- symbols of representative elements (such as signs, delineators, etc.) with corresponding legend; and
- any additional notes required for contractor’s information.

At the engineer’s judgment, pavement markings and signing layouts can be combined, provided all elements can still be shown without risk of error.

Signing and special sign details will contain in-depth information for mounting, bracketing, guidelines, and instructions on specific lettering and numbering for project signs. These drawings do not have to be to scale, but must contain a defined unit of measurement.

Traffic Details

Typical traffic details will be scaled at 1" = 20' or 1" = 40' and include traffic signal layouts, wiring/conduit layouts, traffic signal details, illumination layouts, and all applicable standards. Traffic signal layouts (figure 9–18) should contain the following information:

- scaled plan view of area with alignment(s), ROW, existing features, and proposed improvement features;
- legend for plan view line styles and elements, traffic elements, etc.;
- match lines defining limits of interest for plan sheet or separation of intersection if needed;
- labels for existing properties, streets or other areas of interest, phases, poles, proposed and existing signing, etc.;
- quantity call-out notes for pay items with corresponding quantity box;
- arrows designating traffic movements;
- phasing diagram with both vehicular and pedestrian movement;
- flash sequence diagram; and
- any additional notes for contractor, including contact personnel.

Wiring/conduit layouts (figure 9–19) should contain the following information:

- scaled plan view of identical area as shown in corresponding traffic signal layout
- labels for existing properties, streets or other areas of interest, phases, poles, proposed and existing signing, etc.;

POLE (A) PROPOSED STEEL STRAIN POLE W/ 2 PROPOSED PED HEADS, PED PUSH BUTTONS AND SIGNS, 3 PROPOSED VIVDS CAMERAS ON LUMINAIRE ARM

POLE (B) EXIST TIMBER POLE W/ DOWNGUY TO BE REMOVED

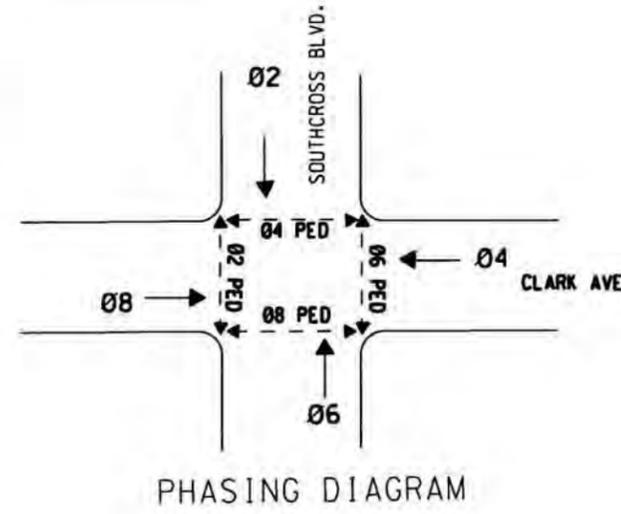
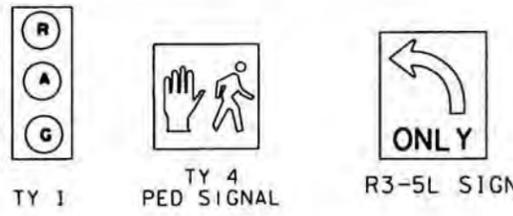
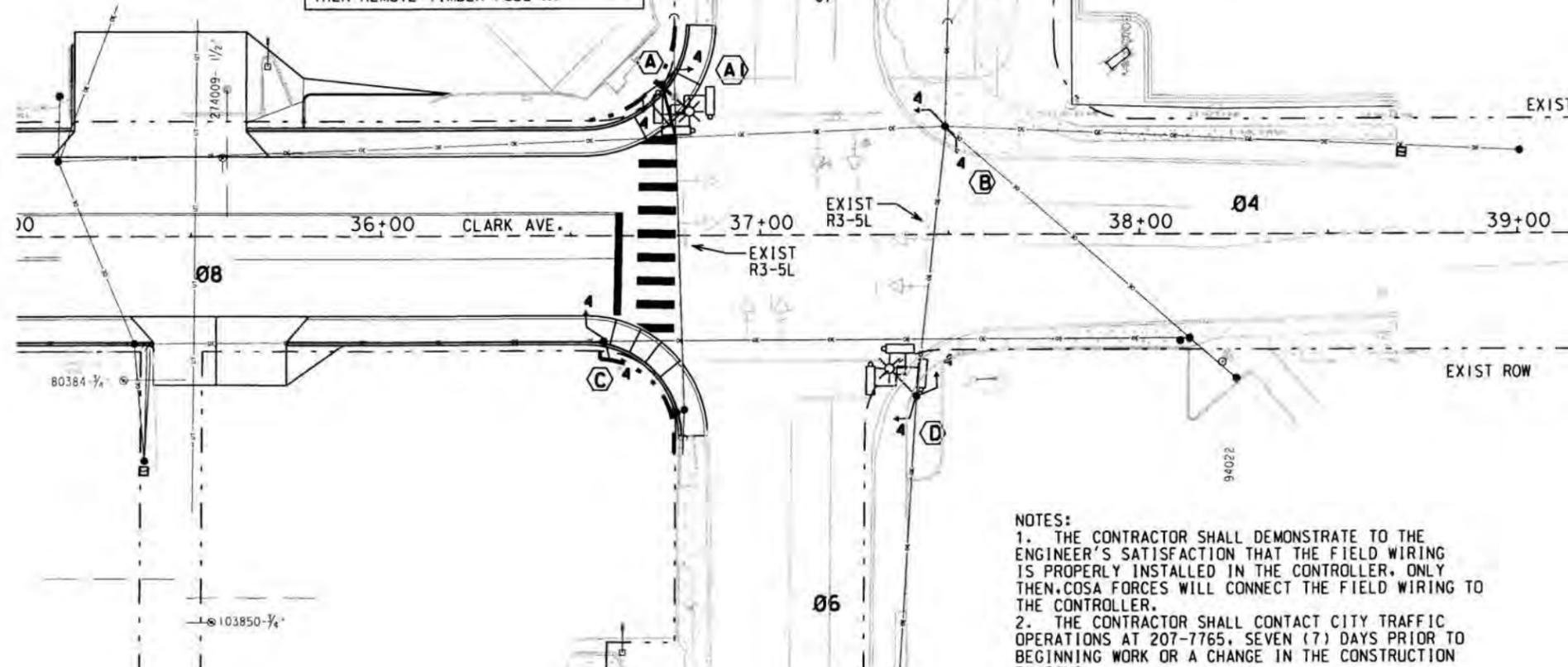
POLE (C) EXIST TIMBER POLE W/ 2 PROPOSED PED HEADS, PED PUSH BUTTONS AND SIGNS

POLE (D) EXIST TIMBER POLE W/ 2 PROPOSED PED HEADS, PED PUSH BUTTONS AND SIGNS, 3 PROPOSED VIVDS CAMERAS ON LUMINAIRE ARM

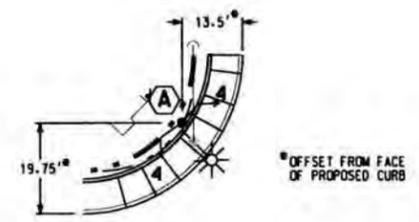
POLE (E) EXIST TIMBER SERVICE POLE W/ SIGNAL CONDUIT AND WIRING

POLE (F) EXIST PEDESTAL MOUNTED CONTROLLER

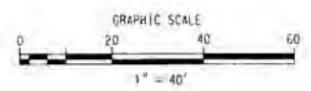
NOTE:
SUSPEND EXISTING SIGNAL SPAN WIRES FROM PROPOSED STEEL STRAIN POLE A THEN REMOVE TIMBER POLE A1



FLASH SEQUENCE:
ALL PHASES RED



POLE "A" LOCATION



14	LF	DRILL SHAFT (TRF SIG POLL) (36 IN)
10	LF	COND (PVC) (SCHD B0) (2")
45	LF	COND (RM) (3/4")
20	LF	COND (RM) (2")
1	EA	GROUND BOX TY D (162922) W/APRON
1	EA	INSTALL HWY TRF SIG (ISOLATED)
1	EA	TEMP TRAF SIGNALS
8	EA	PED SIG SEC (12 IN) LED (2 INDICATIONS)
1300	LF	TRF SIG CBL (TY A) (14 AWG) (9 CONDR)
1	EA	INS TRF SIG PL AM (5) STR (TY B) LUM
8	EA	PED DETECT (2 INCH PUSH BTN)
1	EA	VIVDS PROCESSOR SYSTEM
6	EA	VIVDS CAMERA ASSEMBLY
1	EA	VIVDS SET-UP SYSTEM
1950	LF	VIVDS COMMUNICATION CABLE (COAXIAL)
1	EA	REMOVAL OF TIMBER POLE *
1	EA	INSTALLATION OF LUMINAIRE ARM *
50	LF	INSTALLATION OF STEEL WIRE STRAND *

* FOR CONTRACTOR'S INF'D ONLY (SUBSID TO "INSTALL HWY TRAF SIG")

- NOTES:
1. THE CONTRACTOR SHALL DEMONSTRATE TO THE ENGINEER'S SATISFACTION THAT THE FIELD WIRING IS PROPERLY INSTALLED IN THE CONTROLLER. ONLY THEN, COSA FORCES WILL CONNECT THE FIELD WIRING TO THE CONTROLLER.
 2. THE CONTRACTOR SHALL CONTACT CITY TRAFFIC OPERATIONS AT 207-7765, SEVEN (7) DAYS PRIOR TO BEGINNING WORK OR A CHANGE IN THE CONSTRUCTION PHASING.
 3. ALL EXISTING TRAFFIC SIGNAL EQUIPMENT REMOVED BY THE CONTRACTOR AND TO BE SALVAGED SHALL BE DELIVERED TO THE CITY TRAFFIC OPERATIONS OFFICE (233 S. CHERRY) WITH 48 HRS ADVANCE NOTICE.
 4. UTILITY LOCATIONS SHOWN ARE APPROXIMATE. ALL UTILITIES SHALL BE LOCATED PRIOR TO BEGINNING WORK.
 5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL SIGNAL HEAD ADJUSTMENTS AND MAINTENANCE DURING CONSTRUCTION.
 6. THE CONTRACTOR SHALL INSTALL, MAINTAIN AND OPERATE THE VISUAL IMAGING DETECTION SYSTEM DURING CONSTRUCTION. THE CITY SHALL TAKEOVER OPERATION AND MAINTENANCE, ONCE THE PROJECT IS ACCEPTED.
 7. THE CONTRACTOR WILL PROVIDE THE ENGINEER WITH SIGNAL EQUIPMENT SUBMITTALS AT THE PRE-CONSTRUCTION MEETING.
 8. EXISTING SIGNAL HEADS AND SIGNS TO REMAIN ON SPAN WIRES.

LEGEND

■	PROP. PULL BOX (TYPE A)
■	PROP. PULL BOX (TYPE D)
---	PROP. CONDUIT
●	PROP. STEEL STRAIN POLE
→	PROP. PEDESTRIAN SIGNAL HEAD WITH PUSH BUTTON
□	EXIST. PEDESTAL CONTROLLER
△	EXIST. SIGNAL FACE
○	EXIST. POLE AND SPAN WIRE
●	EXIST. POWER SERVICE
□	PROP. VIVID IMAGING VIDEO DETECTION CAMERA
☀	PROP. LUMINAIRE ARM ONLY



Figure 9-18

CONSULTANT NAME			
CITY OF SAN ANTONIO			
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT			
CLARK AVE			
TRAFFIC SIGNAL LAYOUT			
CLARK AVE AT SOUTH CROSS BLVD.			
% SUBMITTAL	PROJECT NO.	DATE	
DRAWN BY	DESIGN BY	CHECK BY	SHEET NO. OF

POLE (A) PROPOSED STEEL STRAIN POLE W/ 2 PROPOSED PED HEADS, PED PUSH BUTTONS AND SIGNS, 3 PROPOSED VIVDS CAMERAS ON LUMINAIRE ARM

POLE (A) EXIST TIMBER POLE W/ DOWNGUY TO BE REMOVED

POLE (B) EXIST TIMBER POLE W/ 2 PROPOSED PED HEADS, PED PUSH BUTTONS AND SIGNS

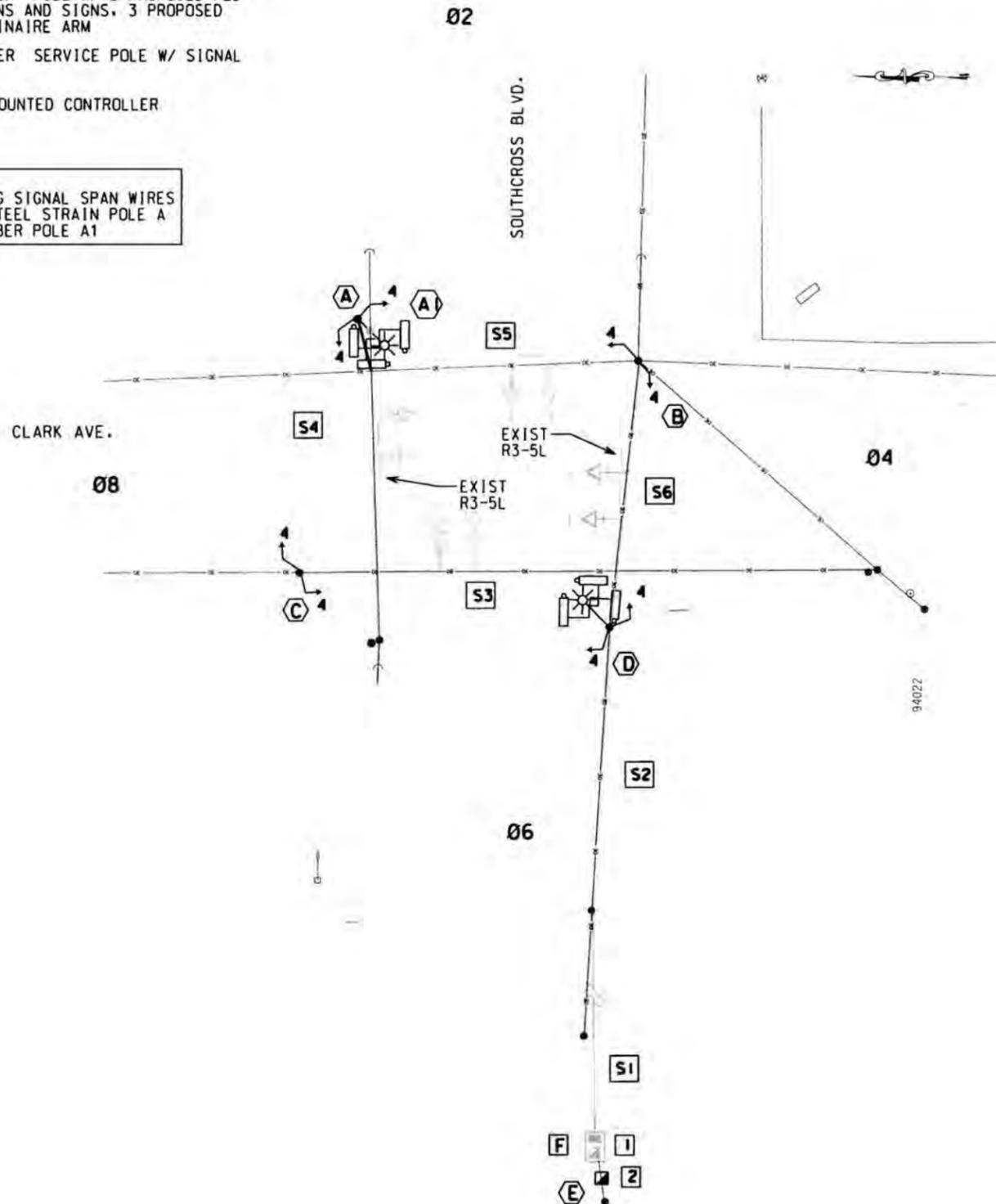
POLE (C) EXIST TIMBER POLE W/ 2 PROPOSED PED HEADS, PED PUSH BUTTONS AND SIGNS

POLE (D) EXIST TIMBER POLE W/ 2 PROPOSED PED HEADS, PED PUSH BUTTONS AND SIGNS, 3 PROPOSED VIVDS CAMERAS ON LUMINAIRE ARM

POLE (E) EXIST TIMBER SERVICE POLE W/ SIGNAL CONDUIT AND WIRING

(F) EXIST PEDESTAL MOUNTED CONTROLLER

NOTE:
SUSPEND EXISTING SIGNAL SPAN WIRES FROM PROPOSED STEEL STRAIN POLE A THEN REMOVE TIMBER POLE A1



CONDUIT AND CONDUCTOR SCHEDULE (SPAN WIRE)									
RUN NUMBER	1	2	S1	S2	S3	S4	S5	S6	
CONDUIT SIZE IN INCHES	CONTRLLR	2	SPAN	SPAN	SPAN	SPAN	SPAN	SPAN	
NUMBER OF CONDUIT(S)		1							
LENGTH OF CONDUIT (FT)		10							
TRENCH (T) / BORE (B)		1							
CIRCUIT		NUMBER OF CONDUCTORS							
#6 XHHW	120 POWER HOT	EXIST TO REMAIN							
	120 POWER COMMON	EXIST TO REMAIN							
#8 BARE	BARE BOND GROUND	EXIST TO REMAIN							
7 / C#14	SIGNALS	02	EXIST TO REMAIN		EXIST TO REMAIN				
		04	EXIST TO REMAIN		EXIST TO REMAIN				
		06	EXIST TO REMAIN		EXIST TO REMAIN				
		08	EXIST TO REMAIN		EXIST TO REMAIN				
9 / C#14	PED SIGNALS		4	4	4	4	2	1	1
		02	2	2	2	2	1	1	
		04	1	1	1	1	1	1	
		06	2	2	2	2	1	1	
RG-59 COMM CABLE W/ 3 - COND 18 AWG POWER CABLE	VIVDS	02							
		04							
		06							
		08							

POLE SCHEDULE						
POLE	A	B	C	D	E	
POLE HEIGHT	30	EXIST	EXIST	EXIST	EXIST	
FOUNDATION TYPE	36A	EXIST	EXIST	EXIST	EXIST	
FOUNDATION DEPTH (FT)	13.2	EXIST	EXIST	EXIST	EXIST	
CONDUIT	3/4" RIGID METAL ON POLE	1	1	1		
	2" RIGID METAL ON POLE				1	
#6 BARE	BARE BOND GROUND	EXIST	EXIST	EXIST	EXIST	EXIST
7 / C#14	SIGNALS	02				EXIST
		04				EXIST
		06				EXIST
		08				EXIST
9 / C#14	PED SIGNALS		1	1	1	4
		02	1			2
		04	1			1
		06	1		1	2
RG-59 COMM CABLE W/ 3 - COND 18 AWG POWER CABLE	VIVDS	02			1	1
		04				
		06				
		08				

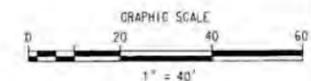


Figure 9-19



CONSULTANT NAME			
STREET NUMBER AND ADDRESS			
CITY	STATE	ZIP CODE	INTERNET ADDRESS
TELEPHONE NUMBER	FAX NUMBER		
CITY OF SAN ANTONIO			
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT			
CLARK AVE			
WIRING LAYOUT			
CLARK AVE AT SOUTHCROSS BLVD.			
% SUBMITTAL	PROJECT NO.	DATE	
DRWN BY	DSGN BY	CHKD BY	SHEET NO. OF

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- conduit and conductor schedule in tabular format;
- pole schedule in tabular format; and
- ductbank details, if required.

Illumination layouts (figures 9–20 and 9–21) should contain the following information:

- scaled plan view of the project with alignment(s), ROW, existing features, and proposed improvement features;
- line work representing the illumination plan, including labels for each fixture associated with the plan;
- legend for plan view line styles and elements;
- match lines defining limits of interest for the plan sheet;
- labels for existing properties, streets or other areas of interest; and
- quantity call-out notes for pay items with corresponding quantity box.

Design Enhancement Details

Enhancement details are independent and specific for each project, when required. No standard is provided for these details other than the enhancement plan. The plan should be clearly presented and understood and be installed in a manner consistent with the public artist's intent. Measurement and payment provisions should be provided, if items do not reference an existing bid item. These sheets will be scaled at 1" = 20' or 1" = 40'.

Cross Sections

Cross sections should be shown at an interval along the roadway(s), at centerline of each driveway, and other areas of interest along the project. The interval should be dictated by the size and the amount of cut/fill of the proposed roadway. A 50' interval is recommended for most projects. In addition, cross sections will be required at points of curvature and points of tangency. Estimates of cut and fill volumes shall also be provided at each section taken.

The following are the minimum requirements for presentation of the deliverables for a city project. Cross section sheets (figure 9–22) should contain the following:

- the proposed roadway, with accompanying improvements such as sidewalks, curbs, retaining walls, driveways, etc.;
- the cross section, reflecting each pavement section component clearly;
- limits of construction (excavation);
- existing ground at cross section;
- stations and name of baseline;
- elevation labels of existing and proposed features at centerline/baseline and top of subgrade (at minimum);
- ROW lines for both existing and proposed (if needed);
- proposed utilities, including the proposed storm drain system
- datum elevations for each individual cross section.
- Offset labels left and right of baseline/centerline
- Cut/Fill quantities

Joint-Bid Utility Notes, Plans, and Details

The consultant will coordinate with the utility owner on plan development, so that all the owner's requirements are met and formatted to provide a uniform look to the overall set of plans.

All joint-bid utility plans will be scaled at 1" = 20' or 1" = 40' and will include the minimum requirements as designated by the owner of the facility. Included will be the following:

- title sheet with reference to the owner and project name;
- general notes sheet;
- summary sheet;
- project layout;
- plan or plan/profile sheets; and
- details.

Driveway Plats

Driveway Plats are used to present improvements to property owners by the city public involvement officer. The information shown on a plat (figure 9–23) will include:

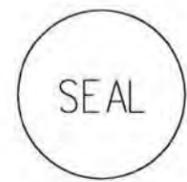
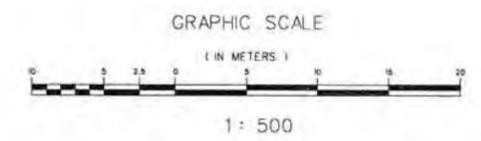
- project name;
- owner's name;
- address for driveway plat;
- statement approving plat and improvements by the city, to proceed with lot numbers and signature blocks for owner and witness;
- a cross sectional view of the driveway with elevations at curblines, back of sidewalk (if present), property line, and at end of driveway (dimensions from centerline of roadway will be provided at each of the aforementioned elevation locations); and
- a plan view with information as listed above, with all improvements adjacent to driveway shown, including width of driveway.

The driveway plats will not be included in a set of plans, but will be required with the PS&E package.



LEGEND

	ELECTRICAL SERVICE
	CONDUIT RUN
	CONDUIT RUN NUMBER
	LIGHT NUMBER / CIRCUIT NUMBER
	GROUND BOX
	ILLUMINATION ASSEMBLIES (SPL TY 4)
	UNDERPASS LUMINAIRE



**ILLUMINATION LAYOUTS
DRY ROUTE TRAIL - "D"**

ILLUMINATION QUANTITIES

QTY	UNIT	DESCRIPTION
1	EA	RDWY ILLUM ASSEM (SPL TY 4)
	EA	RDWY ILLUM ASSEM (SPL TY 5)
	EA	RDWY ILLUM ASSEM (SPL TY 6)
	EA	REMOV RDWY ILL ASSEM (BR MOUNT)
83	M	CONDUIT (PVC)(SCHD 80)(32 mm)
13	M	CONDUIT (PVC)(SCHD 80)(50 mm)
	M	ELEC CONDUCTOR (NO. 12) BARE
102	M	ELEC CONDUCTOR (NO. 6) BARE
	M	ELEC CONDUCTOR (NO. 12) INSULATED
204	M	ELEC CONDUCTOR (NO. 6) INSULATED
1	EA	GROUND BOX TY A (122311) w/ APRON
1	EA	ELEC SERV TYS (120/240) 060 (NS) AL (N) SP (U)
1.8	M	FND FOR RDWY ILL ASM (TY E)(1600 mm DR SH)

CONDUCTOR AND CONDUIT SUMMARY

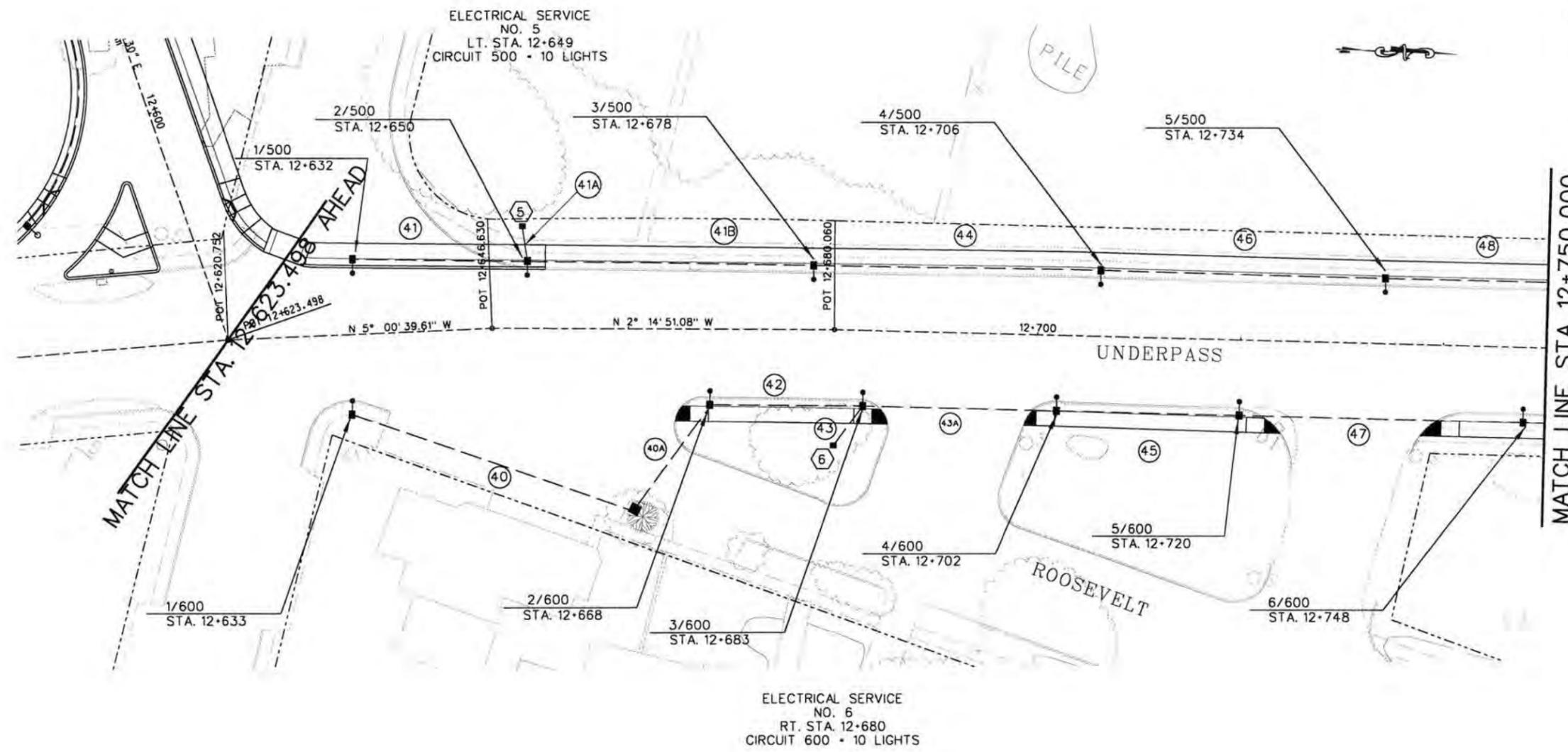
RUN NO.	GROUND NO. & LENGTH		CONDUCTOR NO. & LENGTH		CONDUIT LENGTH		REMARKS
	m		m		m		
	#6 BARE		#6 [NSUL]		PVC 32 mm	PVC 50 mm	
1	1-15		2-15				
2	1-32		2-32		30	13	
3	1-55		2-55		53		
TOTALS	102		204		83	13	

ELECTRICAL SERVICES DATA

Elec. Service No.	Sheet No.	Electrical Service Description (see ED (4) - 00)	Service Conduit Size	Service Conductors No./Size	Safety Switch Amps	Main Ckt. Bkr. Pole/Amp	Two-Pole Contactor Amps	Panel/bd/Loadcenter Amp Rating	Circuit No.	Branch Ckt. Bkr. Pole/Amps	Branch Circuit Amps	KVA Load
1		ELEC SERV TY D(120/240)060(NS)AL(N)SP(U)	1 1/2"	3/#6	N/A	2P/60	N/A	70	A B	2P/20 2P/20	8 8	3.8
2		ELEC SERV TY D(120/240)060(NS)AL(N)SP(U)	1 1/2"	3/#6	N/A	2P/60	N/A	70	A	2P/20	6	1.4
3		ELEC SERV TY D(120/240)060(NS)AL(N)SP(U)	1 1/2"	3/#6	N/A	2P/60	N/A	70	A B	2P/20 2P/20	12 6	4.3
4		ELEC SERV TY D(120/240)060(NS)AL(N)SP(U)	1 1/2"	3/#6	N/A	2P/60	N/A	70	A	2P/20	9	2.2
5		ELEC SERV TY D(120/240)060(NS)AL(N)SP(U)	1 1/2"	3/#6	N/A	2P/60	N/A	70	A	2P/20	15	3.6
6		ELEC SERV TY D(120/240)060(NS)AL(N)SP(U)	1 1/2"	3/#6	N/A	2P/60	N/A	70	A	2P/20	15	3.6

Figure 9-20

CONSULTANT NAME			
STREET NUMBER AND ADDRESS			
CITY		STATE ZIP CODE	
TELEPHONE NUMBER	FAX NUMBER	INTERNET ADDRESS	
CITY OF SAN ANTONIO			
CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT			
MISSION TRAILS			
ILLUMINATION LAYOUTS DRY ROUTE TRAIL "D"			
% SUBMITAL	PROJECT NO.	DATE:	
DRWN. BY:	DSGN. BY:	CHKD. BY:	SHEET NO. OF



LEGEND

- ELECTRICAL SERVICE
- CONDUIT RUN
- CONDUIT RUN NUMBER
- LIGHT NUMBER / CIRCUIT NUMBER
- GROUND BOX
- ILLUMINATION ASSEMBLIES (SPL TY 4)
- UNDERPASS LUMINAIRE

GRAPHIC SCALE
(IN METERS)
1 : 500



Figure 9-21

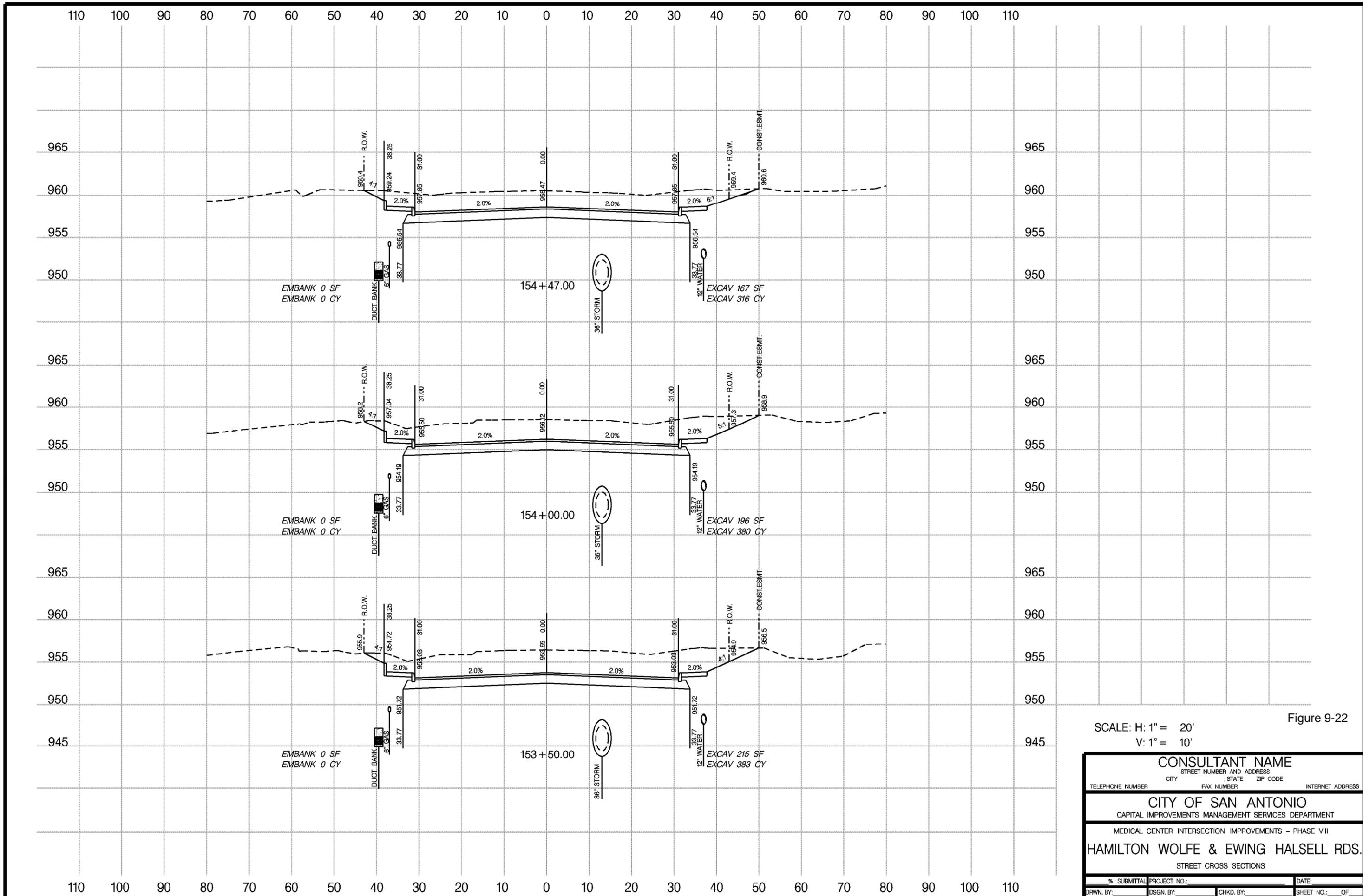
ILLUMINATION QUANTITIES

QTY	UNIT	DESCRIPTION
11	EA	ROWY ILLUM ASSEM (SPL TY 4)
	EA	ROWY ILLUM ASSEM (SPL TY 5)
	EA	ROWY ILLUM ASSEM (SPL TY 6)
	EA	REMOV ROWY ILL ASSEM (BR MOUNT)
	M	CONDUIT (PVC) (SCHD 80) (32 mm)
	M	CONDUIT (PVC) (SCHD 80) (50 mm)
	M	ELEC CONDUCTOR (NO. 12) BARE
	M	ELEC CONDUCTOR (NO. 6) BARE
	M	ELEC CONDUCTOR (NO. 12) INSULATED
	M	ELEC CONDUCTOR (NO. 6) INSULATED
	EA	GROUND BOX TY A (12231) w/ APHON
	EA	ELEC SERV TYS (120/240) 060 TNS AL TN SP III
19.6	M	FND FOR ROWY ILL ASM (TY E11600 mm DR SH)

CONDUCTOR AND CONDUIT SUMMARY

RUN NO.	GROUND NO. & LENGTH		CONDUCTOR NO. & LENGTH		CONDUIT LENGTH		REMARKS
	m		m		m		
	#6 BARE		#6 INSUL		PVC 32 mm	PVC 50 mm	
40	1-32		2-32		30		
40A	1-15		2-15		13		
41	1-20		2-20		18		
41A	1-5		2-5		3		
41B	1-30		2-30		28		
42	1-17		2-17		15		
43	1-7		2-7		5		
43A	1-21		2-21		19		
44	1-30		2-30		28		
45	1-20		2-20		18		
46	1-30		2-30		28		
47	1-30		2-30		28		
48	1-30		2-30		28		
TOTALS	287		574		261		

CONSULTANT NAME		
<small>STREET NUMBER AND ADDRESS</small>		
<small>CITY</small>	<small>STATE</small>	<small>ZIP CODE</small>
<small>TELEPHONE NUMBER</small>	<small>FAX NUMBER</small>	<small>INTERNET ADDRESS</small>
CITY OF SAN ANTONIO		
<small>CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT</small>		
<small>MISSION TRAILS</small>		
ILLUMINATION LAYOUTS		
DRY ROUTE TRAIL "D"		
<small>% SUBMITTAL</small>	<small>PROJECT NO.</small>	<small>DATE</small>
<small>DRWN. BY:</small>	<small>DSGN. BY:</small>	<small>CHKD. BY:</small>
		<small>SHEET NO. OF</small>



SCALE: H: 1" = 20'
 V: 1" = 10'

Figure 9-22

CONSULTANT NAME			
<small>STREET NUMBER AND ADDRESS</small>			
<small>CITY</small>	<small>STATE</small>	<small>ZIP CODE</small>	<small>INTERNET ADDRESS</small>
<small>TELEPHONE NUMBER</small>	<small>FAX NUMBER</small>		
CITY OF SAN ANTONIO			
<small>CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT</small>			
<small>MEDICAL CENTER INTERSECTION IMPROVEMENTS - PHASE VIII</small>			
HAMILTON WOLFE & EWING HALSELL RDS.			
<small>STREET CROSS SECTIONS</small>			
<small>% SUBMITTAL</small>	<small>PROJECT NO.:</small>	<small>DATE:</small>	
<small>DRWN. BY:</small>	<small>DSGN. BY:</small>	<small>CHKD. BY:</small>	<small>SHEET NO.: OF</small>

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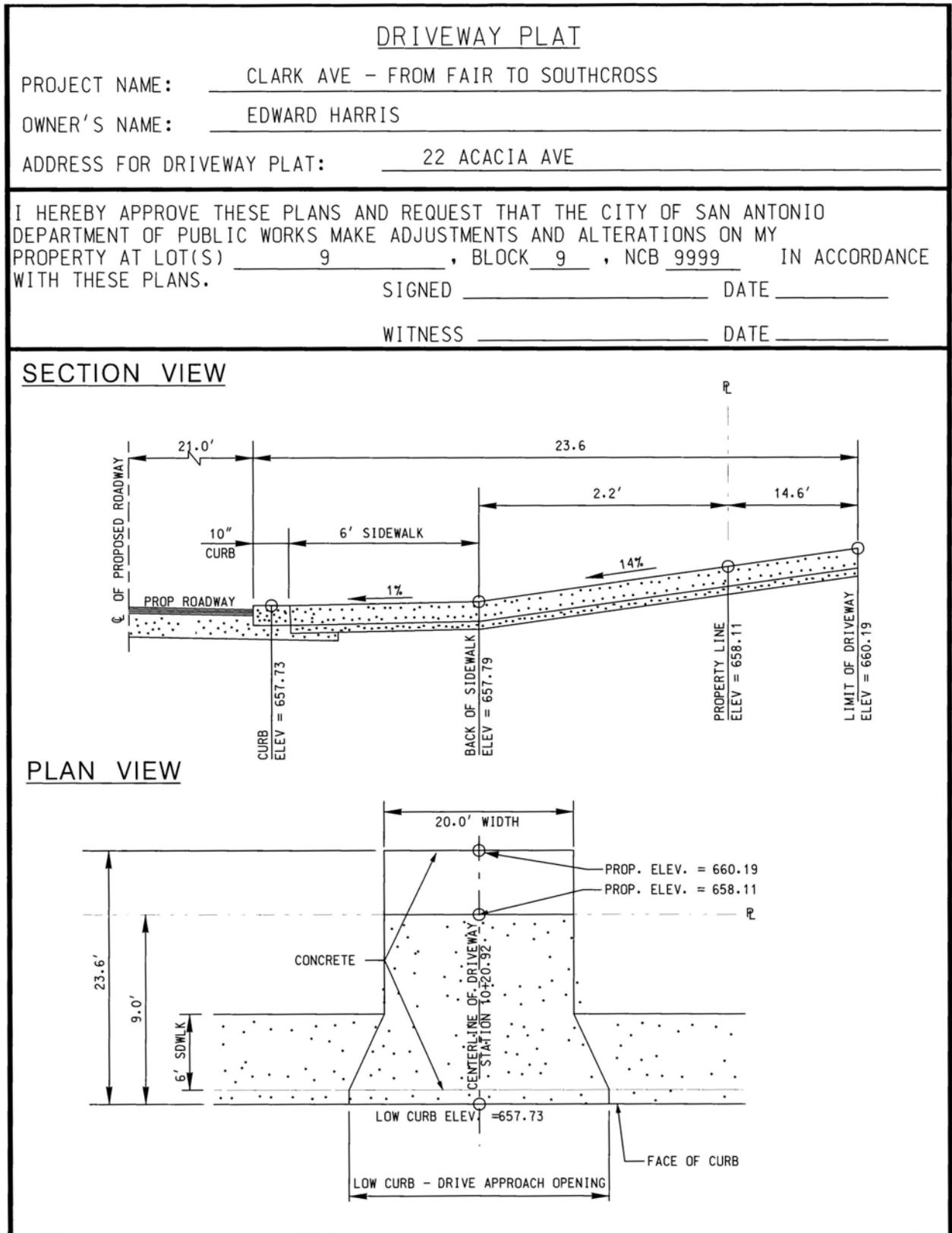


Figure 9-23

CAD Requirements

This section of the manual will address the CAD-related standards and minimum values for each type of plan sheet.

CAD File Management System

The consultant should use a file management system that provides organization among not only CAD files, but all accompanying files, including calculations, reports, spreadsheets, Word documents, plot drivers, project control files, etc.

There is an established file management system in current use for LAM projects which could provide consistency for city projects.

CAD File Naming Convention

All CAD files should consist of reference (as described below) and sheet files.

All files should be named in a logical format, using naming filters to describe content and number if part of a series.

Some example reference file names are:

- MAP_2D_Street X.dgn – 2D survey mapping for Street X
- TCP_Street X_PHASE_01.dgn – Traffic Control Plan phase 1
- PRO_Street X.dgn – profile drawing for Street X
- ALIGN_Street X.dgn – alignment file for Street X

Some example Sheet file names are:

- PLNPRO_01.dgn – plan profile sheet 1
- TYPSECT_PRO_01.dgn – proposed typical section sheet 1
- SW3P_05.dgn – storm water pollution prevention plan sheet 5

There are established naming filters in current use for LAM projects which could provide consistency for city projects.

For whatever naming convention is used, a supplemental listing of the files with corresponding names should be provided with the final deliverables CD.

Seed Files

The coordinate system used for seed files on all city projects will be the Texas State Plane (South Central Zone) horizontal NAD83(93) or NAD 83(CORS) and vertical NAVD 88. Both 2D and 3D seed files are to be set to this standard.

The following working units will be used for civil drawings and standard details and general details:

- MU set to SF
- SU set to TN
- 10 SU to TN

- 100 POS units per SU

Reference files

All CAD files will be in MicroStation format.

Reference, or layout, files will be used in all plan sheet drawings to keep sheet file sizes at a minimum. Reference files comprise survey mapping, proposed features (roadway and utilities), alignments, profiles, and any other layouts showing proposed improvements. All reference files should be 2D, unrotated, full scale, real world coordinates (state plane). 3D files are to be used only for development of existing and proposed surfaces.

Level symbology will be used in sheet files for line style and weight manipulation to achieve results that conform to the criteria described below. While the following provides a guideline, the requirements can be adjusted based on individual project needs and presentation.

Note: Since level symbology is specific to the resource (RSC) files contained on the system developing each project, all RSC files should be included in all CDs used for digital submittals to the city.

Level Conventions

All levels will be in an organized, filtered format for ease of identification. Example file filters and format are as follows:

RDWY_ALIGN_[user defined name]
DRAIN_STORMDRAIN_[user defined name]
SW3P_SILTFENCE_[user defined name]
PROFILE_PROPOSED_[user defined name]

There are established level filters in current use for LAM projects which could provide consistency for city projects. The design firm will provide a listing of all used levels for each project so it is recommended that levels be used efficiently.

Line Weights

Proposed features should be thicker and darker than existing features to provide a clearer presentation of the improvements and proposed features. Existing features could be shown on a gray scale, provided they are reproducible.

Line Styles

Most elements should be drawn in a continuous line style. Such items include:

- proposed edge of pavement, curbs, retaining walls, driveways, sidewalks, drainage, or any instance where a feature is exposed to the view as shown; and
- text, notations and dimensions, match lines, and graphic scales.

Other elements will be represented by the following:

- ROW should be dash-dash-solid;

- all baselines should be solid-dash-solid;
- fence lines should be solid with “x” in line or other to designate specific type of fence;
- utilities should be shown with a brief description of the type and size of facility within a solid line style in accordance with Section 5.0, Utility Coordination;
- existing features will be shown with a dash line style; and
- flow lines will be shown with a solid-dot-dot-dot-solid line.

Color Table

There are standard color tables available. While there is no required table, the designer(s) will use the same for consistency in electronic file appearance and shading.

Text Styles and Sizes

The text styles acceptable are: Leroy, Engineering, Bridge, or Arial. Fancy styles will not be allowed except for logos. Text sizes will be used as dictated by purpose:

Text Usage	Leroy Size	WT	1"=20'	1"=40'	1"=60'	1"=80'	1"=100'	1"=200'
Min	60	0-1	1.2	2.4	3.6	4.8	6	12
Usual	70	1-2	1.4	2.8	4.2	5.6	7	14
Emphasized	100	2-3	2	4	6	8	10	20
Sheet Title	120	3-4	2.4	4.8	7.2	9.6	12	24

Text will be placed to facilitate reading from the bottom or the right hand edge of the drawing. Make every reasonable effort to place text horizontally. Special care shall be taken to place text uniformly and properly. The technician shall use consistent justification and place multiple lines of text as nodes. Use linear leaders only if terminated with an arrow on item called out.

Dimensioning

Presented are general standards regarding dimensioning:

- dimensions of 12 inches or more are to be lettered as feet (e.g., 1.0'); and
- dimensions less than 12 inches are to be lettered as inches only.

Exceptions to these guides are as follows:

- pipe diameters (e.g., 30 " DIA);
- weld dimensions (e.g., 4-16, show no inch marks); and
- reinforcing spacing (e.g., #4 @ 12").

CAD Design Software

GeoPak will be used for all design work within MicroStation. A GeoPak database (.ddb) file will be used to draft all elements associated with reference and layout files, such as alignments, profiles, and cross sections. However, the .ddb file will not be required for miscellaneous line work for quantifying purposes (i.e., pavement markings, curbs, etc.). All elements drawn with the GeoPak database will conform to the established level and filter conventions.

SECTION 10.0

Geotechnical Services

Introduction

The purpose of this section is to provide general guidelines for geotechnical engineering studies for city projects.⁵ If necessary these may be adjusted, based on site-specific subsurface conditions, by qualified geotechnical engineers who are licensed engineers in the State of Texas.

This section is organized as follows:

1. Geotechnical Qualifications — Minimum qualifications/accreditations and test procedures required to provide geotechnical services.
2. Geotechnical Engineering Studies for Pavement Design.
3. Geotechnical Engineering Studies for Structures.
4. Field Operations — Requirements for drilling, sampling, and field testing.
5. Soils and Bedrock Logging — Material order, level of description, and classification.
6. Foundation Design — Selecting foundation types, drilled shafts, piling, and requirements for scour analysis.
7. Retaining Walls – Retaining wall selection, layouts, design, and excavation support.
8. Slope Stability — Requirements for design and analysis.

Geotechnical Qualifications

Minimum Accreditation/Qualifications Required

Introduction

The city requires all geotechnical engineering firms providing services to them to be accredited, qualified, and in compliance with the requirements of the following:

- [ASTM D3740](#) Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
- [ASTM E329](#) Standard Specification for Agencies Engaged in Construction Inspection and/or Testing

⁵ The information and procedures contained herein provide the minimum requirements expected for geotechnical engineering and pavement design for the City of San Antonio. In special cases or instances where additional guidance may be required, the designer shall refer to the latest version of the [Texas Department of Transportation's Geotechnical Manual, Bridge Design Manual, and/or Pavement Design Manual](#) for further information.

- Firms must present a copy of the current, official accreditation by the [American Association for Laboratory Accreditation](#) (A2LA) or the [American Association of State Highway and Transportation Officials](#) (AASHTO).

List of the Minimum Standards to Meet

The A2LA and AASHTO certificate presented to the city will include the following accredited procedures:

Table 10.1
Required Accredited Test Procedures

Test Procedure	Description
ASTM D422	Test Method for Particle-Size Analysis of Soils
ASTM D558	Test Methods for Moisture-Density Relations of Soil-Cement Mixtures
ASTM D698	Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ³ (600 kN-m/m ³)) ²
ASTM D854	Test Method for Specific Gravity of Soil Solids by Water Pycnometer
ASTM D 1140	Amount of Material in Soils Finer than No. 200 Sieve
ASTM D1557	Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ³ (2,700 kN-m/m ³)) ²
ASTM D1883	Test Method for CBR (California Bearing Ratio) of Laboratory-Compacted Soils
ASTM D2166	Test Method for Unconfined Compressive Strength of Cohesive Soil
ASTM D 2216	Water (Moisture) Content of Soil and Rock
ASTM D2435	Test Method for One-Dimensional Consolidation Properties of Soils
ASTM D 2487	Classification of Soils for Engineering Purposes
ASTM D2850	Test Method for Unconsolidated, Undrained Compressive Strength of Cohesive Soils in Triaxial Compression
ASTM D2938	Test Method for Unconfined Compressive Strength of Intact Rock Core Specimens
ASTM D4318	Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

Geotechnical Engineering Studies for Pavement

Introduction

All transportation systems are built either on, in, or with soil and products from the ground. The characterization and evaluation of soils is critical to the performance of pavement structures. The following guidelines will address only geotechnical considerations necessary for the design and evaluation of pavement structures.

This discussion is intended to provide city personnel, consultants, and contractors guidance in establishing soil properties and characteristics to be used in pavement design and determining influencing site characteristics that might require modifications to the pavement structure or adjacent works to accommodate those characteristics. In particular, determination of soil strength, applicable modulus (its stiffness), and matrix stability descriptive of a pavement project, a portion of a project, or materials, respectively, will be the result of the analysis. From this information, a report should be prepared that documents the findings from the geotechnical investigation. Once the subgrade properties

are determined, the pavement section should be designed in accordance with COSA [Pavement Design Standards](#).

Subsurface Exploration

Borings

- Prior to performing geotechnical field investigations, the geotechnical engineer or representative should perform field reconnaissance to determine existing pavement conditions, site access, and traffic conditions.
- Frequency of Borings is to be determined by the project geotechnical engineer.
- Final boring spacing should be determined by the geotechnical engineer, but in no case should exceed 1,000 linear feet
- Depth of Sampling:
 - Sample materials at 2.5 foot intervals to a depth of at least 10 feet. Where cuts are required that exceed this depth, sampling should be conducted to roadbed depth plus 5 additional feet. When materials change physical characteristics, a new bulk sample should be started.
- Backfilling of Test Borings
 - Drill holes must be filled or plugged to prevent injury to livestock or people in the area and to minimize the entry of surface water into the bore hole. If surface contamination of lower aquifers or cross contamination is a concern, the backfilling should be done using bentonite pellets or grout. All borings drilled over the [Edwards Aquifer Recharge Zone](#) should be backfilled in accordance with TCEQ's regulatory requirements. Where borings penetrate asphalt and/or concrete, the borings should be patched with similar materials.

Sampling

The two primary sampling techniques used in pavement material analysis are disturbed and undisturbed. Each is descriptive of the amount of disruption of the soil matrix from its natural or in situ state.

- Disturbed
 - Disturbed samples are frequently referred to as bulk samples. The materials are generally collected with a power auger with helical flights that raise the materials to the surface so they can be collected. This method is efficient, since a great amount of materials can be collected in a short amount of time.
- Undisturbed
 - Undisturbed samples are not requested frequently. The advantage of having these samples is being able to test the material with (relatively) little disturbance, at the moisture content and density at which it was extracted.

Laboratory Evaluation

The laboratory testing program should be established by the geotechnical engineer based on conditions encountered in the borings. As warranted, the geotechnical testing procedures should typically include the following:

Table 10.2
Typical Laboratory Soil Test Procedures

Test Category	Test	Test Method*	Significance
Visual Identification	Soil Classification	Tex-142-E	Use as a check to verify assumed soil properties
Index Properties	Particle Size Analysis	Tex-110-E	A quantitative determination of the distribution of particle sizes
	Moisture Content	Tex-103-E	Determines natural subgrade moisture for use in drainage and soil suitability analyses
	Plasticity Index	Tex-106-E	Defines the amount of moisture a material can hold without turning into a liquid, gives an indication of the potential volume change of the material, assists with classification, potential construction/stabilization characteristics, and a measure that has been correlated to numerous engineering properties
	Potential Vertical Rise	Tex-124-E	Swell potential of subgrade soils
	Moisture Density Relationship	Tex-114-E	Compaction control purposes during construction can provide stronger, more durable materials
Strength Properties	California Bearing Ratio	ASTM D 1883	Strength of subgrade materials
Chemical Properties	Determining Sulfate Content in Soils	Tex 145-E	Soil analysis to determine the presence and the quantity of soluble sulfates that could have detrimental reactions with chemical (calcium-based) soil modifiers
	Soil Conductivity	Tex-146-E	Field detection of sulfate soils
	Soil pH	Tex-128-E	Determining the alkalinity or corrosivity of soils
	Soil Resistivity	Tex-129-E	Corrosivity of subgrade soils

* TxDOT Standard Test Method

Pavement Section Design

Pavements should be designed in accordance with the City of San Antonio Pavement Design Standards, [Appendix 10-A](#).

Geotechnical Summary Report for Pavement Design Development

Upon completion of the field investigation and laboratory testing program, the geotechnical engineer will compile, evaluate, and interpret the data and perform engineering analyses for the design of pavement foundation layers. In addition, the

geotechnical engineer will be responsible for producing a report that both presents the subsurface information obtained from the site investigations and provides specific pavement section design and construction recommendations. The report must be signed by an engineer who is licensed in the State of Texas.

Since the scope, site conditions, and design/construction requirements of each project are unique, the specific contents of a geotechnical design report must be tailored for each project. The report should identify subsurface soil and rock conditions and provide recommended design parameters for each of these units. This requires a summary and analysis of all factual data to justify the recommended index and design properties. Groundwater conditions are particularly important for both design and construction; therefore, they need to be carefully assessed and described. For every project, the subsurface conditions encountered in the site investigation need to be compared with the geologic setting to better understand the nature of the deposits and to predict the degree of variability between borings.

Geotechnical Engineering Studies for Structures

Introduction

Conduct soils surveys for projects with the following features:

- bridges;
- retaining walls;
- slopes and embankments;
- sign structures;
- illumination;
- sound walls; and/or
- radio towers.

Minimum required testing for all structures includes Texas cone penetration (TCP) and/or standard penetration test (SPT) testing at 5-foot intervals, as well as rock quality designation (RQD) and percent recovery if rock coring is utilized.

Review of Existing Data

When available, existing data should be reviewed to estimate required boring frequency and depths. At a minimum, [USGS maps](#) should be reviewed to determine whether deep soil or shallow rock conditions are anticipated.

Boring Location

The complexity of geological conditions and the type, length, and width of a structure determine the number of borings required for foundation exploration.

Borings sites should be in accessible areas, where possible. When determining the location of test holes, exiting utilities and overhead power lines should be considered. If possible, avoid steep slopes and standing or flowing water. Deviations within a 20-foot radius of the staked location that do not include a greater than 5-foot deviation in elevation are not usually excessive, but note them on the logs and obtain the correct surface elevation.

When determining the location and depth of test holes, carefully consider these factors:

- test hole depth;
- lowering of gradeline;
- channel relocations and channel widening;
- scour;
- foundation loads; and
- foundation type;

Bridges

The following figure shows the minimum number of test holes for common types of bridge structures. Avoid spacing test holes more than 300 feet apart.

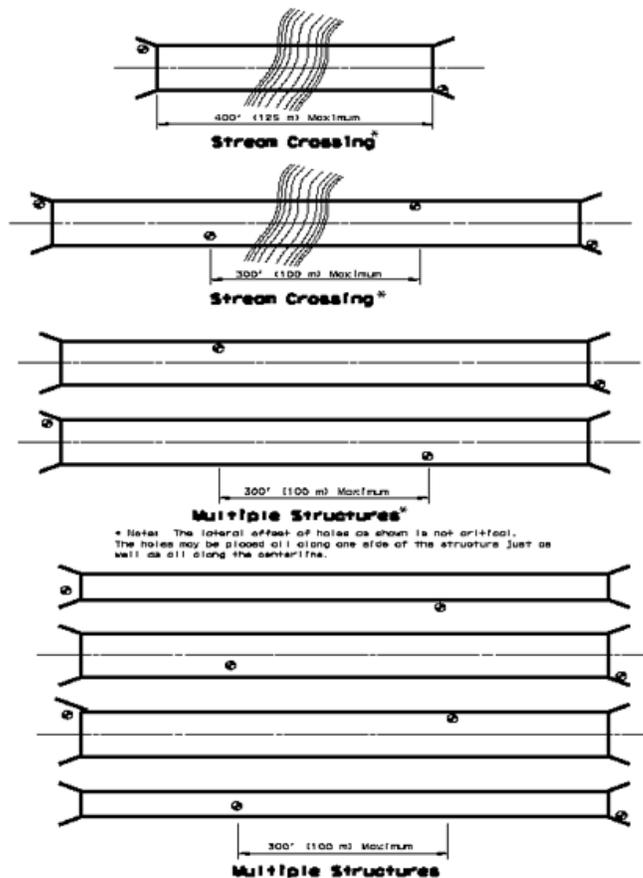


Figure 10-1 Minimum number of test holes for common types of structures

In general, drill test holes 15 to 20 feet deeper than the probable tip elevation of the foundation. Estimate the probable founding or tip elevation from the results of Texas cone penetration tests and correlation graphs, "[Texas Cone Penetration Test](#)," and experience with foundation conditions in the area. Pay special attention to major structures where high foundation loads are expected. If the depth of the boring is questionable, consult the design structural engineer for a detailed analysis of projected foundation loads and foundation capacities.

Stream Crossings

Structures over channels less than 200-feet wide are classified as minor stream crossings. For these crossings, a boring on each bank as close to the water's edge as possible is sufficient. If boring information varies significantly from one side of the channel to the other, a boring in the channel may be necessary.

Major stream crossings require core borings in the channel if no existing data are available. A site inspection by the driller or logger is necessary to evaluate site accessibility and special equipment needs.

Grade Separations — If the structure borings indicate soft surface soils (fewer than 10 blows per foot), additional borings and testing may be required for the bridge approach embankments.

Bridge Field Exploration — The exploration should include the following:

- Test hole spacing. Complete test holes near each abutment of the proposed structure plus a sufficient number of intermediate holes to determine the depth and location of all significant soil and rock strata. If there is no reasonable correlation between borings (for example, TCP and SPT data, stratigraphy), consult with the project engineer to determine the need for additional holes.
- Texas cone and standard penetration tests. Conduct tests at 5-foot intervals beginning at a depth of 5 feet.
- Upper soil layer test. Test as directed under the section titled "Slopes and Embankments," following.
- Soils and bedrock classification. Completely fill out a classification and log record for each test hole on the standard log.
- Groundwater. Include elevation measurements as part of the data acquisition. Site conditions may require installation of piezometers to establish a true groundwater surface elevation and method of monitoring water surface fluctuations.

Retaining Walls

Obtain soil core borings for walls taller than 10 feet. Evaluate walls shorter than 10 feet case-by-case. For most soils, TCP and SPT tests are adequate to design walls and evaluate wall stability.

Soil Borings — Obtain soil borings at 200-foot spacing unless site conditions or the wall designer requires tighter or coarser spacing.

Boring Depth for Fill Walls — For mechanically stabilized earth (MSE) walls, spread footing walls, temporary earth walls, and block walls, the depth of boring should be equal to the height of the wall, depending on the wall type and existing and proposed ground lines. The minimum boring depth is 15 feet below the bottom of the wall, unless rock is encountered. Extending borings 5 feet into rock for fill walls is usually adequate.

Boring Depth for Cut Walls — For drilled shaft walls, tied-back walls, and soil and rock nail walls, always base the depth of boring on the final grade lines. Cantilever drilled shaft walls require the depth of boring to extend the anticipated depth of the shaft below the cut, typically between one and two times the height of the wall. Borings for soil nail and rock nailed walls need to be advanced through the material that is to be nailed. Borings should extend a minimum of 20 feet below the bottom of the proposed wall. Borings for cut walls may need to penetrate rock significant distances depending on the depth of the cut and height of the wall.

Soil Samples and Testing — Provide additional testing for taller walls, walls on slopes, or walls on soft foundations, as necessary to completely evaluate wall stability. Additional testing includes, but is not limited to, obtaining samples for consolidation testing, triaxial testing, or in-place shear testing to determine soil strength. Consult with the wall designer for development of the complete soil exploration plan.

Groundwater — Include groundwater elevation measurements as part of the data acquisition for retaining walls. Site conditions may require the installation of piezometers to establish a true ground water surface elevation and method of monitoring water surface fluctuations.

Other Structures

Conduct foundation investigations for high-mast illumination, radio towers, and overhead sign structures when other borings are not located nearby. The typical depth of the boring ranges from 30 to 50 feet, but depends on existing and proposed ground lines, soil consistency, and structure loading.

Slopes and Embankments

Soil Core Borings — Obtain soil core borings for cuts greater than 10 feet or embankments taller than 15 feet in areas with suspect foundation soils (less than or equal to 10 blows/ft). For most soils, TCP and STP tests are adequate.

The exploration should include the following:

- The soil under future embankments. Advance borings to a depth equal to the height of the embankment or 20 feet, whichever is greater. Conduct TCP and STP testing at 5-foot intervals.
- Soil in proposed cuts. Advance borings to a depth of 15 feet below the bottom of the proposed cut. Conduct TCP and STP testing at 5-foot intervals.
- Groundwater elevation measurements. Include groundwater elevation measurements as part of the data acquisition for slopes and embankments. Site conditions may require installation of piezometers to establish a true groundwater surface elevation and method of monitoring surface fluctuations.

Soil Testing — Perform the appropriate field and laboratory tests necessary to determine the soil shear strength for proper soil elevation. The designer must consider the short-term and long-term conditions:

- Short-term — Use TCP and STP tests, in-place vane shear tests, triaxial tests (UU), and/or direct shear tests.
- Long-term — Use consolidated undrained triaxial tests (r-bar) and/or drained direct shear tests.

Estimate long-term strengths of clay soils based on the index properties of the soil. Use the figure included in [Appendix 10-B](#) to correlate TCP and STP test results to angle of internal friction for cohesionless soil.

Field Operations

Drilling

Introduction

Consider the following items before starting core drill operations:

- core drill equipment;
- drill rig;
- site preparation;
- access;
- utility clearance;
- traffic control;
- barge work; and
- drill hole filling.

Access

Ensure that permission to enter private property has been secured before drilling.

Utility Clearance

All locations proposed for drilling must be cleared for utilities before the core drill team arrives. When utilities are present, their exact location should be clearly marked by the utility company. The number to phone for utility clearance is 1-800-545-6005. Calls to this number automatically rotate to the three notification centers. Obtain utility clearance at least 48 hours and no more than 14 days before starting core drilling. The three notification centers may be contacted directly as shown below. For SAWS facilities, please contact 704-SAWS.

- Texas Excavation Safety System (TESS) 1-800-344-8377
- Lone Star Notification Center 1-800-669-8344
- Texas One Call 1-800-245-4545

Traffic Control

Provide traffic control in general accordance with Texas [Manual on Uniform Traffic Control Devices](#).

Drill Hole Filling

Drill holes must be filled or plugged to prevent injury to livestock or people in the area and to minimize the entry of surface water into the bore hole. If surface contamination of lower aquifers or cross contamination is a concern, backfill the hole with bentonite pellets or grout. This is especially important in urban areas where ground contamination from leaking underground storage tanks is common.

Sampling Methods

Overview

Use appropriate sampling methods as dictated by the structural engineer, field conditions, and laboratory tests. When allowed, provide continuous sampling and testing for all field drilling methods shown below for visual classification.

Field Testing

Texas cone penetration (TCP) testing — Conduct testing in general accordance with TxDOT's standard test procedure Tex 132-E "Texas Cone Penetration Test." Ensure that the drill rig mobilized to the drill site is equipped with test equipment that conforms to the test procedure. Use a hammer with an automated trip mechanism to regulate the fall of the hammer to 24 inches \pm 1/2 inch.

TCP values described in this manual are either the total number of blows necessary to drive the cone 12 inches or the distance the cone advances in inches in 100 blows.

Standard penetration test (SPT) — Conduct testing in general accordance with [ASTM D1586](#) Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils.

Rock core drilling and sampling — Conduct drilling and sampling in general accordance with [ASTM D2113](#) Standard Practice for Rock Core Drilling and Sampling of Rock for Site Investigation.

Thin-walled tube sampling of soils — Conduct undisturbed sampling of soils in general accordance with [ASTM D1587](#) Standard Practice for Thin-Walled Tube Sampling of Soils for Geotechnical Purposes.

In-place vane shear test — Use this test to determine the in-place shearing strength of fine-grained soil which does not lend itself to undisturbed sampling and triaxial testing and when encountering organic silty clay (muck) or very soft clay. These materials, however, must be free of gravel or large shell particles, because pushing the vanes through these obstructions would disturb the sample and probably cause physical damage to the vanes. Use the test with extreme caution in soil that has Texas cone penetration values harder than 15 blows/12 inches.

Torvane and pocket penetrometer — These devices are useful for index and classification purposes. They yield only approximate information and are not suitable for foundation design.

Soil and Bedrock Logging

Logging

Material Order of Description

Keep core descriptions as simple as possible by generally following [ASTM D5434](#) Standard Guide for Field Logging of Subsurface Explorations of Soil and Rock as the guide for field logging of subsurface exploration of soils and rock. The order of description is as follows:

1. material
2. density or consistency, hardness
3. moisture
4. color
5. cementation
6. description adjectives
7. unified soil classification system
8. rock quality designation (RQD), percent recovery

Material

Keep the number of strata to a minimum. Remember that not every small variation in a soil — such as a change in clay from “slightly sandy” to “sandy” — warrants a change in strata. The logger must define strata that have significance to designers who will use the boring log information.

Density or Consistency, Hardness

Use the following charts to determine the density or consistency and hardness of material encountered:

Table 10.3
Soil Density or Consistency

Density (Cohesionless)	Consistency (Cohesive)	TCP Values	Field Identification
Very loose	Very soft	0 to 8	Core (height twice diameter) sags under own weight
Loose	Soft	8 to 20	Core can be pinched or imprinted easily with finger
Slightly compact	Stiff	20 to 40	Core can be imprinted with considerable pressure
Compact	Very stiff	40 to 80	Core can be imprinted only slightly with fingers
Dense	Hard	50 to 5 inches/100	Core cannot be imprinted with fingers,

Density (Cohesionless)	Consistency (Cohesive)	TCP Values	Field Identification
			but can be penetrated with a pencil
Very dense	Very hard	0 inch to 5 inches/100	Core cannot be penetrated with pencil

Table 10.4
Bedrock Hardness

Mohs' Hardness Scale	Characteristics	Examples	Hardness	Approximate TCP Values
5.5 to 10	Rock will scratch knife	Sandstone, chert, schist, granite, gneiss, some limestone	Very hard	0 inch to 2 inches/100
3 to 5.5	Rock can be scratched with knife blade	Siltstone, shale, iron deposits, most limestone	Hard	1 inch to 5 inches/100
1 to 3	Rock can be scratched with fingernail	Gypsum, calcite, evaporites, chalk, some shale	Soft	4 inches to 6 inches/100

Moisture

If any moisture exists, note the extent present. The samples will be assumed dry if the degree of moisture is not indicated. If free water is present, describe the soil as wet or water-bearing.

Color

Describe the primary color and restrict description to one color. If one main color does not exist in a sample, call it multicolored.

Cementation

Identify the degree of cementation, if any is present.

Description Adjectives

Use [ASTM D2488](#) Standard Practice for Description and Identification of Soils (Visual-Manual Procedure).

Unified Soil Classification System

This soil system is based on the recognition of the type and predominance of the constituents, considering grain size, gradation, plasticity index, and liquid limit. It includes three major divisions of soil: coarse-grained, fine-grained, and highly organic. See [ASTM D2487](#) Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System) for the procedure for determining soil classification.

Rock Quality Designation (RQD)

Determine the RQD for rock core samples following [ASTM D6032](#) Standard Test Method for Determining Rock Quality Designation (RQD) of Rock Core. Always note the RQD and percent recovery on logs of borings where rock is encountered.

Log Form

For uniformity, use [ASTM D5434](#) Standard Guide for Field Logging of Subsurface Explorations of Soil and Rock as minimum standard guide for field logging of subsurface exploration of soils and rock.

Retaining Walls

Retaining Wall Selection

Overview

The geotechnical engineer should provide geotechnical design and construction recommendations with regard to retaining wall structures.

Design Considerations

General Design

Design and analyze walls following accepted geotechnical engineering industry standards. In analyses, use earth pressures that follow governing sections of the 17th edition of the AASHTO Standard Specifications for Highway Bridges (2002). For load conditions or walls that are not specifically covered by AASHTO, refer to the TxDOT web page for recommendations.

Check walls to ensure minimum factors of safety are met for all potential modes of failure, including sliding, overturning, bearing pressure, and stability. Consult governing wall standards for assumptions and minimum factors of safety for various modes of failure: the minimum factor of safety is set at 1.3.

Avoid perching walls on slopes. When walls must be placed on slopes, conduct both short- and long-term stability analyses using appropriate soil strengths, geometry, and loading conditions (live load surcharge, hydrostatic, etc.).

Slope Stability

Overview

All slopes, whether a cut or a fill and whether in soil or in rock, must be evaluated for stability for both short-term (undrained) and long-term (drained) conditions. Specific site conditions may require evaluation for additional types of failure, such as bearing capacity, settlement, and undercutting (for rock cuts).

Analysis and Design

Stability Analysis

Use the following data to analyze stability of a slope:

- geometry (cross section and loading conditions);
- location of the water table;
- soil/rock stratigraphy; and
- soil/rock properties (unit, weight, Atterberg Limits, undrained and drained shear strength).

Stability of a slope requires a minimum factor of safety (FS) ≥ 1.3 .

SECTION 11.0

Public Involvement Guidelines

Introduction

This section is a guide to planning and implementing public involvement during the design and construction phases of projects undertaken by the Capital Improvement Management Services (CIMS) Department of the city. This section is not intended to be exhaustive, rather, the checklist format functions as a reminder of elements to consider.

In a broad sense, the design phase is when the project team begins and completes the engineering plans and specifications that will guide project construction. CIMS divides the design phase into 40-percent, 70-percent, 95-percent, and bid documents. The 40-percent design phase is interactive, involving many different interests and perspectives to clarify the needs of the project, analyze alternatives, and recommend the best alternative. The latter stages are focused on plan preparation and assume that all public issues will be resolved with the proposed design. In certain areas where **Complete Streets** have been determined to be a priority due to project location and context, public involvement may be required earlier than 40% design. Projects in such areas shall be identified in the preliminary design conference and included in the Design Summary Report.

Once the preferred alternative has been selected and the team receives approval to move forward, the project moves towards 95-percent and bid documents, when the details of the selected alternative are more fully developed. The project team also conducts environmental review, applies for permits, and prepares the contract bid documents.

Community affairs issues will typically be managed through the CIMS Department. If there is sufficient public interest in the project, the CIMS capital projects officer (CPO) will be engaged to manage public communication. During design, this includes helping the project team identify and understand the community's perspectives and concerns. This should be a two-way, iterative exchange in which the CPO works with the project team to provide information to the community, then receives public comments and suggestions, and then disseminates them to the team. It is also important to follow up and provide feedback to the community to convey how their comments were incorporated. Community involvement can result in better design decisions and increase the likelihood of community support for a project. It's important to note that this work is typically done within the department and is not performed by outside consultants.

Overview of Design Phase

There are three principal elements of responsibility for the CPO during design:

- **Conduct community needs assessment and develop or update a public involvement plan** — Conduct research on the affected community to ensure responsiveness.
- **Implement the public involvement plan** — Plan and arrange all public meetings and other outreach activities.

- **Manage the community relations task** — Develop the community relations scope of work, provide input on the scope and budget for consultants, and provide information regarding the type of public involvement support needed.

Objectives of Public Involvement during 40-percent and 70-percent Design

- Provide information to assist the public in understanding the project, alternatives, and solutions.
- Provide opportunities for public feedback on potential facility locations (e.g., routes, problem areas, etc.), as appropriate.
- Provide opportunities for public feedback on facility design elements, such as site layout, aesthetics, architecture, and landscape design.

Objectives of Public Involvement during 95-percent and 100-percent Design

- Communicate project decisions to the community via fliers. Discuss and demonstrate how their feedback was or was not incorporated and why.
- Provide public information (e.g., fact sheets, graphics) to support the property acquisition and permitting processes, if necessary.
- Explain project details, possible construction impacts, and ways to minimize them, and establish communications channels, typically through a pre-construction meeting.

Project Stages during Design

Preliminary Engineering Report

Pre-design lasts through the 70-percent engineering design phase. During pre-design, the project need and purpose are identified. Examples of alternatives to be evaluated could include whether to repair a facility or replace it. It could also include where to site a new facility or how to manage storm water through the facility. During the pre-design process, a facility concept is selected. This includes the rough sizes and functional arrangement of roadway lanes and intersections.

During pre-design, soil and groundwater investigations, utility locations, and other fieldwork often occurs. This information is used during detailed design to determine roadway cross section requirements and construction methods.

The CPO should plan to conduct a meeting with the public during this phase of work to explain the project and what the city intends to do, including the project need and purpose, information about the configuration of the project, and a schedule of activities.

Role of the Community Relations Planner in Pre-design

During the pre-design phase it is important to determine the need for public involvement. Some projects may be small in scope, and their impact on public activities is minor. For these, the need to have a public involvement task is low and may not be required. Other projects, however, may have significant impact and may require extensive public

outreach to inform and solicit support for the proposed work. Public involvement for small non-controversial projects may be satisfied by contact with affected owners.

On significant projects, the CPO can refine information developed by the design consultant about the purpose and need for the project and can prepare the public to provide input and feedback on the design. Many basic design decisions are made during pre-design, particularly those related to route and basic site layout. Opportunities for input later on in the design process are more limited.

At the end of the 40-percent design, the CPO should include a section in the resulting report that summarizes the information in the needs assessment and public involvement plan. Full copies of the needs assessment and public involvement plan should also be provided as appendices to the pre-design report.

As the project moves toward 70-percent, the concept developed during the 40-percent design is expanded. The scope of the project becomes fixed, as major construction elements are defined and the number of construction contracts and phasing are determined. Major drawings are drafted, and master specifications are determined.

Plans and specifications define the scope of the construction work. The environmental review is often conducted during this phase, after which the team can begin to apply for permits.

At this stage, the CPO can obtain feedback on exterior design elements, such as architectural details and landscaping plans. The planner should also work with the project team to develop responses to likely questions from the community about construction and potential operational impacts. Some type of community meeting is usually held early in this phase to get feedback from the public before final design.

Other tasks that occur during this phase typically include the following:

- obtain any necessary properties, permits, and easements;
- identify and address operations and maintenance, constructability, and risks;
- complete construction contract packaging (the number of contracts and phasing);
- develop construction cost estimates and schedule for budgeting and staffing; and
- hold community and neighborhood meetings and discussions with the city and permitting agencies.

The goals are to inform the public about the project, identify concerns, and develop ways to resolve them before the 70-percent design begins.

95-percent to 100-percent Design

At the 95-percent stage, drawings and specifications are essentially complete. Final permits and final easements are obtained, and final comments are incorporated. At 100 percent design, they are compiled into the bid document.

Role of the CPO in 100 Percent Design

During this stage, the CPO typically provides information to the public on the project status, how public input was incorporated, and the project's next steps: bid and award construction contracts and preparing for transition to construction. Once the design is complete, the bid package is advertised and a contractor is selected. The process of bid solicitation, bid evaluation, and contract awards typically takes about four months.

Role of the CPO in Transition to Construction

During this time, the CPO will develop a detailed plan for construction community relations and should provide a public information update to the community. As the project moves toward construction, the CPO will need to develop tools to rapidly communicate project construction information to directly impacted residents and businesses. Contact lists with phone numbers, e-mail lists, and door-to-door delivery maps are examples of such tools. An emergency communications plan and after hours contact list for project team members is also helpful.

Planning for Public Involvement

The first step in preparing to involve the public during the design phase is to become educated about the purpose and need for the project. CPOs should meet with the project team and review whatever relevant materials are available, including programmatic plans that may initially have defined the need for a project.

The next crucial step is to conduct an initial needs assessment (INA), followed by a full needs assessment (FNA), if needed. These and the draft public involvement plan (PIP) should be written during pre-design and should be prepared by the CPO. These are tools to determine and document the objectives and level of public involvement required for a project. The whole team should agree on the objectives before planning public involvement activities. Will the public have an opportunity to provide feedback on the roadway plan? Be involved in development of the design? How will the project team incorporate feedback? Answers to such questions will help define the role of the public in design, as well as the public involvement activities required.

Role of the CPO in the Environmental Review Process

The Environmental Management Division (EMD) is responsible for ensuring that the city meets the requirements of state and federal environmental policy. The CPO should work with the EMD to determine how public involvement can support that process.

The basic regulations require legal notice to agencies and property owners within 500 feet of the project. This notice is typically prepared by the design consultant. To support this, the CPO may prepare a flier explaining the permit review process or help compile a mailing list of interested groups and other appropriate parties who should receive notice. Official notices of public meetings and hearings must be advertised in local newspapers as part of the NEPA process. Public meetings and hearings require completion of a findings report. These official notices and reports are typically prepared by the EMD and its representatives.

Role of the CPO in Property Owner Interactions

Many projects require the city to obtain a construction or permanent easement or right-of-way from a property owner. The city may also have to obtain a right-of-entry permit to conduct surveying, geotechnical work, or other field investigations. The city’s real property agents are responsible for this work. CPOs are sometimes asked to help with public contacts or to review written materials that explain the project in detail.

Role of the CPO in the Permitting Processes

The design consultant in conjunction with EMD is responsible for obtaining permits for projects. During permitting, the CPO’s role is limited. In some cases, planners may be asked to help a real property agent prepare fact sheets or graphics to respond to a request from a permitting agency. Permitting can involve a number of local, state, and federal jurisdictions and covers such things as water quality, land use, erosion control, street use, noise, hours of operation, and traffic planning. Permits also specify conditions that must be met to minimize community impacts.

Role of the CPO in the Interface with Public Art

If the project is an aboveground capital improvement, 1 percent of the budget may be allocated for public art. The city coordinates the inclusion of public art by publishing a prospectus describing the project, the scope of the artist’s involvement, and the schedule and budget.

The public art program also issues a call for artists and helps the artists work with the community. The CPO should stay in communication with selected artists to ensure the goals of the community are understood.

Working with an artist, the project team may decide to hold a public meeting to discuss the objectives of the public art program and how public art funding might be used. Such a meeting could be held in conjunction with other project goals, such as presenting 70-percent design plans, although the timing of these events may vary.

Implementing Public Involvement

A checklist for public involvement planning and implementation is provided in Table 1 below. The CPO should clarify the level of public involvement appropriate for the project in order to manage public expectations.

Table 1
Design Phase Public Involvement Checklist

Pre-design Phase	Yes or No
<i>Review Existing Materials</i>	
Project description and plan	
Plans or summaries from programmatic or public meetings	
Initial needs assessment and full needs assessment	
<i>Meet with Project Team</i>	
Determine project knowns and unknowns	
Identify when will public input be most helpful?	
Identify any previous commitments made to the public regarding this project	

Pre-design Phase	Yes or No
Identify who will answer technical questions	
<i>Develop a Public Involvement Plan</i>	
What are the topics for public input?	
How will input be collected and used?	
How will the team provide feedback to the public to let them know how their input was used?	
<i>40-Percent Design</i>	
Develop community relations section to report	
Review environmental permit process to support public review	
Support property owner interactions, if ROW to be acquired	
Plan for interface regarding public art	
Determine whether public meetings are needed	
<i>70-percent Design</i>	
Document activities and community input	
Support permitting and land owner interactions as needed	
<i>Transition to Construction</i>	
1. Create a project design closeout folder and finalize the project file: <ul style="list-style-type: none"> a. Public involvement plan b. Newsletters, fliers, and other material distributed to the public c. Correspondence d. Public meetings hearings, and workshop summaries e. Summary of community issues and responses 	
2. Create a mailing list	
Attend pre-construction conference with design team	
Conduct pre-construction survey of residents	
Hold preconstruction meeting with residents	

All communication about the project should be consistent and identifiable. For example, a project identity (such as a logo or nickname) could be developed for a project of long duration. For a shorter project with multiple public outreach tools, use a similar template across all pieces.

Newsletters and Fliers

Newsletters and/or fliers can be used to communicate information on the project’s status to neighbors and other interested parties. Newsletters contain more detailed information, while fliers are useful for advance notice about specific impacts or brief updates that project milestones have been reached.

If there have been significant lulls or a long time has passed since previous interaction with the public, newsletters or fliers may be an appropriate way to update the community, as well as reach new members of the public not familiar with the project. One possible tool would be a “frequently asked questions” section in a newsletter.

It’s important to be inclusive in the development of newsletters and fliers. Therefore, communications tools must be developed to automatically provide large-print and brailled formats. All public meetings must be held at ADA accessible sites, including the provision of sign language interpreters, if requested. All printed materials must inform of this availability.

Public Meetings

If the project team determines that a public meeting is necessary during the design phase, the timing should be carefully considered. The meeting should be held when design is far enough along to show structures, but not so far that input would be meaningless.

Frequently, meetings are held during development of 70-percent design plans, and public feedback is solicited on defined topics. It may be possible to hold the public meeting in conjunction with environmental review. Coordination with the relevant project team members will be necessary to determine overlap, schedule issues, and topics of the meeting. The design engineer should be prepared to attend these meetings to answer questions from the public and to support the meeting by providing exhibits for presentation.

Documentation

As the design activities conclude, it is crucial to document the status of the public involvement, especially the commitments the project team has made to the community or to individuals. Documentation should include the public involvement plan, summaries of public meetings, Advertisements for public meetings or hearings, and public meeting or hearing reports.

Concluding design phase public involvement includes preparation for construction phase public involvement and tailoring the public involvement plan to construction activities. The most important contribution to future public involvement efforts is to ensure that the commitments to the public are documented and that the bid documents include accurate descriptions of these commitments. The construction phase is governed by what is in the bid documents, so it is crucial for the CPO to have input into this process.

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SECTION 12.0

Cost Estimating

Purpose

The purpose of this section is to outline recommended procedures and establish minimum format standards for preparing engineer's estimates.

Introduction

The project cost estimate is an important component of the scope of work performed by the design consultant. Important decisions regarding scope and schedule are made based on the costs presented in the engineer's estimate, therefore, project costs should be developed and reviewed throughout the design phase so adjustments can be made to ensure the work will be delivered within financial expectations.

It's unreasonable to expect estimates made early in the design process to be precise, since these are made at a time when the least is known about the work. However, as the design continues and more becomes known, the accuracy of the estimate improves. To this end, a phased approach to cost estimating is adopted for use on city capital improvement projects. Table 1, below, presents a cost estimate classification matrix taken from the [Association for the Advancement of Cost Engineering International](#) (AACEI). This matrix subdivides estimates into five classifications and provides data regarding level of project definition, usage, method of preparation, expected accuracy, and preparation effort.

Table 1
Cost Estimate Classification Matrix

Estimate Classification	Level of Project Definition Expressed as a % of complete definition	End Usage Typical purpose of estimate	Methodology Typical estimating method	Expected Accuracy Typical +/- range relative to best index of 1 (a)	Preparation Effort Typical degree of effort relative to least cost index of 1 (b)
Class 5	0% to 2%	Screening or Feasibility	Judgment	4 to 20	1
Class 4	1% to 15%	Concept Study or Feasibility	Primarily judgment	3 to 12	2 to 4
Class 3	10% to 40%	Budget Authorization or Control	Mixed, but primarily judgment	2 to 6	3 to 10
Class 2	30% to 70%	Control or Bid/Tender	Primarily deterministic	1 to 3	5 to 20

Estimate Classification	Level of Project Definition Expressed as a % of complete definition	End Usage Typical purpose of estimate	Methodology Typical estimating method	Expected Accuracy Typical +/- range relative to best index of 1 (a)	Preparation Effort Typical degree of effort relative to least cost index of 1 (b)
Class 1	50% to 100%	Check Estimate or Bid/Tender	Deterministic	1	10 to 100

Notes:

(a) If the range index value of “1” represents +10%/-5%, then an index value of 10 represents +100/-50%.

(b) If the cost index value of “1” represents 0.005% of project costs, then an index value of 100 represents 0.5%.

Using this matrix, it can be seen that most estimates that are prepared for projects managed by the CIMS Department of the city will be either class 1, class 2, or class 3 estimates. Class 4 or class 5 estimates may be required from time to time, but only for those projects where project screening reviews are conducted or where project concept studies are needed.

Preparing Engineer’s Estimate

The critical review of a project’s scope or a contractor’s bid price depends on the purpose and reliability of the estimate. Therefore, the design consultant is strongly urged to employ the same level of detail in preparing estimates as does the contracting industry. The engineer’s estimate should reflect the amount that the current contracting community considers fair and reasonable for performance of the work. Under-estimating causes project delay, while additional funding has to be arranged to meet the contract costs. On the other hand, over-estimating causes inefficient use of funds that could be directed to other projects.

There are two basic approaches to estimating project costs: stochastic methods and deterministic methods. In stochastic methods, the variables used in cost estimating are generally something other than a direct measure of the work. The cost estimating relationships are subjective, not exact. Deterministic methods, on the other hand, incorporate direct measurements of the work and are not subject to supposition. Generally, as the level of design increases, the estimating methodology moves from stochastic to deterministic.

Most estimates prepared for CIMS will be deterministic, so stochastic methodologies will not be presented here.

Deterministic Estimating Method

Deterministic cost estimating is based on direct measurement of the work that is to be accomplished. Therefore, this method can be employed for preparing engineer’s

estimates when sufficient design has occurred to allow definition of the work. To this end, engineer estimates are required upon completion of the 40-percent design, 70-percent design, and 95-percent design. These estimates will comprise the following:

- descriptions of work elements to be accomplished (tasks);
- a quantity of work required for each task; and
- a cost for each task quantity.

A unit cost for each task is developed to increase the accuracy of the estimating procedure and should provide a reference comparison to historic experience. For this reason, the descriptions of work elements used in the estimate must closely parallel those used in the bid items presented in the city's standard specifications. Non-standard work descriptions must be documented, so the work referenced is fully understood. The documentation must address not only material requirements, but must also quantify labor in terms of crew type, size, equipment, and production rates. Lump sum estimating, when used at the task level, must also be documented.

Estimate preparation is dependent upon the design consultant thoroughly understanding the project scope of work, the bid-ability, constructability, operability, and all other aspects of the project being estimated. The engineer must also know the drawings, specifications, and other references to formulate a construction sequence and duration. The construction sequence must be developed as soon as possible and should be used to provide a checklist of construction requirements throughout the cost estimating process.

The quantity "take-off" is an important part of the cost estimate. It must be as accurate as possible and should be based on available engineering and design data. After the scope has been analyzed and broken down into construction tasks, each task must be quantified prior to pricing. Equal emphasis should be placed on both accurate quantity calculation and accurate pricing. Quantities should be shown in standard units of measure and should be consistent with design units typically used in the city's standard specifications. In addition, quantities should be calculated by sheet, and quantity tables that identify the work on that drawing should be provided on each plan and profile drawing.

The detail to which the quantities are prepared for each task is dependent on the level of design detail. Quantity calculations beyond design details are often necessary to determine a reasonable price to complete the overall scope of work for the cost estimate. Project notes will be added at the appropriate level in the estimate to explain the basis for the quantity calculations, to clearly show contingencies, and to note quantities determined by cost engineering judgment that will be reconciled upon design refinement.

Types of Costs

Various types of cost elements must be evaluated in detail. Direct costs are those which can be attributed to a single task of construction work. These are usually associated with a construction labor crew performing a task using specific materials. Labor foreman costs should normally be considered as direct costs. Subcontracted costs should be considered as direct costs to the prime contractor in estimates. Indirect costs are those which cannot

be attributed to a single task of construction work. These include overhead, profit, and bond. Indirect costs are also referred to as distributed costs.

Estimates based on detailed design will be developed from separate direct cost pricing of labor, material, construction equipment, and supplies. Applicable indirect costs will be added later to reflect the total construction cost. Other costs, including lands and damages, escalation, design contingencies, and construction contingencies, construction supervision and administration, and engineering during construction, will be added to the construction cost to determine the total project cost according to program-specific requirements.

Price Sources

Various pricing sources should be obtained and be available to the design engineer. In using pricing from any source, experience and ability to relate data in hand to a specific circumstance is important. The following discussion is provided on commonly used cost sources and source development.

City Bid Tabulations (CBT) — These are available from the CIMS Department or the Department of Public Works. They contain repetitive construction tasks with direct cost pricing (labor, equipment, material) based on standard city bid items. The data are taken directly from bid openings for a variety of city projects. These data are historical and can be an excellent pricing source when adequate details have been saved. Before applying these costs to new work, the design engineer must understand the context in which the prices were determined and be satisfied that the conditions in the new project are similar, otherwise, adjustments must be made.

Development of specific tasks — When standard tasks do not meet project needs, specific new tasks need to be developed. Such development requires experience. Descriptions developed for new tasks must adequately define the scope and material requirement. Unit cost for each task is developed as a direct cost with separate costing for the labor, equipment, and material components. Notes which explain key factors in the pricing and methodology should accompany the task development. Comparison with existing pricing guides, such as Means CostWorks[®], is recommended.

- **Labor unit cost** — This cost is based on a defined crew which performs the tasks at an assigned production rate. Hourly rates for each craft are applied to the crew labor to arrive at the hourly crew labor cost. The total crew labor cost/hour is divided by the expected production rate (units/hour) to derive the labor cost/unit.
- **Equipment unit cost** — This cost is derived similar to labor unit cost. Hourly equipment rates are obtained from an appropriate regional manual such as the United States Army Corps of Engineers manual entitled, “Construction Equipment Ownership and Operating Expense Schedule” (herein referenced as, Equipment Ownership Schedule), [Engineer Pamphlet \(EP\) 1110-1-8](#).
- **Material unit cost** — This cost is developed using vendor quotes, historical costs, commercial pricing sources, or component calculations. The price should include delivery to the project site.

Commercial unit cost books — These common sources are typically available through subscription or purchase. Basis of costs shown are typically explained along with adjustment methodology. Such publications are valuable “second-opinion” verification and appropriate for minor commercial type work item pricing.

Costs and Pricing

The cost for each task should be developed by summing the direct cost elements for labor, equipment, and materials. Indirect costs and other markups associated with each task or work item should be identified and are considered separately for the specific project.

The direct cost of construction tasks of minor overall cost significance and of a repetitive nature can normally be priced from any of the sources discussed above. When using historical pricing, adjustments must be made for project location, work methodology, quantity of work, and other dissimilarities which affect prices.

Use of lump sum items is discouraged. If lump sum items are used in the estimate, they must have backup cost data relating to their tasks and source of the data. As a rule of thumb, when a task extended direct cost is \$10,000 or more, or 5 percent of the total direct cost, whichever is less, detailed backup for the cost should be prepared or quotations obtained as pricing support to the cost estimate.

Applying the same rule of thumb, unit price bid items for city estimates may be based on suitable experienced bid prices or historical cost data, i.e., the predetermined bid item does not exceed \$100,000, or 5 percent of the estimated total cost, whichever is less.

For cost estimates prepared during preliminary or planning phases, where design is limited or not available, predetermined unit prices, adjusted to current pricing level, may be used by the design engineer. Use of experienced prices should consider any necessary adjustments in prime contractor’s profit or distributed costs appropriate to the contract requirements.

The design engineer must use extreme care and sound judgment when using predetermined or historical unit costs. The basis for the unit costs should be well documented and included in the supporting data for the estimate. Where a bid item consists primarily of equipment and labor costs, with very little materials and supplies, it is advisable to develop the cost as indicated above, even though the item may fall under this rule of thumb.

Inflation will be accounted for by the city manager. The design engineer will not include inflation factors in his or her estimates.

Composition of City Estimates

The city estimate prepared at 40-percent, 70-percent, and 95-percent should include the following primary elements: narrative of contract cost, estimate backup data, and miscellaneous support data.

Narrative of Contract Costs

This part of the estimate of construction cost describes the scope tasks and costing. It contains discussions, considerations, and the developed construction plan. The types of items normally included are:

- *Table of contents.* This page denotes the backup content.
- *Project narrative.* Providing general details of the project, the narrative defines the assumptions made during the preparation of the cost estimate. It describes the project requirements that must be performed in sufficient detail to give a clear understanding of the scope of work, and it describes project details including length, width, height, and shape of primary features; special problems that will be encountered in performing the work; site conditions affecting the work; reasons for the selection of equipment (if appropriate); method and time for mobilization and demobilization of all equipment; and the reasons for unusually high or low unit prices. Each estimate will include a statement that relates both the development of design, as appropriate, and date of effective pricing. Other factors to be considered in the project narrative include:
 - Construction schedule, use of overtime, construction windows, phasing, right-of-way acquisition plan, and subcontracting.
 - Project-related details include site access; borrow areas; construction methodology; unusual conditions (soil, water or weather); unique techniques of construction; equipment/labor availability and distance traveled; environmental concerns; contingencies by feature or sub-feature, if appropriate; and effective dates and sources for labor, equipment, and material pricing.
- *Construction Schedule.* The design engineer will prepare a construction schedule to support the cost estimate that is consistent with the schedule for completion of the project. It may be in the form of a bar chart or network analysis system and must identify the sequence and duration of the tasks upon which the cost estimate is developed. The schedule must be prepared in sufficient detail to adequately develop the required labor, equipment, crew sizes, and production rates required for each of the identified construction tasks.
- *Equipment and materials utilization.* On those projects involving considerable heavy construction equipment, it is necessary to sufficiently plan the equipment usage against the work schedule to identify the actual number of cranes and bulldozers and allow for proper mobilization, to assure that demand for the equipment is not over or

understated. Materials which require long lead-time and can become critical to the construction schedule should be noted, planned, and adequately considered.

- *Labor discussion and utilization.* The estimate should clearly state the sources for the various labor classifications and rates and include tabulation by crafts of the various composite wage rates used. When extensive overtime beyond the normal workday is used in the estimate, an explanation should be included.

Estimate Backup Data

This part of the estimate comprises all the support and backup documentation. The various categories of support documentation are as follows:

- *Cost analysis summary sheets.* The summary sheets for direct, indirect, and owner costs are used to summarize cost components for each bid item and by the appropriate work breakdown structure. Distribution of overhead and profit is also shown on these sheets.
- *Mobilization, preparatory work, and demobilization.* These costs should be itemized and priced separately. These costs may be combined at summary level with overhead, if these costs are not paid as a separate bid item. This item may be shown as a lump sum on the bid schedule.
- *Profit computation sheet.* When profit is included, the weighted guidelines will be used to compute the profit and will be part of the cost estimate backup.
- *Overhead costs.* The itemization and calculations of overhead costs, both job site and home office, should be estimated and presented.
- *Bond costs.* Bond costs should be based on costs provided by bonding companies at the time the project estimate is made.
- *Production rates.* The details that are used to express production rate analysis of crews.
- *Crew, labor, equipment rates.* These details express the crew composition, and associated rates for labor and equipment costs. The information contained on these sheets provides the backup support for the task unit labor and equipment costs shown.
- *Quantity computations.* The quantity take-off computations should be organized by task for the bid items and kept as backup. The take-off should reference the drawing and clearly explain the computation.
- *Quotations.* Quotations should be collected and compiled by task or bid item into an organized reference. When quotations were not obtained for significant material and supply items, the basis for the cost used should be fully described. Quotations should be considered proprietary information and should be kept confidential to protect the information entrusted to the design engineer.

Miscellaneous Support Data

Include all other information pertinent to the estimate, such as drawings and sketches which were used as the basis of the cost estimate. Drawings may include a project map showing the location of the work with respect to principal cities and roads; a site map showing the location of the work; borrow, quarry, and spoil areas; and existing work access roads; any existing facilities usable by the contractor; a general plan and elevation or profile of the work with typical sections; and a construction layout.

Complete Streets

Project cost estimates shall include Complete Street components as determined appropriate and feasible. In instances where enhanced components (e.g. wider sidewalks, pedestrian refuge medians, or right-of-way acquisition solely for non-vehicular travel) are included, the costs shall be incorporated into the overall project costs. Such costs, that can be directly be attributed to implementation of Complete Streets, shall also be tracked separately to allow for long-term assessment of cost factors associated with Complete Streets. For instances where the Complete Streets design components resulted in lower costs, or no change in estimated projects costs, this shall also be noted

SECTION 13.0

Quality Assurance/Quality Control

Purpose

The objective of the QA/QC process is to provide successful projects that meet the project goals and budget through good planning and quality design. The plans should be clear, concise, understandable, constructible, and relatively error free. The QA/QC process also provides or sets out a mechanism by which all design documents will be subjected to a systematic and consistent review process resulting in a set of quality project plans that meet these criteria.

A secondary objective of the QA/QC process will be the creation of a documented audit trail of the design process.

This section of the *Design Guidance Manual* establishes processes to ensure that:

- the city's project requirements and goals are incorporated into the design documents;
- projects are proceeding on schedule and within budget;
- designs and design documents are being developed and prepared in conformance with the project work plan and the manual and that they are consistent with accepted industry standards;
- consistency is provided with all plans developed for the city by use of the standards and guidelines set forth in the manual;
- errors are detected and corrected through the implementation of quality controls, which include checking during all phases of the work;
- all design decisions, instructions, issues, correspondence, and calculations are documented and preserved;
- all parties or stakeholders are involved throughout the design process;
- plans accurately and thoroughly present the existing project site and terrain features; and
- plans accurately and thoroughly present the proposed project features and details to be constructed.

Definitions

Quality — The design and construction of a project that meets or exceeds the project goals and standards established for the project and is delivered within budget.

Quality Control (QC) — Activities and tools required to control the design quality of a project. These activities include providing clear decisions and directions, constant supervision by experienced individuals, immediate review of completed work or tasks for accuracy, and completeness and accurate documentation of all decisions, assumptions, and recommendations.

Quality Assurance (QA) — Activities and tools required to ensure an acceptable level of quality is provided by the design engineer. QA involves items such as constructability, function, and maintainability.

Quality Control Plan — A comprehensive written set of procedures and activities aimed at delivering projects that meet or exceed the city’s expectations.

Requirements for Quality Control

The quality control process includes quality planning, training, constant supervision, and immediate review of completed work. Additionally, the quality control process should ensure that all plans are accurate, that they have properly prepared and coordinated, and that they have been reviewed and checked.

Quality control does not consist of a review after a project is completed, rather it is an ongoing process that is planned and must be carried out throughout the design process. Quality control is based on the belief that:

- quality control should ensure that the work is done correctly;
- quality is achieved by focusing on preventing problems or errors;
- quality is achieved by qualified individuals performing and supervising all work functions;
- quality is achieved by providing proper training of personnel and ensuring that all personnel remain current on the knowledge and skills needed for their position;
- quality is achieved through proper planning, coordination, supervision, technical direction, and clear understanding of the project’s requirements and goals;
- quality is verified through review of completed activities for accuracy and completeness; and
- the quality review process documents all decisions, directions, assumptions, and recommendations.

The design engineer is ultimately responsible for the project designs and preparation of all construction documents and must ensure quality and adhere to established design policies, good engineering practice procedures, and standards and guidelines in the preparation and review of all design projects.

The city will review plans for compliance with policies and adherence to project goals, city and industry standards, procedures, and good engineering practice. This review by the city will not absolve the design engineer from his or her design responsibilities or limit professional liability.

Quality Assurance/Quality Control Plan

The QA/QC activities presented below represent the minimum requirements that should be included in a quality control plan. The design engineer is to develop a QC plan specifically tailored to his or her organization. The QC plans will be submitted to the city in conjunction with the fee proposal during contract negotiations. When the contract is executed the design engineer shall also post the QC plan to the COSA PM portal.

The Design Engineer's QA/QC plan should include, as a minimum, the following:

- project description, location, limits and minimum design criteria;
- project deliverables and schedules;
- organization chart showing responsibilities for design services and for quality control checks, which shall be conducted by an independent person qualified in the specific area of review;
- communications plan outlining the protocol for all communications related to the project;
- format and schedule for checking design reports, calculations, plans, and specifications for accuracy and completeness. The QA/QC plan should make provisions for review of reports, plans, specifications, and estimates provided by sub-consultants. The design engineer will be totally responsible for all sub-consultant's work as if it were the design engineer's own work;
- format and procedure for documenting all issues, design directions, design decisions, review comments, and review comment responses; and
- format and procedures for certifying that all of the requirements of the QA/QC plan have been met and that all comments and issues have been resolved to the satisfaction of the reviewer.

Plan Submittals

All submittals will be checked prior to submission to the city for review. This review shall include, as a minimum, the following activities:

- compliance with project requirements;
- compliance with design engineer's QA/QC plan;
- technical accuracy and adequacy;
- compatibility with other associated project documents; and
- compliance with previous review comments.

The design engineer will be required to provide submittal requirement checklists with all submittals. The checklists are to be signed and dated by the design engineer and are for the purpose of documenting what items are included in the submitted. The checklists for each project phase are included in each of the various sections of the *Design Guidance Manual*. Submittals not accompanied by the checklists or with missing items will not be accepted and will be returned to the design engineer.

The checklists should not be considered as including all items necessary for review, but should be considered as guides to be expanded or reduced as necessary for each individual project. These checklists establish the minimum submittal requirements which must be met to satisfy the documentation requirements for each phase of the project.

QA/QC Certification

All design deliverables shall be accompanied by a QA/QC certification, which is the design engineer's confirmation to the city that the attached submittal:

- has been prepared and reviewed in accordance with the design firm's quality control policies, standards, and guidelines;

- has gone through a quality control checking process;
- conforms to the design requirement outlined in the project work plan; and
- was prepared in accordance with the criteria outlined in the manual.

A copy of this certification is included as [Appendix 13-A](#).

Quality Assurance

Quality assurance is used to ensure continued high standards of quality for all design projects. It provides tools and methods with which design engineers can manage and measure the quality and work product. Timely reviews are one method used to manage quality. These reviews will, in effect, be an audit of a design engineer's quality control. While quality control and quality assurance should be ongoing internal processes throughout the development of a project, the city will also be performing its own quality assurance on the design engineer's design submittals.

All projects will be reviewed at the 40-percent, 70-percent, 95-percent, and bid documents phases. If a project requires a preliminary engineering report phase, it will also require a review.

At each submittal stage, the city will review the submittals for the degree of completeness required by that phase, conformance with project goals, technical adequacy, schedule, and budget. The design engineer's submittals will be distributed by the city to all reviewers. The city will provide a date by which all comments are to be received from reviewers. It will be the responsibility of each reviewer to review the submittals in accordance with their area of expertise and return their comments to the project manager by the specified date. The city review shall be complete within 30 days of the date the design engineer's submittal is received.

Design submittals prepared for the project will be reviewed for conformance with the requirements, design criteria, and standards and guidelines required by COSA. At a minimum the city will check:

- for conformance with the design criteria and project requirements outlined in the project work plan, including graphic standards (CAD standards), compatibility standards, and good plans preparation practice;
- for completeness and clarity;
- previous review comments to ensure they have been addressed and incorporated into the current submittal;
- for coordination with other aspects of the project, i.e., structural, utilities, civil, traffic, right-of-way, etc., and with other associated project documents; and
- for coordination with project elements being developed or planned for development on adjacent projects.

The design engineer will not rely on reviews by the COSA or its program manager as a part of the QC plan either formally or informally. The design engineer is expected to follow his or her own QC plans and accepted engineering practices.

Review Meetings

All QA/QC review comments provided to the design engineers will be on the review comment and resolution form, included as [Appendix 13-B](#). Comments from reviewers may include marked-up plans. It will be the responsibility of each reviewer to ensure that their comments are concise, clear, and to the point.

The city's project manager will be responsible to compile the comments on the review comment and resolution form. The city will provide the design engineer both an electronic copy on the Web Portal and a hardcopy of the review comment and resolution form and any marked-up plans. The city's review comments will also be posted on the COSA Web Portal.

After the city's review comments have been compiled and transmitted to the design engineer, a design phase workshop (design review meeting) will be scheduled to be held within five days. The purpose of this workshop will be to discuss the review comments and address any project related concerns or issues. The proceedings of these workshops will be documented by the design engineer in the form of meeting minutes. In the event that review comments are received at the workshops, the design engineer will note these new review comments in the meeting minutes.

Within five days of the design phase workshop the design engineer is required to submit both meeting minutes and responses due prior to the next submittal. The design engineer's response to review comments shall be on the review comment and resolution form provided by the city. The design engineer will submit one hardcopy of his formal response along with all marked-up plans to the city. The design engineer shall also upload these items to the COSA PM portal.

The city's project manager will forward the design engineer's responses to the appropriate reviewer and will ensure that all comments and responses have been documented in the project files. It is the design engineer's responsibility to ensure that all comments are incorporated into the design plans.

Environmental Review

An environmental review will occur in all design phases. The purpose of this review is to identify environmental challenges that could potentially affect the project. Further assessments may be conducted to identify the environmental impact and its extent.

Both the design consultant and the EMD will work closely in the early stages of the design to avoid or minimize the environmental impact to the project. Plans may need to be modified to address these environmental issues and/or permits. The design consultant needs to coordinate and confirm with the EMD that all environmental issues have been addressed in accordance with federal, state and local regulations and requirements.

Right-of-Way Review

A right-of-way review will occur at the 40-percent phase. The purpose of this review is to

allow input to assist the Real Estate Section in commencing process for acquiring easements or right-of-way necessary to construct the project.

Constructability Review

If required, a constructability review will occur at the 70-percent phase. The constructability review is intended to save on project costs, anticipate and mitigate field problems, minimize potential change orders, improve the overall project design and timeline, and still achieve the design engineer's intent. Some of the items to be considered include scheduling requirements, construction sequencing, phase conflicts, completeness and clarity, errors, omissions, inconsistencies, construction methods, and construction materials fabrication requirements. The constructability reviews comments will be discussed at the 70-percent design workshop.

Construction Phase QA/QC

The QA/QC will ensure that the project is constructed in accordance with the construction documents, that the construction budget is monitored and controlled, and that construction inspection and observation is preformed to monitor construction quality.

The activities to be performed by the design engineer during the construction phase will be outlined in the project work plan. The design engineer shall respond to all inquires and reviews in a timely fashion or within the time frames spelled out in the contract documents.

Construction Phase Documentation

All construction phase project documentation shall be provided to the appropriate parties in hardcopy and posted on the COSA PM portal.

Written correspondence — All written correspondence to the contractor shall be signed by the city's project manager and transmitted to the contractor by the city construction representative.

Submittals logs — All required project submittals and submittal logs shall be posted on the COSA PM portal. Appropriate parties responsible for reviewing these submittals shall be notified that a submittal has been posted and is available for review. Submittal logs for shop drawings, requests for information, change order requests, and change orders should be maintained. These logs shall document the submittal number, submittal date, submittal description, response date, disposition of submittal, and whether the submittal has been closed or further action is pending.

Meeting minutes — All meeting shall be documented and meeting minutes prepared and distributed to all attendees for review. If there are any discrepancies in the meeting minutes, the preparer of the meeting minutes shall be notified and appropriate revisions made or exceptions noted in revised meeting minutes.

Telephone conversations records — All telephone conversations related to the construction of the project shall be documented. These telephone records will serve to

document items or issues discussed, dates of telephone conversations, and parties involved.

Periodic construction observation report — The design engineer shall prepare construction observation reports of all visits. These reports shall as a minimum have the following information:

- project name;
- contractor name;
- report date;
- weather and approximate temperature;
- site conditions (i.e., wet, dry, etc.);
- description of equipment on site and operating;
- summary of work observed a location of work;
- noted deviations from plans and specifications; and
- summary of conversations with city’s construction representative, contractor, subcontractors, suppliers, property owners, or any other parties associated with the project.

The construction observation report is included as [Appendix 13-C](#).

Project Closeout

If required by the project work plan, a post-construction workshop will be held with the design engineer, construction field inspector, and city staff. This workshop will document the quality and accuracy of the construction plans and any construction issues. This feedback will then be provided to the city’s project manager to serve as lessons learned. These memos will be compiled, categorized, and distributed to the various departments to serve as a knowledge data base from which to update the *Design Guidance Manual* and improve the quality of future construction plans.

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APPENDICES

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Appendix 2-A ~ Professional Services Contract

STATE OF TEXAS

COUNTY OF BEXAR

CITY OF SAN ANTONIO

**FOR ENGINEERING DESIGN SERVICES
FOR - Project # 40-xxxxx**

This Agreement is made and entered into in San Antonio, Bexar County, Texas, between the City of San Antonio, a Municipal Corporation in the State of Texas, hereafter referred to as "City" and

DESIGN FIRM

(hereafter referred to as "Consultant"), said Agreement being executed by City pursuant to the City Charter, Ordinances and Resolutions of the City Council, and by Consultant for ENGINEERING DESIGN SERVICES set forth herein in connection with the above designated Project for the City of San Antonio.

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ARTICLE I. DEFINITIONS

As used in this Agreement, the following terms shall have meanings as set out below:

- 1.1 "Application for Compensation" means written form for a request from Consultant to be paid for completed work.
- 1.2 "City" means the City of San Antonio, Texas.
- 1.3 "Owner Designated Representative (ODR)" means person designated by City to act for City.
- 1.4 "Compensation" means amounts paid for services under this Agreement.
- 1.5 "Consultant" means _____ and its officers, partners, employees, agents and representatives, and all sub-Consultants, if any, as well as all other persons or entities for which Consultant legally is responsible.
- 1.6 "Director" means the Director of City's Capital Improvements Management Services Department (hereafter referred to as "CIMS") or his/her designee.
- 1.7 "Plans and Specifications" means the construction documents.
- 1.8 "Portal" means the City's internet-based, project management software for approving Task Orders and Applications for Compensation.
- 1.9 "Project" means the specific Engineering Services work for which services are negotiated and executed by both Parties.
- 1.10 "Proposal" means Consultant's Proposal to provide services for this Project.
- 1.11 "SAMSA" means the San Antonio Metropolitan Statistical Area or Relevant Marketplace, which collectively is comprised by Bexar County and the seven (7) surrounding counties of Atascosa, Bandera, Comal, Guadalupe, Kendall, Medina and Wilson
- 1.12 "Proposed Task Order Request" means a request to Consultant to submit a Proposal for a specific Project as further defined herein.

ARTICLE II. COMPENSATION

- 2.1 The Compensation for all services included in this Agreement and in the Scope of Services for this Agreement shall not exceed AMOUNT IN WORDS, (\$XXXX). Amount to be paid to Consultant, including authorized adjustments, is the total amount payable by City to Consultant for performance of the Services under this Agreement. It is agreed and understood that such amount will constitute full compensation to Consultant for Services included in the Scope of Services and shall meet all requirements of the City's Design Guidelines. Unless and until City makes further appropriations for any services not included in the Scope of Services of this Agreement, the obligation of City to Consultant for Compensation in connection with this Agreement cannot and will not exceed such sum of AMOUNT IN WORDS, (\$XXXX) without further amendment to this Agreement.

2.2 Reimbursable Expenses

When authorized by the City in writing, the Consultant will be entitled to reimbursement at actual incurred cost for services and related expenses for the following items:

2.2.1 Travel outside SAMSA only if approved in writing by City prior to such travel. Reimbursement for travel costs will be limited to costs directly associated with Consultant's performance of Service under the Agreement. Travel costs are limited to the per diem rates set annually by the Federal Government's General Services Administration. Consultant shall provide detailed receipts for all reimbursable charges. Travel expenses, if any, shall be negotiated with each Task Order issued. Kindly note that City does not pay for Consultant's travel within SAMSA.

2.2.2 Mailing, courier services and copies of documents requested by the City in writing in excess of the copies to be provided under Article IV of this Agreement. These costs, if any, shall not exceed the amount noted in Article IV herein without further approval of City. Consultant shall bear these costs unless agreed to, in writing, by City.

2.2.3 Graphics, physical models, and presentation boards requested by the City in writing in excess of the copies to be provided under Article IV of this Agreement. These costs shall not exceed the amount noted in Article IV herein without further approval of City. Consultant shall bear these costs unless agreed to, in writing, by City. Note that the City does not allow a markup on any of the above reimbursable items and only will reimburse approved hard costs incurred.

2.2.4 Markup on Sub-Consultant work

Markups for Sub-Consultant work shall not exceed five percent 5%. There shall be no markup on reimbursables from Sub-Consultants.

ARTICLE III. METHOD OF PAYMENT

3.1 Payments to Consultant shall be in the amount shown on the invoices and its supporting documentation submitted, and shall be subject to City's approval. All services shall be performed to City's satisfaction, which satisfaction shall be judged by the Director in his/her sole discretion, and City shall not be liable for any payment under this Agreement for services which are unsatisfactory and which previously have not been approved by the Director. The final payment due hereunder will not be paid until all reports, data and documents have been submitted, received, accepted and approved by City.

3.1.1 Payment may be made based solely on the units of services completed and approved by the Director and the associated unit price for such service, as may be described in Consultant's proposal/fee schedule (attached hereto and incorporated by reference herein as **Exhibit "1"**).

3.1.2 Monthly payments for services performed in the various additional services will be reviewed by Director upon Consultant entering itemized invoices, with all required back-up, within the Portal. The invoice shall indicate the value of the additional services performed to date.

3.2 Consultant shall, within ten (10) days following receipt of Compensation from City, pay all bills for services performed and furnished by others, in connection with the Project and the performance of the work, and shall, if requested, provide City with evidence of such payment. Consultant's failure to make payments within such time shall constitute a material breach of this Agreement, unless Consultant is able to demonstrate to City bona fide disputes associated with the unpaid sub-consultant and its services. Consultant shall include a provision in each of its sub-

agreements imposing the same payment obligations on the sub-consultants as are applicable to Consultant hereunder, and if City so requests, shall provide copies of such payments by Consultant to City. If Consultant has failed to make payment promptly to the sub-consultant for the Services for which City has made payment to Consultant, City shall be entitled to withhold payment to Consultant to the extent necessary to protect City.

- 3.3 Consultant warrants that title to all Services covered by an Application for Payment will pass to City no later than the time of payment. Consultant further warrants that, upon submittal of an Application for Compensation, all Services for which Applications for Compensation have been previously issued and payments received from City shall, to the best of Consultant's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrance in favor of Consultant or other persons or entities making a claim by reason of having provided labor or services relating to this Agreement. **CONSULTANT SHALL INDEMNIFY AND HOLD CITY HARMLESS FROM ANY LIENS, CLAIMS, SECURITY INTEREST OR ENCUMBRANCES FILED BY ANYONE CLAIMING BY, THROUGH OR UNDER THE ITEMS COVERED BY PAYMENTS MADE BY CITY TO CONSULTANT.**
- 3.4 Consultant may submit a request for Partial Compensation prior to the completion of services. A request for Partial Compensation must be accompanied by a progress report detailing the Services performed. Any partial payment made shall be in proportion to the Services performed, as reflected in the progress report and approved by the Director and at City's sole discretion. Compensation also may be made based solely on the tasks and services completed and approved by the Director and the associated unit price for each Service/Project, as may be described in fee schedule and/or hourly rates included in Exhibit "1".

3.5 Project Close Out and Final Payment:

- 3.5.1 Final billing shall indicate "Final Bill - no additional compensation is due to Consultant".
- 3.5.2 City may withhold compensation to such extent as may be necessary, in City's opinion, to protect City from damage or loss for which Consultant is responsible, because of:
- 3.5.2.1 delays in the performance of Consultant's work;
 - 3.5.2.2 third-party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to City is provided by Consultant;
 - 3.5.2.3 failure of Consultant to make payments properly to sub-consultants or vendors for labor, materials or equipment;
 - 3.5.2.4 reasonable evidence that Consultant's work cannot be completed for the amount unpaid under this Agreement;
 - 3.5.2.5 damage to City; or
 - 3.5.2.6 persistent failure by Consultant to carry out the performance of its services in accordance with this Agreement.

- 3.5.3 When the above reasons for withholding are removed or remedied by Consultant, compensation of the amount withheld will be made within a reasonable time. City shall not be deemed in default by reason of withholding compensation as provided for in this Article III.
 - 3.5.3.1 In the event of any dispute(s) between the parties, regarding the amount properly compensable for any Phase or as final compensation, or regarding any amount that may be withheld by City, Consultant shall be required to make a claim pursuant to and in accordance with the terms of this Agreement and follow the procedures provided herein for the resolution of such dispute. In the event Consultant does not initiate and follow the claims procedures provided in this Agreement in a timely manner and as required by the terms thereof, any such claim shall be waived.
 - 3.5.3.2 City shall make final compensation of all sums due Consultant not more than thirty (30) days after Consultant's execution and delivery of a final Pay Application.
 - 3.5.3.3 Acceptance of final compensation by Consultant shall constitute a waiver of claims except those previously made in writing and identified by Consultant as unsettled at the time of final application for compensation.
 - 3.5.3.4 Consultant agrees to maintain adequate books, payrolls and records satisfactory to City in connection with any and all Services performed hereunder. Consultant agrees to retain all such books, payrolls and records (including data stored in computer) for a period of not less than four (4) years after completion of Services. At all reasonable times, City and its duly authorized representatives shall have access to all personnel of Consultant and all such books, payrolls and records, and shall have the right to audit same.
- 3.6 Internet-based Project Management Systems. City will administer its services through an Internet-Based Management System ("Portal"). In such case, Consultant shall conduct communication through this media and perform all Project related functions utilizing this database system. This includes correspondence, submittals, requests for information, vouchers, compensation requests and processing, amendment, change orders and other administrative activities. City shall administer the software, shall provide training to Project Team Members and shall make the software accessible via the Internet to all necessary Project Team Members.
 - 3.6.1 All invoices shall be submitted through City's Program Management Portal

ARTICLE IV. SCOPE OF SERVICES

[SUBJECT TO REVISION AS APPLICABLE]

- 4.1 Consultant shall provide Engineering Services, and all associated services required for Consultant to provide such Services, pursuant to this Agreement. Services may include, but are not limited to, the following:

The scope of services for this project include design services to prepare a Preliminary Engineering Report (PER) in connection with the Harry Wurzbach - Taps Memorial Way Boulevard Project. Preparations of the PER include, but not limited to, the following: a summary of existing conditions and the preparation of

the schematic layout, to include horizontal and vertical alignment, roadway geometrics, drainage and all requirements, as per TxDOT's Roadway Design Manual. Services will also include cost estimating, landscape architecture, traffic analysis, geotechnical and environmental services, to meet state and federal requirements.

Services will include, but are not limited to:

1.
 - a. Land Planning
 - b. Traffic Noise and Air Quality Analysis
 - c. Wetland Delineation
 - d. Nationwide Permit, 404 Permits
 - e. Protected Species Determination, Biological Surveys
 - f. Surveys of Historic Buildings, Structures, Architecture, Archeological Surveys
 - g. Historical Research
 - h. Social and Environmental Justice Analysis
 - i. Hazardous Materials Site Assessment
 - j. Environmental Document Preparation
 2.
 - a. Route Studies and Schematic Design
 - b. Incorporation of the "Complete Streets" concept
 - c. Bio-sensitive Roadway and Bridge Design
 - d. Traffic Engineering Studies
 - e. Hydrological Studies
 - f. Hydraulic Design
 - g. Survey
 - h. Right of Way Maps
 - i. Aerial Mapping
 - j. Architectural Design, Landscaping Planting and Irrigation
- 4.4 Consultant shall provide all labor, equipment and transportation necessary to complete all services agreed to hereunder in a timely manner throughout the term of the Contract. Additionally, Consultant shall provide staff for regular, overtime, night, weekend and holiday service, as requested by Department. Persons retained by Consultant to perform work pursuant to this Agreement shall be employees or subcontractors of Consultant.
- 4.5 Consultant shall not commence service on any Task Order authorized under this Agreement until being thoroughly briefed on the scope of the project and being notified in writing to proceed. Should the scope subsequently change, either Consultant or City may request a review of the anticipated services, with an appropriate adjustment in compensation.
- 4.6 Consultant, in consideration for the compensation herein described, shall render the professional services described in this Section IV necessary for the advancement of the Project to Substantial Completion.
- 4.7 Consultant shall perform its obligations under this Agreement in accordance with the Scope of Services outlined herein, and in accordance with the Consultant's Fee Schedule, attached and incorporated herein as Exhibit "1". The Scope of Services shall be fully described in Consultant's Proposal, as revised in accordance with negotiations with City and approval of the Director for each authorized service task, and as provided in this Agreement.
- 4.8 Consultant's Fee Schedule, which includes pre-priced tasks and/or hourly rates, is attached hereto and incorporated by reference herein as "Exhibit 1".

ARTICLE V. TIME AND PERIOD OF SERVICE

- 5.1 The term of this Agreement shall commence upon its approval by the San Antonio City Council and its execution by both parties.
- 5.2 Time is of the essence of this Agreement. Consultant shall perform and complete its obligations for the services under Article IV herein in a prompt and continuous manner, so as to not delay the development of services and so as to not delay the construction of the work for the Project, in accordance with the schedules approved by City. City will perform its obligations of review and approval in a prompt and continuous manner so as to not delay the project.
- 5.3 Consultant shall not be liable or responsible for any delays due to strikes, riots, acts of God, national emergency, acts of the public enemy, governmental restrictions, laws or regulations, or any other causes beyond Consultant's reasonable control. Within twenty one (21) days from the occurrence of any event, for which time for performance by Consultant shall be significantly extended under this provision, Consultant shall give written notice thereof to City stating the reason for such extension and the actual or estimated time thereof. If City determines that Consultant is responsible for the need for extended time, City shall have the right to make a Claim as provided in this Agreement.
- 5.4 This Agreement shall remain in force for a period which may reasonably be required for the design, award of the contract and the completion of the Project, including any extra work and any required extensions thereto, unless terminated, as provided for elsewhere in this Agreement.

ARTICLE VI. RESERVED

ARTICLE VII. COORDINATION WITH THE CITY

- 7.1 Consultant shall hold periodic conferences with the Director or his/her representative(s) through the end of the Project. The Project shall have the full benefit of City's experience and knowledge of existing needs and facilities and be consistent with City's current policies and standards. To assist Consultant in this coordination, City shall make available, for Consultant's use in planning and designing the Project, all existing plans, maps, statistics, computations and other data in City's possession, relative to existing facilities and to this particular Project, at no cost to Consultant. However, any and all such information shall remain the property of City and shall be returned by Consultant to City upon termination or the completion of the Project or if instructed to do so by the Director.
- 7.2 The Director shall act on behalf of City, with respect to the services to be performed under this Agreement. The Director shall have complete authority to transmit instructions, receive information and interpret and define City's policies and decisions, with respect to materials, equipment, elements and systems pertinent to Consultant's services.
- 7.3 City promptly will give written notice to Consultant whenever City observes, discovers or otherwise becomes aware of any defect in Consultant's services, or any development that affects the scope or timing of Consultant's services.
- 7.4 Unless otherwise required by City, City shall furnish approvals and permits from all governmental authorities having jurisdiction over the Project and other such approvals and consents from others, as may be necessary, for the completion of the Project. Consultant will provide City reasonable assistance in connection with such approvals and permits, such as the furnishing of data compiled by Consultant pursuant to other provisions of the Agreement, but Consultant shall not be obligated to develop additional

data, prepare extensive reports or appear at hearings or the like unless compensated therefore under other provisions of this Agreement.

ARTICLE VIII. REVISIONS TO DOCUMENTS

Consultant shall make, without expense to City, such revisions to the drawings, reports or other documents, as may be required to meet the needs of City and which are within the Scope of Services. After the approval of reports or other documents by City, any revisions, additions or other modifications made at City's request, which involve extra services and expenses to Consultant, only shall be requested through an additional Amendment and Task Order for services.

ARTICLE IX. OWNERSHIP OF DOCUMENTS

- 9.1 All documents, including the original drawings, estimates, specifications and all other documents and data, previously owned by Consultant, shall remain the property of Consultant as instruments of service. However, it is to be understood that City shall have free access to all such information and hold the right to make and retain copies of drawings, estimates, specifications and all other documents and data. Any reuse, without specific written verification or adaptation by Consultant, will be at City's sole risk and without liability or legal exposure to Consultant.
- 9.2 Consultant acknowledges and agrees that City exclusively shall own any and all information in whatsoever form and character produced and/or maintained in accordance with, pursuant to or as a result of this Agreement and said information shall be used as City desires. Any and all documents, including the original drawings, estimates, specifications and all other documents and data, shall be delivered to City at no additional cost to City, upon request, termination or completion of this Agreement without restriction on future use.
- 9.3 Consultant agrees and covenants to protect any and all proprietary rights of City in any materials provided to Consultant. Such protection of proprietary rights by Consultant shall include, but not be limited to, the inclusion in any copy intended for publication of copyright mark reserving all rights to City. Additionally, any materials provided to Consultant by City shall not be released to any third party without the consent of City and shall be returned intact to City upon termination or completion of this Agreement or if instructed to do so by the Director.
- 9.4 Consultant hereby assigns all statutory and common law copyrights to any copyrightable work that, in part or in whole, was produced from this Agreement is the property of City, including all equitable rights. No reports, maps, documents or other copyrightable works, produced in whole or in part by this Agreement, shall be subject of an application for copyright by Consultant. All reports, maps, project logos, drawings or other copyrightable work produced under this Agreement shall become the property of City (excluding any instrument of services, unless otherwise specified herein). Consultant shall, at its own expense, defend all suits or proceedings instituted against City and pay any award of damages or loss resulting from an injunction against City, insofar as the same are based on any claim that materials or work provided under this Agreement constitute an infringement of any patent, trade secret, trademark, copyright or other intellectual property rights.
- 9.5 Consultant may make copies of any and all documents and items for its files. Consultant shall have no liability for changes made to or use of the drawings, specifications and other documents by other engineers, or other persons, subsequent

to the completion of the Project. City requires that Consultant appropriately mark all changes or modifications on all drawings, specifications and other documents by other engineers or other persons, including electronic copies, subsequent to the completion of the Project.

- 9.6 Copies of documents, which may be relied upon by City are limited to the printed copies (also known as hard copies) and PDF electronic versions that are sealed and signed by Consultant. Files in editable electronic media format of text, data, graphics or other types, (such as DWG or DGN) that are furnished by Consultant to City or utility only are for convenience of City or utility. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk.
- 9.7 Notwithstanding anything to the contrary contained herein, all previously owned intellectual property of Consultant, including but not limited to, any computer software (object code and source code), tools, systems, equipment or other information used by Consultant or its suppliers in the course of delivering the Services hereunder, and any know-how, methodologies or processes used by Consultant, to provide the services or protect deliverables to City, including without limitation, all copyrights, trademarks, patents, trade secrets and any other proprietary rights inherent therein and appurtenant thereto, shall remain the sole and exclusive property of Consultant or its suppliers.

ARTICLE X. TERMINATION AND/OR SUSPENSION OF SERVICES

10.1 Right of Either Party to Terminate for Default

10.1.1 This Agreement may be terminated by either party for substantial failure by the other party to perform, through no fault of the terminating party, in accordance with the terms of this Agreement and a failure to cure as provided in this **Article X**.

10.1.2 The party not in default must issue a written and signed Notice of Termination, citing this **Paragraph 10.1.2**, to the other party declaring the other party to be in default and stating the reason(s) why it is in default. Upon receipt of such written Notice of Default, the party in receipt shall have a period of ten (10) calendar days to cure any failure to perform under this Agreement. Upon the completion of said ten-day period, commencing upon receipt of Notice of Termination, if such party has not cured any failure to perform, such termination shall become effective without further written notice.

10.2 Right of City to Terminate

10.2.1 City reserves the right to terminate this Agreement, for reasons other than substantial failure by Consultant to perform, by issuing a signed Notice of Termination, citing this **Paragraph 10.2.1**, which shall take effect on the twentieth (20th) calendar day following receipt of said notice and upon the scheduled completion date of the performance phase in which Consultant then currently is working, whichever effective termination date occurs first.

10.3 Right of City to Suspend Giving Rise to Right of Consultant to Terminate

10.3.1 City reserves the right to suspend this Agreement at the end of any phase for the convenience of City by issuing a written and signed Notice of Suspension, citing this **Paragraph 10.3.1**, which shall outline the reasons for the suspension and the expected duration of the suspension, but such expected duration shall,

in no way, guarantee what the total number of days of suspension will occur. Such suspension shall take effect immediately upon receipt of said Notice of Suspension by the Consultant.

10.3.2 Consultant hereby is given the right to terminate this Agreement in the event such suspension extends for a period in excess of one hundred twenty (120) calendar days. Consultant may exercise this right to terminate by issuing a signed, written Notice of Termination, citing this **Paragraph 10.3.2**, to City after the expiration of one hundred twenty (120) calendar days from the effective date of the suspension. Termination, pursuant to this **Paragraph 10.3.2**, shall become effective immediately upon receipt of said written notice by City.

10.4 Procedures Consultant to follow upon Receipt of Notice of Termination

10.4.1 Upon receipt of a Notice of Termination and prior to the effective date of termination, unless the notice otherwise directs or Consultant immediately takes action to cure a failure to perform under the cure period set out hereinabove, Consultant immediately shall begin the phase-out and the discontinuance of all services, in connection with the performance of this Agreement, and shall proceed promptly to cancel all existing orders and contracts insofar as such orders and contracts are chargeable to this Agreement. Within thirty (30) calendar days after receipt of such Notice of Termination, unless Consultant successfully has cured a failure to perform, Consultant shall submit a statement showing in detail the services performed under this Agreement prior to the effective date of termination. City retains the option to grant an extension to the time period for submittal of such statement.

10.4.2 Copies of all completed or partially completed specifications and all reproductions of all completed or partially completed designs, plans and exhibits prepared under this Agreement, prior to the effective date of termination, shall be delivered to City, in the form requested by City, as a pre-condition to final payment. These documents shall be subject to the restrictions and conditions set forth in Article IX herein.

10.4.3 Upon the above conditions being met, absent any reason why the City may be compelled to withhold fees, City promptly shall pay Consultant that proportion of the prescribed fee which the services actually performed under this Agreement bear to the total services called for under this Agreement, less any previous payments of the fee.

10.4.4 City, as a public entity, has a duty to document the expenditure of public funds. Consultant acknowledges this duty imposed upon City. Consultant further acknowledges that the failure of Consultant to comply with the submittal of the statement and documents, as required above, shall constitute a waiver by Consultant of any and all rights or claims to payment for services performed under this Agreement by Consultant.

10.4.5 Failure of Consultant to comply with the submittal of the statement and documents, as required above, shall constitute a waiver by Consultant of any and all rights or claims to collect monies that Consultant otherwise may be entitled to for services performed under this Agreement.

10.5 Procedures Consultant to Follow upon Receipt of Notice of Suspension

10.5.1 Upon receipt of written Notice of Suspension, which date also shall be the effective date of the suspension, Consultant shall, unless the Notice otherwise

directs, immediately begin to phase-out and discontinue all services in connection with the performance of this Agreement and promptly shall proceed to suspend all existing orders and contracts, insofar as such orders and contracts are chargeable to this Agreement.

- 10.5.2 Consultant shall prepare a statement showing, in detail, the services performed under this Agreement prior to the effective date of suspension.
- 10.5.3 Copies of all completed or partially completed designs, plans and specifications, prepared under this Agreement prior to the effective date of suspension, shall be prepared for possible delivery to City but shall be retained by Consultant until such time as Consultant may exercise the right to terminate.
- 10.5.4 In the event that Consultant exercises the right to terminate one hundred twenty (120) calendar days after the effective suspension date, within thirty (30) calendar days after receipt by City of Consultant's Notice of Termination, Consultant promptly shall cancel all existing orders and contracts, insofar as such orders and contracts are chargeable to this Agreement, and shall submit the above referenced statement showing, in detail, the services performed under this Agreement prior to the effective date of suspension.
- 10.5.5 Any documents prepared in association with this Agreement shall be delivered to City as a pre-condition to final payment.
- 10.5.6 Upon the above conditions being met, absent any reason why the City may be compelled to withhold fees, City promptly shall pay Consultant that proportion of the prescribed fee which the services actually performed under this Agreement bear to the total services called for under this Agreement, less any previous payments of the fee.
- 10.5.7 City, as a public entity, has a duty to document the expenditure of public funds. Consultant acknowledges this duty imposed upon the City. Consultant further acknowledges that the failure of Consultant substantially to comply with the submittal of the statements and documents, as required herein, shall constitute a waiver by Consultant of any portion of the fee for which Consultant did not supply such necessary statements and/or documents.

ARTICLE XI. CONSULTANT'S WARRANTY

Consultant warrants that the services required under this Agreement will be performed with the same degree of professional skill and care that typically are exercised by similar consulting professionals performing similar services in Bexar County, Texas. Consultant further warrants that it has not employed or retained any company or person other than a bona fide employee, working solely for Consultant, to solicit or secure this Agreement, and that it has not, for the purpose of soliciting or securing this Agreement, paid or agreed to pay any company or person a commission, percentage, brokerage fee, gift or any other consideration, contingent upon or resulting from the award or making of this Agreement. For breach of this warranty, City shall have the right to terminate this Agreement under the provisions of **Article X** herein.

ARTICLE XII. SMALL BUSINESS ECONOMIC DEVELOPMENT ADVOCACY (SBEDA)

12.1. SBEDA Program

City has adopted a Small Business Economic Development Advocacy Ordinance (Ordinance No. 2010-06-17-0531, hereafter referred to as “SBEDA” or “the SBEDA Program”), which is posted on City’s International and Economic Development (hereafter referred to as “IEDD”) website page and is also available in hard copy form upon request to City. The SBEDA Ordinance Compliance Provisions, contained in this section of the Agreement, are governed by the terms of this Ordinance, as well as by the terms of the SBEDA Ordinance Policy & Procedure Manual established by City pursuant to this Ordinance, and any subsequent amendments to this referenced SBEDA Ordinance and SBEDA Policy & Procedure Manual that are effective as of the date of the execution of this agreement. Unless defined in a contrary manner herein, terms used in this section of the agreement shall be subject to the same expanded definitions and meanings as given those terms in the SBEDA Ordinance and as further interpreted in the SBEDA Policy & Procedure Manual.

12.2. Definitions

12.2.1 Affirmative Procurement Initiatives (hereafter referred to as “API”) – Refers to various Small Business Enterprise, Minority Business Enterprise, and/or Women Business Enterprise (hereafter collectively referred to as “S/M/WBE”) program tools and solicitation incentives which are used to encourage greater prime and subcontract participation by S/M/WBE firms, including bonding assistance, evaluation preferences, subcontracting goals and joint venture incentives. For full descriptions of these and other S/M/WBE program tools, see Section III. D. of **Attachment A** to the SBEDA Ordinance.

12.2.2 Certification or “Certified” – The process by which the Small Business Office (hereafter referred to as “SBO”) staff determines a firm to be a bona-fide small, minority-, women-owned, or emerging small business enterprise. Emerging Small Business Enterprises (hereafter referred to as “ESBEs”) automatically are eligible for Certification as SBEs. Any firm may apply for multiple Certifications which cover each and every status category (e.g., SBE, ESBE, MBE, or WBE), for which it is able to satisfy eligibility standards. The SBO staff may contract these services to a regional Certification agency or other entity. For purposes of Certification, City accepts any firm which is certified by local government entities and other organizations identified herein which have adopted Certification standards and procedures similar to those followed by the SBO, provided the prospective firm satisfies the eligibility requirements set forth in this Ordinance in Section III.E.6 of **Attachment A**.

12.2.3 Commercially Useful Function – An S/M/WBE firm performs a Commercially Useful Function when it is responsible for execution of a distinct element of the work of the contract and is carrying out its responsibilities by actually performing, staffing, managing and supervising the work involved. To perform a Commercially Useful Function, the S/M/WBE firm also must be responsible, with respect to materials and supplies used on the contract, for negotiating price, determining quantity and quality, ordering the material, installing (where applicable) and paying for the material itself. To determine whether an S/M/WBE firm is performing a Commercially Useful Function, an evaluation must be performed of the amount of work subcontracted, normal industry practices, whether the amount the S/M/WBE firm is to be paid under the contract is commensurate with the work it is actually performing and the S/M/WBE credit claimed for its performance of the work and other relevant factors. Specifically, an S/M/WBE firm does not perform a Commercially Useful Function if its role is limited to that of an extra participant in a transaction, contract or project through which funds are passed in order to obtain the appearance of meaningful and useful S/M/WBE participation, when in similar transactions in which S/M/WBE firms do not participate, there is no such role performed. The use of S/M/WBE firms by Consultant to perform such “pass-through” or “conduit” functions that are not commercially useful shall be viewed by City as

fraudulent if Consultant attempts to obtain credit for such S/M/WBE participation towards the satisfaction of S/M/WBE participation goals or other API participation requirements. As such, under such circumstances where a commercially useful function is not actually performed by the S/M/WBE firm, Consultant shall not be given credit for the participation of its S/M/WBE subcontractor or joint venture partner towards attainment of S/M/WBE utilization goals, and Consultant and S/M/WBE firm may be subject to sanctions and penalties in accordance with the SBEDA Ordinance.

12.2.4 Good Faith Efforts – The documentation of Consultant’s intent to comply with S/M/WBE Program Goals and procedures including, but not limited to, the following: (1) documentation within a solicitation response reflecting the Consultant’s commitment to comply with SBE or M/WBE Program Goals as established by the GSC for a particular contract; or (2) documentation of efforts made toward achieving the SBE or M/WBE Program Goals (e.g., timely advertisements in appropriate trade publications and publications of wide general circulation; timely posting of SBE or M/WBE subcontract opportunities on the City of San Antonio website; solicitations of bids/proposals/qualification statements from all qualified SBE or M/WBE firms listed in the Small Business Office’s directory of certified SBE or M/WBE firms; correspondence from qualified SBE or M/WBE firms documenting their unavailability to perform SBE or M/WBE contracts; documentation of efforts to subdivide work into smaller quantities for subcontracting purposes to enhance opportunities for SBE or M/WBE firms; documentation of Consultant’s posting of a bond covering the work of SBE or M/WBE Subcontractors; documentation of efforts to assist SBE or M/WBE firms with obtaining financing, bonding or insurance required by Consultant; and documentation of consultations with trade associations and consultants that represent the interests of SBE and/or M/WBEs in order to identify qualified and available SBE or M/WBE Subcontractors.) The appropriate form and content of Contractor’s Good Faith Efforts documentation shall be in accordance with the SBEDA Ordinance as interpreted in the SBEDA Policy & Procedure Manual.

12.2.5 HUBZone Firm – A business which has been certified by U.S. Small Business Administration for participation in the federal HUBZone Program, as established under the 1997 Small Business Reauthorization Act. To qualify as a HUBZone firm, a small business must meet the following criteria: (1) it must be owned and Controlled by U.S. citizens; (2) at least 35 percent of its employees must reside in a HUBZone; and (3) its Principal Place of Business must be located in a HUBZone within the San Antonio Metropolitan Statistical Area. [See 13 C.F.R. 126.200 (1999).]

12.2.6 Independently Owned and Operated – The ownership of an SBE firm must be direct, independent and by individuals only. Ownership of an M/WBE firm may be by individuals and/or by other businesses, provided the ownership interests in the M/WBE firm can satisfy the M/WBE eligibility requirements for ownership and control, as specified herein The M/WBE firm also must be independently owned and operated, in the sense that it cannot be the subsidiary of another firm which does not itself (and in combination with the certified M/WBE firm) satisfy the eligibility requirements for M/WBE Certification.

12.2.7 Individual – Is an adult person that is of legal majority age.

12.2.8 Industry Categories – Procurement groupings for the City of San Antonio, inclusive of construction, architectural & engineering (collectively referred to as “A&E”), professional services, other services and goods & supplies (i.e., manufacturing, wholesale and retail distribution of commodities). This term sometimes may be referred to as “business categories.”

12.2.9 Originating Department – The City department, or authorized representative of City, which issues solicitations or for which a solicitation is issued.

12.2.10 Payment – The dollars actually paid to Consultants and/or Sub-consultants for City contracted goods and/or services.

12.2.11 San Antonio Metropolitan Statistical Area (hereafter referred to as “SAMSA”) or Relevant Marketplace – The geographic market area affecting the S/M/WBE Program, as determined, for purposes of collecting data for the MGT Studies and for determining eligibility for participation under various programs established by the SBEDA Ordinance, is defined as the San Antonio Metropolitan Statistical Area (SAMSA), currently including the counties of Atascosa, Bandera, Bexar, Comal, Guadalupe, Kendall, Medina and Wilson.

12.2.12 Respondent – A Consultant submitting a bid, statement of qualifications or proposal in response to a solicitation issued by City. For purposes of this agreement, Consultant is the Respondent.

12.2.13 Responsible – A firm which is capable in all respects to fully perform the contract requirements and has the integrity and reliability to assure good faith performance of contract specifications.

12.2.14 SBE Directory - A listing of small businesses which have been certified for participation in City's SBE Program APIs.

12.2.15 SBE Subcontracting Program – An API under which Consultants are required to make Good Faith Efforts to subcontract a specified percentage of the value of prime contract dollars to certified SBE firms. Such subcontracting goals may be set and applied by the GSC, on a contract-by-contract basis, to those types of contracts which provide subcontract opportunities for performing Commercially Useful Functions wherein there have been ongoing disparities in the utilization of available SBE Subcontractors. When specified by the GSC, the SBE Subcontracting Plan or Good Faith Efforts plan submitted by Consultant also may be required to reflect Good Faith Efforts that a Consultant has taken, or commits to taking in the case of solicitations which do not include a detailed scope of work or those in which price cannot be considered a factor in evaluation, toward attainment of subcontracting goals for SBE firms.

12.2.16 Significant Business Presence – To qualify for this Significant Business Presence program, an S/M/WBE must be headquartered or have a significant business presence for at least one year within the Relevant Marketplace, defined as an established place of business in one or more of the eight counties that make up the (SAMSA), from which 20% of its full-time, part-time and contract employees regularly are based, and from which a substantial role in the S/M/WBE's performance of a Commercially Useful Function is conducted. A location utilized solely as a post office box, mail drop or telephone message center or any combination thereof, with no other substantial work function, shall not be construed to constitute a significant business presence.

12.2.17 Small Business Enterprise (SBE) – A corporation, partnership, sole proprietorship or other legal entity for the purpose of making a profit, which is independently owned and operated by individuals legally residing in, or which are citizens of, the United States or its territories, and which meets the U.S. Small Business Administration (hereafter referred to as “SBA”) size standard for a small business in its particular industry/ies and meets the Significant Business Presence requirements as defined herein.

12.2.18 Small Business Office (SBO) – The office within the International and Economic Development Department (hereafter referred to as “IEDD”) of City which primarily is responsible for general oversight and administration of the S/M/WBE

Program.

12.2.19 Small Business Office Manager – The Assistant Director of the IEDD of City who is responsible for the management of the SBO and ultimately is responsible for oversight, tracking, monitoring, administration, implementation and reporting of the S/M/WBE Program. The SBO Manager also is responsible for the enforcement of Consultant compliance with contract participation requirements and ensuring that the overall Program goals and objectives are met.

12.2.20 Sub-Consultant – Any entity which is providing goods or services to Consultant in furtherance of Consultant's performance under a contract or purchase order with City. A copy of each binding agreement between Consultant and its Sub-Consultants shall be submitted to City prior to execution of this contract agreement and any contract modification agreement.

12.2.21 Suspension – The temporary stoppage of the SBE or M/WBE firm's beneficial participation in City's S/M/WBE Program for a finite period of time, due to cumulative contract payments the S/M/WBE firm received during a fiscal year, which exceed a certain dollar threshold as set forth in Section III.E.7 of Attachment A to the SBEDA Ordinance, or the temporary stoppage of Consultant's and/or S/M/WBE firm's performance and payment under City contracts due to City's imposition of Penalties and Sanctions set forth in Section III.E.13 of Attachment A to the SBEDA Ordinance.

12.2.22 Sub-Consultant Utilization Plan – A binding part of this Agreement which states Consultant's commitment for the use of Joint Venture Partners and / or Sub-Consultants in the performance of this Agreement, and states the name, scope of work, and dollar value of work to be performed by each of Consultant's Joint Venture partners and/or Sub-Consultants in the course of the performance of this Agreement, specifying the S/M/WBE Certification category for each Joint Venture partner and Sub-Consultant, as approved by the SBO Manager. Additions, deletions or modifications of the Joint Venture partner or Sub-Consultant's names, scopes of work or dollar values of work to be performed requires an amendment to this Agreement to be approved by the IEDD Director or designee.

12.3 SBEDA Program Compliance – General Provisions. As Consultant acknowledges that the terms of City's SBEDA Ordinance, as amended, together with all requirements, guidelines, and procedures set forth in City's SBEDA Policy & Procedure Manual are in furtherance of City's efforts at economic inclusion and, moreover, that such terms are part of Consultant's scope of work as referenced in City's formal solicitation that formed the basis for contract award and subsequent execution of this Agreement, these SBEDA Ordinance requirements, guidelines and procedures hereby are incorporated by reference into this Agreement, and are considered by the parties to this Agreement to be material terms. Consultant voluntarily agrees to fully comply with these SBEDA program terms as a condition for being awarded this contract by City. Without limitation, Consultant further agrees to the following terms as part of its contract compliance responsibilities under the SBEDA Program:

12.3.1 Consultant fully shall cooperate with the Small Business Office and other City departments in its data collection and monitoring efforts regarding Consultant's utilization and payment of Sub-Consultants, S/M/WBE firms, and HUBZone firms, as applicable, for their performance of Commercially Useful Functions on this contract including, but not limited to, the timely submission of completed forms and/or documentation promulgated by SBO, through the Originating Department, pursuant to the SBEDA Policy & Procedure Manual, timely entry of data into monitoring systems, and ensuring the timely compliance of its Sub-Consultants with this term;

12.3.2 Consultant fully shall cooperate with any City or SBO investigation (and also shall respond truthfully and promptly to any City or SBO inquiry) regarding possible non-compliance with SBEDA requirements on the part of Consultant or its Sub-Consultant or suppliers;

12.3.3 Consultant shall permit the SBO, upon reasonable notice, to undertake inspections as necessary including, but not limited to, contract-related correspondence, records, documents, payroll records, daily logs, invoices, bills, cancelled checks, and work product, and to interview Sub-Consultants and workers to determine whether there has been a violation of the terms of this Agreement;

12.3.4 Consultant immediately shall notify the SBO, in writing on the Change to Utilization Plan form, through the Originating Department, of any proposed changes to Consultant's Sub-Consultants/Supplier Utilization Plan for this Agreement, with an explanation of the necessity for such proposed changes, including documentation of Good Faith Efforts made by Consultant to replace the Sub-Consultant/Supplier in accordance with the applicable Affirmative Procurement Initiative. All proposed changes to the Sub-Consultant/Supplier Utilization Plan including, but not limited to, proposed self-performance of work by Consultant of work previously designated for performance by Sub-Consultant or supplier, substitutions of new Sub-Consultants, terminations of previously designated Sub-Consultants, or reductions in the scope of work and value of work awarded to Sub-Consultants or suppliers, shall be subject to advanced written approval by the Originating Department and the SBO.

12.3.5 Consultant immediately shall notify the Originating Department and SBO of any transfer or assignment of its contract with City, as well as any transfer or change in its ownership or business structure.

12.3.6 Consultant shall retain all records of its Sub-Consultant payments for this contract for a minimum of four (4) years, or as required by state law, following the conclusion of this Agreement or, in the event of litigation concerning this Agreement, for a minimum of four (4) years, or as required by state law, following the final determination of litigation, whichever is later.

12.3.7 In instances wherein the SBO determines that a Commercially Useful Function is not actually being performed by the applicable S/M/WBE or HUBZone firms listed in a Consultant's Sub-Consultant/Supplier Utilization Plan, Consultant shall not be given credit for the participation of its S/M/WBE or HUBZone Sub-Consultant(s) or joint venture partner(s) toward attainment of S/M/WBE or HUBZone firm utilization goals, and Consultant and its listed S/M/WBE firms or HUBZone firms may be subject to sanctions and penalties in accordance with the SBEDA Ordinance.

12.4 SBEDA Program Compliance – Affirmative Procurement Initiatives. City has applied the following contract-specific Affirmative Procurement Initiative to this Agreement: Consultant hereby acknowledges and agrees that the selected API requirement also shall be extended to any change order or subsequent modification of this Agreement, and, absent SBO's granting of a waiver, that its full compliance with the following API terms and conditions are material to Consultant's satisfactory performance under this Agreement:

SBE Subcontracting Program. In accordance with SBEDA Ordinance Section III. D. 1. (c), this Agreement is being awarded pursuant to the SBE Subcontracting Program. Consultant agrees to subcontract at least **20%** of its prime contract value to certified SBE firms headquartered or have a significant business presence within the SAMSA. The Sub-Consultant/Supplier Utilization Plan that Consultant submitted to City, with its response for this Agreement (or, as appropriate, that it agrees to submit during the

price proposal negotiation phase of this Agreement), and that contains the names of the certified SBE Sub-Consultants to be used by Consultant on this Agreement, the respective percentages of the total prime contract dollar value to be awarded and performed by each SBE Sub-Consultant, and documentation including a description of each SBE Sub-Consultant's scope of work and confirmation of each SBE Sub-Consultant's commitment to perform such scope of work for an agreed upon dollar amount is hereby attached and incorporated by reference into the material terms of this Agreement. In the absence of a waiver granted by the SBO, the failure of Consultant to attain this sub-consulting goal for SBE firm participation in the performance of a Commercially Useful Function under the terms of its Agreement shall be a material breach and grounds for termination of the Agreement with City and may result in debarment from performing future City Agreements and/or shall be subject to any other remedies available under the terms of this Agreement for violations of the SBEDA Ordinance, or under any other law.

12.5 Commercial Nondiscrimination Policy Compliance. As a condition of entering into this Agreement, Consultant represents and warrants that it has complied with City's Commercial Nondiscrimination Policy throughout the course of this solicitation and Agreement award process, and will continue to comply with said Commercial Nondiscrimination Policy, as described under Section III. C. 1. of the SBEDA Ordinance. As part of such compliance, Consultant shall not discriminate on the basis of race, color, religion, ancestry or national origin, sex, age, marital status, sexual orientation, or on the basis of disability or other unlawful forms of discrimination in the solicitation, selection, hiring or commercial treatment of Sub-Consultant, vendors, suppliers or commercial customers, nor shall Consultant retaliate against any person for reporting instances of such discrimination. Consultant shall provide equal opportunity for Sub-Consultants, vendors and suppliers to participate in all of its public sector and private sector sub-consulting and supply opportunities, provided that nothing contained in this clause shall prohibit or limit otherwise lawful efforts to remedy the effects of marketplace discrimination which have occurred or are occurring in City's Relevant Marketplace. Consultant acknowledges that it understands and agrees that a material violation of this clause shall be considered a material breach of this Agreement and may result in termination of this Agreement, disqualification of Consultant from participating in City contracts, or other sanctions. This clause is not enforceable by or for the benefit of, and creates no obligation to, any third party. Consultant's certification of its compliance with this Commercial Nondiscrimination Policy, as submitted to City pursuant to the solicitation for this Agreement, is hereby incorporated into the material terms of this Agreement. Consultant shall incorporate this clause into each of its Sub-Consultant and supplier agreements entered into, pursuant to City agreements/contracts.

12.6 Prompt Payment. Upon execution of this Agreement by Consultant, Consultant shall be required to submit to City accurate progress payment information with each invoice regarding each of its Sub-Consultants, including HUBZone Sub-Consultants, to ensure that the Consultant's reported sub-consultant participation is accurate. Consultant shall pay its Sub-Consultants in compliance with Chapter 2251, Texas Government Code (the "Prompt Payment Act") within ten (10) calendar days of receipt of payment from City. In the event of Consultant's noncompliance with these prompt payment provisions, no new City contracts shall be issued to Consultant until City's audit of previous Sub-Consultant payments is complete and payments are verified to be in accordance with the specifications of the Agreement.

12.7 Violations, Sanctions and Penalties. In addition to the above terms, Consultant acknowledges and agrees that it is a violation of the SBEDA Ordinance and a material breach of this Agreement to:

12.7.1 Fraudulently obtain, retain, or attempt to obtain, or aid another in fraudulently obtaining, retaining, or attempting to obtain or retain Certification status as an SBE, MBE, WBE, M/WBE, HUBZone firm, Emerging M/WBE, or ESBE for purposes of benefiting from the SBEDA Ordinance;

12.7.2 Willfully falsify, conceal or cover up by a trick, scheme or device, a material fact or make any false, fictitious or fraudulent statements or representations, or make use of any false writing or document, knowing the same to contain any false, fictitious or fraudulent statement or entry pursuant to the terms of the SBEDA Ordinance;

12.7.3 Willfully obstruct, impede or attempt to obstruct or impede any authorized official or employee who is investigating the qualifications of a business entity which has requested Certification as an S/M/WBE or HUBZone firm;

12.7.4 Fraudulently obtain, attempt to obtain or aid another person fraudulently obtaining or attempting to obtain public monies to which the person is not entitled under the terms of the SBEDA Ordinance; and

12.7.5 Make false statements to any entity that any other entity is, or is not, certified as an S/M/WBE for purposes of the SBEDA Ordinance.

12.8 Any person who violates the provisions of this section shall be subject to the provisions of Section III. E. 13. of the SBEDA Ordinance and any other penalties, sanctions, and remedies available under law, including but not limited to:

12.8.1 the suspension of this Agreement;

12.8.2 the Withholding of funds;

12.8.3 the rescission of this Agreement, based upon a material breach of contract pertaining to S/M/WBE Program compliance;

12.8.4 the refusal to accept a response or proposal; and

12.8.5 the disqualification of Consultant or other business firm from eligibility for providing goods or services to City for a period not to exceed two (2) years (upon City Council approval).

ARTICLE XIII. ASSIGNMENT OR TRANSFER OF INTEREST

Consultant shall not assign or transfer Consultant's interest in this Agreement without the written consent of City.

ARTICLE XIV. INSURANCE REQUIREMENTS

14.1 Prior to the commencement of any work under this Agreement, Consultant shall furnish copies of all required endorsements and a completed Certificate(s) of Insurance to City's CIMS/Contract Services, which clearly shall be labeled **ENGINEERING DESIGN SERVICES FOR HARRY PROJECT NAME (PROJECT #40-XXXX)** in the Description of Operations block of the Certificate. The original Certificate(s) shall be completed by an agent and signed by a person authorized by that insurer to bind coverage on its behalf. City will not accept Memorandum of Insurance or Binders as proof of insurance. The certificate(s) or form(s) must have the agent's signature, phone number and be mailed, with copies of all applicable endorsements, directly from the insurer's authorized representative to City. City shall have no duty to pay or perform under this Agreement until such certificate and endorsements have been received and approved by City's CIMS Department. No officer or employee, other than City's Risk Manager, shall have authority to waive this requirement.

14.2 City reserves the right to review the insurance requirements of this Article XIV during the effective period of this Agreement and any extension or renewal thereof and to modify insurance coverages and limits, when deemed necessary and prudent by City's Risk Manager, based upon changes in statutory law, court decisions or circumstances surrounding this contract. In no instance will City allow modification whereupon City may incur increased risk.

14.3 Consultant's financial integrity is of interest to City. Therefore, subject to the Consultant's right to maintain reasonable deductibles in such amounts as are approved by City, Consultant shall obtain and maintain in full force and effect for the duration of this Agreement, and any extension hereof, at Consultant's sole expense, insurance coverage written on an occurrence basis, unless otherwise indicated, by companies authorized to do business in the State of Texas and with an A.M. Best's rating of not less than A- (VII), in the following types and for an amount not less than the amount listed:

1. Workers' Compensation	Statutory Limit
2. Employers' Liability	\$500,000/\$500,000/\$500,000
3. Commercial General Broad Form Liability Insurance to include coverage for the following: a. Premises/Operations b. Independent Contractors c. Products/completed operations d. Personal Injury e. Contractual liability	Combined Single Limit for Bodily Injury and Property Damage of \$1,000,000 per occurrence; General Aggregate limit of \$2,000,000 or its equivalent in umbrella or excess liability coverage
4. Business Automobile Liability a. Owned/Leased Vehicles b. Non-Owned Vehicles c. Hired Vehicles	Combined Single Limit for Bodily Injury and Property Damage of \$1,000,000 per occurrence
5. Professional Liability (Claims made form)	\$1,000,000 per claim to pay on behalf of the insured all sums which the insured shall become legally obligated to pay as damages by reason of any negligent act, malpractice, error or omission in professional services.

14.4 As they apply to the limits required by the City, City shall be entitled, upon request and without expense, to receive copies of the policies, declarations page and all endorsements thereto. Consultant shall be required to comply with any such requests and shall submit a copy of the replacement insurance documents to City at the address provided below within ten (10) calendar days of City's request. Consultant shall pay any costs incurred resulting from said request. If the City requests a copy/copies of any insurance policy, Consultant prominently will mark those portions of the policy it regards as confidential. In the event a third party makes an open records request under the Texas Freedom of Information Act, or other public information law, asking to view or copy Consultant's policy, City shall submit the material to the Texas Attorney General (AG) for an opinion regarding the release of said policy. Consultant and City agree that City will be bound by the AG opinion. Similarly, City will provide all material under a court order or a litigation discovery rule which may require or direct disclosure of the information.

City of San Antonio

Capital Improvements Management Services Department
Attn: Contracts Services Division 9th Floor
P.O. Box 839966
San Antonio, Texas 78283-3966

- 14.5 Consultant agrees that, with respect to the above required insurance, all insurance policies are to contain or be endorsed to contain the following required provisions:
- Name City and its officers, officials, employees, volunteers and elected representatives as additional insureds by endorsement, as respects operations and activities of, or on behalf of, the named insured performed under Agreement with City, with the exception of the workers' compensation and professional liability policies;
 - Provide for an endorsement that the "other insurance" clause shall not apply to City where City is an additional insured shown on the policy;
 - Workers' compensation, employers' liability, general liability and auto liability policies will provide a waiver of subrogation in favor of City; and
 - Provide advance written notice directly to City of any suspension, cancellation, non-renewal or material change in coverage, and not less than ten (10) calendar days advance written notice for nonpayment of premium.
- 14.6 Within five (5) calendar days of a suspension, cancellation or non-renewal of coverage, Consultant shall provide a replacement Certificate of Insurance and applicable endorsements to City. City shall have the option to suspend Consultant's performance, should there be a lapse in coverage at any time during this contract. Failure to provide and maintain the required insurance shall constitute a material breach of this Agreement.
- 14.7 In addition to any other remedies it may have, upon Consultant's failure to provide and maintain any insurance or policy endorsements, to the extent and within the time herein required, City shall have the right to order Consultant to stop services/tasks hereunder and/or withhold any compensation which become due to Consultant hereunder until Consultant demonstrates compliance with the requirements hereof.
- 14.8 Nothing herein contained shall be construed as limiting in any way the extent to which Consultant may be held responsible for payments of damages to persons or property resulting from Consultant's or its sub-Consultant's performance of the services covered under this Agreement.
- 14.9 It is agreed that Consultant's insurance shall be deemed primary and non-contributory with respect to any insurance or self insurance carried by City for liability arising out of operations under this Agreement.
- 14.10 It is understood and agreed that the insurance required is in addition to and separate from any other obligation contained in this Agreement and that no claim or action by or on behalf of CITY shall be limited to the insurance coverage provided.
- 14.11 Consultant and its subcontractors are responsible for all damages to their own equipment and/or property.

ARTICLE XV. INDEMNIFICATION

- 15.1 **Consultant, whose work product is the subject of this Agreement for professional services, agrees to INDEMNIFY AND HOLD CITY, ITS ELECTED OFFICIALS, OFFICERS AND EMPLOYEES HARMLESS** against any and all claims, lawsuits, judgments, cost, liens, losses, expenses, fees (including reasonable attorney's fees and costs of defense), proceedings, actions, demands, causes of action, liability and suits of any kind and nature, including but not limited to, personal injury (including death), property damage, or other harm for which recovery of damages is sought that may **ARISE OUT OF OR BE OCCASIONED OR CAUSED BY CONSULTANT'S NEGLIGENT ACT, ERROR, OR OMISSION OF CONSULTANT, ANY AGENT, OFFICER, DIRECTOR, REPRESENTATIVE, EMPLOYEE, CONSULTANT OR SUBCONSULTANT OF CONSULTANT, AND THEIR RESPECTIVE OFFICERS, AGENTS, EMPLOYEES, DIRECTORS AND REPRESENTATIVES** while in the exercise of performance of the rights or duties under this **AGREEMENT**. The indemnity provided for in this paragraph shall not apply to any liability resulting from the negligence of City, its officers or employees, in instances where such negligence causes personal injury, death, or property damage. **IN THE EVENT CONSULTANT AND CITY ARE FOUND JOINTLY LIABLE BY A COURT OF COMPETENT JURISDICTION, LIABILITY SHALL BE APPORTIONED COMPARATIVELY IN ACCORDANCE WITH THE LAWS OF THE STATE OF TEXAS, WITHOUT, HOWEVER, WAIVING ANY GOVERNMENTAL IMMUNITY AVAILABLE TO CITY UNDER TEXAS LAW AND WITHOUT WAIVING ANY DEFENSES OF THE PARTIES UNDER TEXAS LAW.**
- 15.2 Consultant shall advise City in writing within 24 hours of any claim or demand against City or Consultant, related to or arising out of Consultant's activities under this Agreement.
- 15.3 The provisions of this Article XV solely are for the benefit of the parties hereto and not intended to create or grant any rights, contractual or otherwise, to any other person or entity.

ARTICLE XVI. CLAIMS AND DISPUTES

- 16.1 **Definition.** A Claim is a demand or assertion by one of the parties seeking, as a matter of right, adjustment or interpretation of the Agreement terms, payment of money, extension of time or other relief, with respect to the terms of the Agreement. The term "Claim" also includes other disputes and matters in question, between City and Consultant, arising out of or relating to the Agreement. Claims must be initiated by written notice. Every Claim of Consultant, whether for additional compensation, additional time or other relief, shall be signed and sworn to by an authorized corporate officer (if Consultant is not a corporation, then an official of the company authorized to bind Consultant by his/her signature) of Consultant, verifying the truth and accuracy of the Claim. The responsibility to substantiate Claims shall rest with the party making the Claim.
- 16.2 **Time Limit on Claims.** Claims by Consultant or by City must be initiated in writing to the other party within twenty-one (21) calendar days after the occurrence of the event giving rise to such Claim.
- 16.3 **Continuing Contract Performance.** Pending final resolution of a Claim, except as otherwise agreed in writing, Consultant shall proceed diligently with performance of the Agreement and City shall continue to make payments in accordance with this Agreement.

- 16.4 **Claims for Additional Time.** If Consultant wishes to make a Claim for an increase in the time for performance, written notice, as stated in this Section XVI, must be given. Consultant's Claim shall include an estimate of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.
- 16.5 **Claims for Consequential Damages.** Except as otherwise provided in this Agreement, in calculating the amount of any Claim or any measure of damages for breach of contract (such provision to survive any termination following such breach), the following standards will apply both to claims by Consultant and to claims by City:
- 16.5.1 No consequential damages will be allowed.
- 16.5.2 Damages are limited to extra costs specifically shown to have been directly caused by a proven wrong for which the other party is claimed to be responsible.
- 16.5.3 No profit will be allowed on any damage claim.
- 16.6 **No Waiver of Governmental Immunity. NOTHING IN THIS SECTION XVI SHALL BE CONSTRUED TO WAIVE CITY'S GOVERNMENTAL IMMUNITY FROM LAWSUIT, WHICH IMMUNITY IS EXPRESSLY RETAINED TO THE EXTENT IT IS NOT CLEARLY AND UNAMBIGUOUSLY WAIVED BY STATE LAW.**
- 16.7 Alternative Dispute Resolution.
- 16.7.1 **Continuation of Services Pending Dispute Resolution.** Each party is required to continue to perform its obligations under this Agreement, pending a final resolution of any dispute arising out of or relating to this Agreement, unless it would be impossible or impracticable under the circumstances.
- 16.7.2 **Requirement for Senior Level Negotiations.** Before invoking mediation or any other alternative dispute process set forth herein, the parties agree that they first shall try to resolve any dispute arising out of or related to this Agreement through discussions directly between those senior management representatives within their respective organizations who have overall managerial responsibility for similar projects. This step shall be a condition precedent to use of any other alternative dispute resolution process. If the parties' senior management representatives cannot resolve the dispute within thirty (30) calendar days, after a party delivers a written notice of such dispute, then the parties shall proceed with the mediation alternative dispute resolution process contained herein. All negotiations pursuant to this clause are confidential and shall be treated as compromise and settlement negotiations for purposes of applicable rules of evidence.
- 16.7.3 Mediation.
- 16.7.3.1 In the event that City or Consultant shall contend that the other has committed a material breach of this Agreement, the party alleging such breach shall, as a condition precedent to filing any lawsuit, request mediation of the dispute.
- 16.7.3.2 Request for mediation shall be in writing, and shall request that the mediation commence not less than thirty (30) or more than ninety (90) calendar days following the date of the request, except upon agreement of both parties.

- 16.7.3.3 In the event City and Consultant are unable to agree to a date for the mediation or to the identity of the mediator or mediators within 30 calendar days following the date of the request for mediation, all conditions precedent in this Article XVI shall be deemed to have occurred.
- 16.7.3.4 The parties shall share the mediator's fee and any filing fees equally. Venue for any mediation or lawsuit arising under this Agreement shall be in Bexar County, Texas. Any agreement reached in mediation shall be enforceable as a settlement agreement in any court having jurisdiction thereof. No provision of this Agreement shall waive any immunity or defense. No provision of this Agreement is a consent to suit.

ARTICLE XVII. SEVERABILITY

If for any reason, any one or more Articles and/or paragraphs of this Agreement are held invalid or unenforceable, such invalidity or unenforceability shall not affect, impair or invalidate the remaining Articles and/or paragraphs of this Agreement but shall be confined in its effect to the specific Article, sentences, clauses or parts of this Agreement held invalid or unenforceable, and the invalidity or unenforceability of any Article, sentence, clause or parts of this Agreement, in any one or more instance, shall not affect or prejudice in any way the validity of this Agreement in any other instance.

ARTICLE XVIII. INTEREST IN CITY CONTRACTS PROHIBITED

- 18.1 No officer or employee of City shall have a financial interest, directly or indirectly, in any contract with City or shall be financially interested, directly or indirectly, in the sale to City of any land, materials, supplies or service, except on behalf of City as an officer or employee. This prohibition extends to City's Public Service Board, SAWS and other City boards and commissions, which are more than purely advisory. The prohibition also applies to Sub-Contracts on City projects.
- 18.2 Consultant acknowledges that it is informed that the Charter of City and its Ethics Code prohibit a City officer or employee, as those terms are defined in the Ethics Code, from having a financial interest in any contract with City or any City agency, such as the City-owned utilities. Consultant's officer or employee has a "prohibited financial interest" in a contract with City or in the sale to City of land, materials, supplies or service, if any of the following individual(s) or entities is a party to the contract or sale: a. a City officer or employee; b. a City officer or employee's parent, child or spouse; c. a business entity in which the City officer or employee, or the officer or employee's parent, child or spouse, owns ten percent (10%) or more of the voting stock or shares of the business entity, or ten percent (10%) or more of the fair market value of the business entity; d. a business entity in which any individual or entity above listed is a subcontractor on a City contract, a partner or a parent or subsidiary business entity.
- 18.3 Consultant warrants and certifies, and this Agreement is made in reliance thereon, that Consultant, its officers, employees and agents are neither officers nor employees of City. Consultant further warrants and certifies that it has tendered to City a Discretionary Contracts Disclosure Statement in compliance with City's Ethics Code.

ARTICLE XIX. CONFLICTS OF INTEREST DISCLOSURE

Consultant must disclose if it is associated in any manner with a City officer or employee in a business venture or business dealings. Failure to do so will constitute a violation of City Ordinance No. 76933. To be "associated" in a business venture or business dealings includes: a) being in a partnership or joint venture with a City officer or employee; b) having a contract with a City officer or employee; c) being joint owners of a business with a City officer or employee; d) owning at least ten percent (10%) of the stock in a corporation in which a City officer or employee also owns at least ten percent (10%); or e) having an established business relationship with a City Officer or employee as a client or customer.

ARTICLE XX. STANDARD OF CARE/LICENSING

- 20.1 Services provided by Consultant under this Agreement shall be performed in a manner consistent with that degree of care and skill ordinarily exercised by members of the same profession currently practicing under similar circumstances.
- 20.2 Consultant shall be represented by personnel with appropriate certification(s) at meetings of any official nature concerning the Project, including but not limited to scope meetings, review meetings, pre-bid meetings and preconstruction meetings.

ARTICLE XXI. RIGHT OF REVIEW AND AUDIT

- 21.1 Consultant grants City, or its designees, the right to audit, examine or inspect, at City's election, all of Consultant's records relating to the performance of the Work under the Agreement, during the term of the Agreement and retention period herein. The audit, examination or inspection may be performed by a City designee, which may include its internal auditors or an outside representative engaged by City. Consultant agrees to retain its records for a minimum of four (4) years following termination of the Agreement, unless there is an ongoing dispute under the contract, then, such retention period shall extend until final resolution of the dispute. "Consultant's records" include any and all information, materials and data of every kind and character generated as a result of the work under this Agreement. Example of Consultant records include, but are not limited to, billings, books, general ledger, cost ledgers, invoices, production sheets, documents, correspondence, meeting notes, subscriptions, agreements, purchase orders, leases, contracts, commitments, arrangements, notes, daily diaries, reports, drawings, receipts, vouchers, memoranda, time sheets, payroll records, policies, procedures, federal and state tax filings for issue in question and any and all other agreements, sources of information and matters that may, in City's judgment, have any bearing on or pertain to any matters, rights, duties or obligations under or covered by any Agreement Documents.
- 21.2 City agrees that it will exercise the right to audit, examine or inspect Consultant's records only during City's regular business hours. Consultant agrees to allow City's designee access to all of Consultant's Records, Consultant's facilities and current or former employees of Consultant, deemed necessary by City or its designee(s), to perform such audit, inspection or examination. Consultant also agrees to provide adequate and appropriate work space necessary to City or its designees to conduct such audits, inspections or examinations.
- 21.3 Consultant must include this audit clause in any subcontractor, supplier or vendor contract.

ARTICLE XXII. ENTIRE AGREEMENT

This Agreement represents the entire and integrated Agreement between City and Consultant and supersedes all prior negotiations, representations or agreements, either oral or written. This Agreement may be amended only by written instrument signed by both City and Consultant.

ARTICLE XXIII. VENUE

The obligations of the parties to this Agreement shall be performable in San Antonio, Bexar County, Texas. If legal action, such as civil litigation, is necessary in connection therewith, exclusive venue shall lie in Bexar County, Texas.

ARTICLE XXIV. NOTICES

Except as may be provided elsewhere herein, all notices, communications, and reports required or permitted under this Agreement shall personally be delivered or mailed to the respective party by depositing the same in the United States Postal Service, addressed to the applicable address shown below, unless and until either party otherwise is notified in writing by the other party of a change of such address. Mailed notices shall be deemed communicated as of five (5) calendar days of mailing.

If intended for City to:

If intended for Consultant, to:

Capital Improvements Management
Services
Attention: Contract Services
114 West Commerce, 9th Floor
San Antonio, Texas 78205

ARTICLE XXV. INDEPENDENT CONTRACTOR

In performing services under this Agreement, the relationship between City and Consultant is that of an independent contractor. By the execution of this Agreement, Consultant and City do not change the independent contractor status of Consultant. Consultant shall exercise independent judgment in performing its duties and obligations under this Agreement and solely is responsible for setting working hours, scheduling or prioritizing the work flow and determining how the work is to be performed. No term or provision of this Agreement or act of Consultant, in the performance of this Agreement, shall be construed as making Consultant the agent, servant or employee of City, or as making Consultant or any of its agents or employees eligible for any fringe benefits, such as retirement, insurance and worker's compensation, which City provides to or for its employees.

ARTICLE XXVI. CAPTIONS

The captions for the individual provisions of this Agreement are for informational purposes only and shall not be construed to effect or modify the substance of the terms and conditions of this Agreement to which any caption relates.

IN WITNESS WHEREOF, the City of San Antonio has lawfully caused these present to execute this Agreement by the hand of the City Manager, or designee; Consultant, acting by the hand of _____ thereunto authorized _____ does now sign, execute and deliver this document.

Executed on this _ day of _____, A. D. _____.

CITY OF SAN ANTONIO

DESIGN FIRM

CITY MANAGER

DESIGN FIRM
PRESIDENT

APPROVED:

CITY ATTORNEY

ATTACHMENT 5
SAN ANTONIO WATER SYSTEM
(SAWS)
SCOPE OF SERVICES
(September 21, 2011)

The Consultant shall perform his obligations under this Agreement the following engineering design: phases 40% Design, 70% Design, 95% Design, Pre Bid Review, Bid Documents, Construction Engineering Services and Project Close Out & Final Payment.

1. 40% Design

The Consultant Shall:

- a) Meet with SAWS staff to further define the scope of the proposed water, sewer or recycle main work within the COSA project limits. SAWS shall make known to the Consultant other elements that might directly affect the project. Consultant will be given any information about ongoing SAWS projects or projects recently completed that might impact the design of the proposed project
- b) Consultant must obtain written authorization from COSA concurrent with SAWS prior to commencing any additional services. Consultant will bear all expenses for any additional services done by the Consultant without prior approved proposal from COSA concurrent with SAWS in writing.
- c) Consultant shall obtain and apply the necessary and latest rules and regulations, specifications, special specifications, ordinances, codes, TCEQ, EPA, and any other pertinent governing entity requirements for the development of design plans and supporting documents.
- d) Consultant to obtain the latest dgn cells and drawing symbols from SAWS website http://www.saws.org/business_center/specs/cadd/CADD_Standards.pdf to prepare the SAWS design plans.
- e) Project drawings shall include, but not be limited to, plan and profile sheets with the plan view at a scale of 1"=40' horizontal and vertical, 1"=5' vertical scales for the profile on 11" x 17" sheets. All design drawings shall be submitted on 11" x 17", unless stated otherwise.
- f) Prior to submitting the 40% Phase Plans, identify as early as possible any potential conflicts with proposed utilities, storm drain features, street reconstruction designs, etc., as required by the City's scope of services.
- g) Consultant to use information that will be used by the COSA for the generation of plans at no cost to SAWS. This information will include but not limited to (Topography Survey, Base Mapping, Plan Sheets, Tree Survey and Environmental Studies).
- h) Consultant is to use actual survey information for the design of the project. SAWS existing block maps, as-builts are to be used as a bases for preliminary information of existing water and sewer facilities.
- i) The City's scope of services includes quality level C locates of the SAWS water valve boxes and sewer manholes. In preparation of the 40% plans the consultant is to survey the actual location and depth of existing water valves and sanitary sewer manholes in order to properly identify conflicts. If the information obtained from this service is not

adequate for use in identifying conflicts, additional potholing may be required and will be addressed as an additional service for the City.

- j) Additional Information for the development of plans.
 - a. Surveying required for the project and by the contract will be based on Texas State Plane, South Central NAD 83(93) projection. All CADD drawings must be submitted in the Texas State Plane, South Central NAD 83(93) projection.
 - b. The contractor is required to provide at a minimum two (2) accurate x,y coordinates that are located at the beginning and end of the project.
 - c. Measurements will be in English Standards (i.e. inches, feet, miles).
 - d. True North will be identified and depicted for map orientation.
 - e. CADD Drawings shall be submitted preferably in Bentley Microstation (DGN) version 7 or 8.
 - f. Adherence to SAWS CADD Standards for levels, weights, colors, and symbology must be followed.
- k) Include a quantity summary table on each individual sheet of the water and sewer plan, tabulating the quantities of the work shown on that individual sheet.
- l) If any portion of the SAWS work is outside the limits of the COSA project but the work is necessary to accommodate the COSA project, the consultant will need to perform additional field surveys to collect information needed in the design of the water, sewer or recycle main work. Survey outside of the COSA project limits required for SAWS work will be done as an additional service for SAWS.

40% plans shall include but not necessarily be limited to the following:

- Plan and profile sheets for all proposed sewer lines. Each sheet will have a plan and profile.
 - Plan and profile sheets for water mains 20-inches or larger
 - Plan sheets for proposed water mains 16-inches or smaller
 - Location Map
 - Project Limits
 - SAWS Water and Sewer Job Numbers
 - SAWS Standard Title Block
 - SAWS stationing shall match CoSA stationing
 - Existing water and sewer facilities, including material type and size of pipes
 - Location of clean outs, fire hydrants, meter boxes, valves and manholes
 - Recommendations for adjustments, if possible, using the latest rules and regulations, ordinances, codes, TCEQ, and any other pertinent governing entity requirements for the development of the 40% design.
 - Recommendation for additional Geotechnical information required for the SAWS work not included as part of the COSA proposed work
 - Identify if project is over the Edwards Recharge Zone and use appropriate notes.
 - Consultant to include any other pertinent information deemed necessary in the preparation of the 40% Design plans into the Internet-based Project Management Systems.
- m) Furnish the San Antonio Water System with 5 complete sets of 40% Phase SAWS plans,

2 complete sets of 40% Phase COSA plans, a PDF copy of all plans, the SAWS QA/QC form and supporting documents for review and comments. SAWS will review the plans and documents and provide written comments to the Consultant. Comments will be mailed and also be provided in the COSA internet-based Project Management System. Consultant is required to address all comments and to provide a written narrative addressing all comments. Comments will need to be addressed prior to proceeding to the next phase of work. If the Consultant does not understand the comment and a meeting is necessary, SAWS will meet with the consultant to clarify any question. Consultant will need to address SAWS comments in a timely manner to keep in phase with the COSA schedule.

- n) Furnish an Opinion of Probable Construction Cost based on the plan and supporting documents of the proposed construction. The probable cost opinion will be based on consultant using the latest unit prices provided by SAWS for similar work, latest and most recent bid tabulations for similar projects, recent market trends and consultants experience and research to include adjustment to reflect the ease or difficulty of constructing the project. The Opinion of Probable Construction Cost shall not include construction contingency.

- o) After acceptance and approval of 40% plans, consultant to provide SAWS with two copies of the revised SAWS plans.

2. 70 % Design

The Consultant Shall:

- a) During the design of the 70% plans, consultant can request additional potholing that may be required to design the replacement, installation, or adjustment of SAWS facilities. This additional potholing will be done as an additional service for SAWS. Consultant shall also try to minimize the adjustment of water mains 20-inches and larger by looking at modifying the proposed roadway and storm drain work if possible.

- b) Prior to completing the 70% water main design plans, the consultant shall coordinate with SAWS and provide a map indicating all valves which must be closed by the SAWS maintenance division. to determine if the proposed water main work can be done with minimal disruption to the customers. This test shutdown of the water system will be done by SAWS maintenance division and results of the test shutdown will be provided to the Consultant. If as a result of the test shutdown requires a temporary water main or the installation of a new valve, the consultant should include the necessary temporary water main design in the 70% design phase.

- c) The Consultants shall coordinate the design of sewer and water facilities with all other aspects of the project, including but not limited to proposed street, drainage design, proposed or existing CPS Gas Main, CPS Power Poles, AT&T and other providers to ensure that the project can be constructed without conflicts. This includes the preparation of a phasing plan if the order of installation of street, drainage, sewer and water facilities requires special attention to avoid conflicts during construction.

- d) 70% design plans shall include but not necessarily be limited to:
 - Separate sets of plans for water and sewer
 - Cover Sheet for the water plans and the sewer plans (to include a location map and SAWS job number)
 - Overall SAWS utility layout plan in both the sewer and water plan sets

- General Notes for water and sewer work with an overall quantity sheet for water and sewer on respective plan sets
 - Plan and Profile Sheets with appropriate SAWS Title Block for said project(Consultant to obtain SAWS Title Blocks from the SAWS Web page)
 - Plan and Profile sheets for all proposed sewer lines
 - Plan and Profile sheets for water mains 20-inches and larger
 - Plan sheets for proposed water mains 16-inches or smaller

 - Temporary Water Main
 - Provide existing valve nut elevations
 - Existing water and sanitary sewer easements
 - Include any SAWS or other details required for clarification on proposed work in relation to the project as necessary.
- e) Show on the plan and profile existing topographical features, improvements, and proposed street and drainage improvements, proposed water, proposed sewer facilities and any existing or proposed easements within and outside the right-of-way necessary for the design of the Project. Also show any fences, trees, shrubs or structural encroachments, and identify whether or not removal is necessary for construction and show tap numbers, service sizes, N.C.B., Block No. Lot No. and house numbers for each residence on the plans. Consultant is also to obtain addresses for platted vacant lots from the City of San Antonio and show the new addresses on the plans. SAWS will provide the Consultant with new tap numbers.
- f) Furnish the San Antonio Water System with 5 complete sets of 70% Phase SAWS plans, 2 complete sets of 70% Phase COSA plans, a PDF copy of all plans, the SAWS QA/QC form and supporting documents for review and comments. SAWS will review the plans and documents and provide written comments to the Consultant. Comments will be mailed and also be provided in the COSA internet-based Project Management System. The Consultant is required to address all comments and to provide a written narrative addressing all comments. Comments will need to be addressed prior to proceeding to the next phase of work. If the Consultant does not understand the comment and a meeting is necessary, SAWS will meet with the consultant to clarify any questions. The Consultant will need to address SAWS comments in a timely manner to keep in phase with the COSA schedule.
- g) Furnish an Updated Opinion of Probable Construction Cost based on the plan and supporting documents of the proposed construction. The probable cost opinion will be based on consultant using the latest unit prices provided by SAWS for similar work, latest and most recent bid tabulations for similar projects, recent market trends and consultants experience and research to include adjustment to reflect the ease or difficulty of constructing the project. The Opinion of Probable Construction Cost shall not include construction contingency.
- h) Meet with SAWS engineer on job site and perform a walk-through to verify the accuracy and constructability of the SAWS plans.
- i) After acceptance and approval of 70% plans, The Consultant shall provide SAWS with two complete copies of the revised SAWS plans including the COSA plans

3. 95% Design
The Consultant Shall:

SAWS is part of the COSA joint bid process, and the Consultant is to prepare drawings and documents for any permits related to the SAWS work. This should include, but not limited to, TxDOT permits, Bexar County permits, Railroad Permits, or any other permit required.

- a) Prepare Change of Service forms for all affected services. Existing service data and proper form shall be provided by SAWS. Consultant to obtain change of service forms from the SAWS Web page. Consultant to submit one change of service form for review and comments. Consultant to submit three approved change of service forms to SAWS.
- b) Detailed specifications shall be developed using the SAWS Standard Specifications for Construction, latest revisions and other necessary special specification.
- c) Consultants shall coordinate the design of sewer and water facilities with all other aspects of the project, including but not limited to street and drainage design, to ensure that the project can be constructed without conflicts. This includes the preparation of a phasing plan if the order of installation of street, drainage, sewer and water facilities requires special attention to avoid conflicts during construction.
- d) Consultant to review the COSA Traffic Control Plan to verify that SAWS work can be constructed according to the COSA Traffic Control Plan. If revisions are necessary or a separate traffic control plan is necessary for SAWS work it will be considered supplemental services.
- e) Consultant to review the phasing plan and provide in the plans the phasing of SAWS work so that it can be done without impacting the overall project and disrupting service to customers. This work is considered supplemental services.
- f) Consultant to obtain the proposed work from CPS Overhead and CPS Gas as well as other utilities to verify if the proposed SAWS work is not in conflict.
- g) 95% plans should be substantially complete to include specification and standard details or other details as required for the construction of the project.
- h) Furnish an Updated Opinion of Probable Construction Cost based on the plan and supporting documents of the proposed construction. The probable cost opinion will be based on consultant using the latest unit prices provided by SAWS for similar work, latest and most recent bid tabulations for similar projects, recent market trends and consultants experience and research to include adjustment to reflect the ease or difficulty of constructing the project. The Opinion of Probable Construction Cost shall not include construction contingency.
- i) Furnish the Water System with 5 complete sets of 95% Phase SAWS plans, 2 complete sets of 95% Phase COSA plans, a PDF copy of all plans, the SAWS QA/QC form and supporting documents for review and comments. SAWS will review the plans and documents and provide written comments to the Consultant. Comments will be mailed and also be provided in the COSA internet-based Project Management System. The Consultant is to address all comments and to provide a written narrative addressing all comments. Comments will need to be addressed prior to proceeding to the next phase of work. If the Consultant does not understand the comment and a meeting is necessary, SAWS will meet with the consultant to clarify any question. The Consultant will need to address SAWS comments in a timely manner to keep in phase with the COSA schedule.

- j) After acceptance and approval of 95% plans, the Consultant shall provide SAWS with two complete copies of the revised SAWS plans and specs including the COSA plans.
- k) If project is over the Recharge Zone Consultant to submit SCS Permit to TCEQ for review and approval 45 to 60 days prior to bidding. This will be considered a supplemental services.

4. Pre Bid Review

5. Bid Phase

The Consultant Shall:

- a) Consultant to provide all necessary bid plans and all bid documents in conjunction with the COSA bid package to SAWS for review and approval.
- b) Furnish the San Antonio Water System with 2 complete sets of Bid Phase SAWS plans, 2 complete sets of Bid Phase COSA plans and specification, a PDF copy of all plans, and supporting documents for review and comments. SAWS will review the plans and documents and provide written comments to the Consultant. Comments will be mailed and also be provided in the COSA internet-based Project Management System. Consultant to address all comments and to provide a written narrative addressing all comments. Comments will need to be addressed prior to proceeding to the next phase of work. If the Consultant does not understand the comment and a meeting is necessary, SAWS will meet with the consultant to clarify any question. Consultant will need to address SAWS comments in a timely manner to keep in phase with the COSA schedule
- c) After acceptance and approval of bid plans, the Consultant shall provide SAWS with 2 complete sets of Bid Phase SAWS plans, 1 complete set of Bid Phase COSA plans and specifications, and a PDF copy of all plans.
- d) Attend the pre-bid meeting, prepare and provide meeting minutes. Two (2) copies of meeting minutes shall be submitted to SAWS for review and approval
- e) If necessary prepare signed and sealed addendums.
- f) Attend the bid opening, review the SAWS portion of the Bid Tabulation, and submit a written analysis of the bid results for the SAWS portion of the work.
- g) Included in the evaluation of the apparent low bidder the qualifications of the contractor or sub contractor to construct SAWS work.
- h) After bid opening, provide SAWS with (7) seven copies of the SAWS plans (4 sets of 11" x 17" and 3 sets of 22" x 34") and specifications, (2) copies of CoSA plans (11" x 17"), and (1) one CD containing the plans and specifications, including all addendums, in pdf and dgn format.
- i) Submit an electronic CADD design of the Overall Utility Plan on a cd.

6. Construction Engineering Services

The Consultant Shall:

- a) Attend COSA Citizen meetings as representative of SAWS. Prepare project specific exhibits for public meetings and workshops as required by SAWS.

- b) Attend Pre-Construction meeting as the Design Engineer representative of the SAWS proposed work. Write meeting minutes and submit two (2) copies of meeting minutes to SAWS.
- c) Since this is a joint project with COSA the contractor will provide any survey staking or cut sheets required for SAWS project. The consultant will provide sufficient data on the plan sheets so that the contractor may provide their own survey staking or cut sheets.
- d) The Consultant will provide SAWS the same services as indicated in Article IV Scope of Services with one additional site visit in which the contractor, SAWS inspector and the consultant will verify that field information is being transposed into the field copy plans for future development of plan of record drawings. The Consultant is also to attend the field office meetings as a representative of SAWS and respond to SAWS related issues and keep SAWS informed by providing meeting minutes.
- e) The consultant shall submit construction observations reports on a monthly basis as part of the engineering invoices.

7. Project Close Out and Final Payment

- **The Consultant Shall:**

- a) SAWS will defer to the COSA Section 3.1.7 for services to be provided by the consultant for SAWS work.
- b) In addition SAWS will be requesting that the consultant provide the following:
 - 1. All submitted engineering drawings of proposed SAWS projects and SAWS Plan of Records drawings must include a single Overall Utility Plan in an electronic 2D (two dimensional) CADD version along with the required hard copies.
 - 2. An electronic CADD design of the Overall Utility Plan will be submitted at the bid phase followed by an updated electronic version of the Overall Utility Plan based on the As-Built submittal of Plan of Records at the completion of the project.
 - 3. SAWS CADD Standards and As-Built requirements may be found on the SAWS webpage ([url:http://www.saws.org/business_center/specs/](http://www.saws.org/business_center/specs/)).
 - 4. Transfer all water and sewer service measurements from inspector's field copies to the Change of Service form in Excel format and submit Excel file on CD with final plan of records.

COMPENSATION FOR PROFESSIONAL SERVICES

Section 1 - Basis for Compensation

- 1.1 The base fee for all services shall be defined by the approved proposal accepted by SAWS and in concurrence with the COSA Method of Compensation.

Section 2 - Method of Payments

- 2.1 Payment shall be made to the Consultant as defined in the City of San Antonio's Method of Payment Article III.

Section 3 - Payment for Services

- 3.1 Invoices for SAWS work shall be submitted to the COSA and each invoice will be reviewed and approved by SAWS on the COSA internet-based Project Management System prior to payment by the COSA.

Section 4 - Payment for Additional Services

- 4.1 Payment for additional services for SAWS work will need to be approved by the COSA concurrently with SAWS and invoiced per the COSA Compensation for Additional Professional Services.

Appendix 2-B ~ City of San Antonio Design Summary Report

The DSR is intended to be a tool that can be used by the Project Delivery team to anticipate and memorialize basic project information, with the objective being to minimize or eliminate rework, last minute surprises, and their associated costs and delays.

Although the DSR addresses a wide range of issues that can affect the design and delivery of a project, every project is unique and, as such, every project warrants thoughtful consideration about how its design and construction will be accomplished. Not all factors identified in the DSR will apply to each project and factors will arise on some projects that are not addressed in the standard DSR. Those individuals contributing the DSR are encouraged to think comprehensively and tailor their use of the DSR form to meet the unique needs of the project.

It is likely that the DSR will be partially completed prior to the Initial Scope Meeting (ISM) and updated from time to time as the project progresses. As information is added or revised, it is strongly recommended that they be associated with a date and the author of the change. Information that is outdated should not be deleted, but stricken, so as to preserve a more complete record of the progression of the project design. The ISM should be stored on the Web Portal and available for all parties to review. The City PM and the Consultant PM should be the only parties that can modify the ISM.

I. SCHEDULING, FUNDING, AND DELIVERY

Project: Project Name

Type of Project: Project Type

Project Background, History, Goals and Objectives: Background, History, Goals and Objectives

City Council District: District

Other Projects affected by this project: Other Projects

Preliminary Engineering Report Required (COSA PM Decision) yes/no

Project Schedule	Start	Completion	Duration
Design	<u>M/D/YYYY</u>	<u>M/D/YYYY</u>	<u> </u> days
Environmental/Permitting	<u>M/D/YYYY</u>	<u>M/D/YYYY</u>	<u> </u> days
ROW Acquisition	<u>M/D/YYYY</u>	<u>M/D/YYYY</u>	<u> </u> days
Construction	<u>M/D/YYYY</u>	<u>M/D/YYYY</u>	<u> </u> days

Programmed Funding and Date Available (Excluding Utility Costs):

Design	<u>\$0.00</u>	Date	<u>M/D/YYYY</u>
ROW	<u>\$0.00</u>	Date	<u>M/D/YYYY</u>
Construction	<u>\$0.00</u>	Date	<u>M/D/YYYY</u>

Project Construction Cost Estimate History (Excluding Utility Relocation Costs):

Level 1 Project Estimate	<u>\$0.00</u>	Date	<u>M/D/YYYY</u>
Level 2 Project Estimate	<u>\$0.00</u>	Date	<u>M/D/YYYY</u>
PER Project Estimate	<u>\$0.00</u>	Date	<u>M/D/YYYY</u>

40% Design Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>
70% Design Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>
95% Design Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>

Project Funding Partners and Description of Work, etc.

- SAWS - Description of Work, Etc.

Level 1 Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>
Level 2 Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>
PER Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>
40% Design Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>
70% Design Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>
95% Design Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>

- CPS - Description of Work, Etc.

Level 1 Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>
Level 2 Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>
PER Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>
40% Design Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>
70% Design Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>
95% Design Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>

- TxDOT - Description of Work, Etc.

Level 1 Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>
Level 2 Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>
PER Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>
440% Design Project Estimate	\$0.00	Date	<u>M/D/YYYY7</u>
70% Design Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>
95% Design Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>

- ROW Costs - Description of Work, Etc.

Level 1 Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>
Level 2 Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>
PER Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>
40% Design Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>
70% Design Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>
95% Design Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>

- Environmental Costs - Description of Work, Etc.

Level 1 Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>
Level 2 Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>
PER Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>
40% Design Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>
70% Design Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>
95% Design Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>

- Capital Administration Costs - Description of Work, Etc.

Level 1 Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>
Level 2 Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>
PER Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>
40% Design Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>
70% Design Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>
95% Design Project Estimate	\$0.00	Date	<u>M/D/YYYY</u>

Project Delivery

Anticipated method of project delivery

- Design-bid-build
- Competitive Sealed Proposals (list factors influencing awards)
 - Cost (000%)
 - Schedule (000%)
 - Prior Experience (000%)
 - Other (000%)
- Construction Manager at Risk
- Design-Build

II. EXISTING CONDITIONS

A1. Existing typical roadway conditions for Name of Roadway (complete for each major roadway in project)

- 1. Number of traffic lanes Yes
- 2. Approximate lane width Yes
- 3. Approximate shoulder/parkway width Yes
- 4. Sidewalks Describe
- 5. Median width Yes
- 6. Curbs Yes
- 7. Underground Storm Drainage System Yes

A2. Existing typical roadway conditions for Name of Roadway (complete for each major roadway in project)

- 1. Number of traffic lanes Yes
- 2. Approximate lane width Yes
- 3. Approximate shoulder/parkway width Yes
- 4. Sidewalks Describe
- 5. Median width Yes
- 6. Curbs Yes
- 7. Underground Storm Drainage System Yes

B. Existing bridge and bridge class structure data

- 1. Name of stream, tributary, etc Name
- 2. Structure type Type
- 3. Structure length Length
- 4. Date of construction M/YYYY
- 5. Is structure adequate for:
 - a. Roadway Yes
 - b. Sidewalk and pedestrian Yes
 - c. Hydraulic capacity Yes

C. Underground and cross drainage facilities:

- Location ##/Alpha Description: Describe

D. ROW

- Existing ROW width Length
- Is ROW adequate? Yes
- Existing Sidewalks (Condition 0-3) Yes
- Existing Curb Ramps (Condition 0-3) Yes

Estimated number of adjacent parcels ##
Estimated number of parcels required ##
Will "corner clips" be acquired? Yes
Characterize adjacent land use: Description

E. Environmental

Potential environmental concerns (i.e., gas stations, industrial sites, auto shops, landfills, etc.):
Description: Describe
Existing Creeks and/or Tributaries: Description: Describe
Potential Historical Area (50 years or older) Description: Describe
Potential Archeological Sites: Description: Describe
Potential Endangered Species Habitat Area: Description: Describe
Project over Edwards Aquifer Recharge or Transition Zone: Description: Describe

F. Constraints

Schools: Description
Parks: Description
Businesses: Description
Cemeteries: Description
Trees: Description
Other: Description

G. Railroads: crossing adjoining grade separation

Railroad owner: Owner's Name

Type of warning device:

- Passive
- Flashing lights only
- Lights and gates
- Other (pre-emption, crossing consolidation, etc.): Explain

H. Airport Clearance Zone issues: Description

I. Preliminary Utility Inventory (Briefly describe facilities, locations, age, adequacy (if known), condition (if known), anticipated or potential conflict, conceptual approach, and any especially critical issues related to the utility.)

Sanitary Sewer: Description
Water: Description
Natural Gas: Description
Underground Electric: Description
Overhead Electric: Description
Cable Television: Description
Telephone: Description
Other: Description

Will the Utility Owner or Design Consultant perform conflict assessment and design?

	Utility	Consultant
Sanitary Sewer	<input type="checkbox"/>	<input type="checkbox"/>
Water	<input type="checkbox"/>	<input type="checkbox"/>
Natural Gas	<input type="checkbox"/>	<input type="checkbox"/>
Underground Electric	<input type="checkbox"/>	<input type="checkbox"/>
Overhead Electric	<input type="checkbox"/>	<input type="checkbox"/>
Cable Television	<input type="checkbox"/>	<input type="checkbox"/>
Telephone	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>

Will utility owner joint bid or perform work ahead of City project?

	Joint bid	Prior to Project
Sanitary Sewer	<input type="checkbox"/>	<input type="checkbox"/>
Water	<input type="checkbox"/>	<input type="checkbox"/>
Natural Gas	<input type="checkbox"/>	<input type="checkbox"/>
Underground Electric	<input type="checkbox"/>	<input type="checkbox"/>
Overhead Electric	<input type="checkbox"/>	<input type="checkbox"/>
Cable Television	<input type="checkbox"/>	<input type="checkbox"/>
Telephone	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>

Owner of poles supporting overhead lines Utility Co

Are there locations of multiple contacts? Yes

Any AC water or sewer lines? Yes

K. Are there any existing traffic signals, crosswalks, school zones, fire stations, emergency medical facilities, etc. that warrant special design consideration? Description

L. Any other relevant information about the project that should be considered, such as existing historic structures or aesthetic design enhancement? Description

III. BASE MAPPING, GEOTECHNICAL & ENVIRONMENTAL, PERMITTING, & COMMUNITY RELATIONS ISSUES

Surveying and Mapping

Is aerial topo and mapping desired?

Scale: 1"=##

- planimetric
- orthophoto
- contours

Coordinate system to be used: Type of system

Vertical control system to be used: Type of system (See Survey Section of DGM)

ROW and/easements required? Yes Unknown No

Conceptual ROW Expansion approach (e.g., corner clips only, equal amounts both sides, all on one side, variable, etc.) Description

Locate apparent ROW only Locate and resolve ROW and side lot lines

Tree mitigation survey requirements (e.g., tie clusters, all trees over certain diameter, trunk size only, canopy) Description

Geotechnical and Environmental Investigations

Soil types in project area per Bexar County Soil Survey: Narrative

Are geotechnical reports for other projects in or near the area available and adequate for use on this project? Yes No (list)

Drilling and/or testing required for

- Pavement design
- Bridge class structures
- Scour Analysis
- Trench Excavation Protection
- Subsurface Investigation (rock, groundwater, etc)

Pavement Design(s) Provided by geotech

Provided by City
Scour analysis required? Yes No

Permitting Issues

Cultural resource survey required? Yes No
Historic Preservation Permit likely? Yes No
NEPA Permit likely required? Yes No
Hazardous Waste Contamination assessment Yes No
Endangered species assessment needed? Yes No
USACE401 permit likely? Yes No
USACE404 permit likely? Yes No
 Nationwide
 Individual
Wetlands delineation survey required? Yes No
Environmental Waste Management Plan,
Spec's, Quantities, & Details Yes No
WPAP (TCEQ Permit likely required)? Yes No
Tree Permit required? Yes No
TxDOT ROW permit required? Yes No
Railroad permit required? Yes No

TDLR Review

Submitted by City
 Submitted by Design Consultant

TDLR Inspection

Coordinated by City
 Coordinated by Design Consultant

San Antonio River Authority

Sand and Gravel Permit
 Submitted by City
 Submitted by Design Consultant

Community relations issues

Is a formal public relations plan required? Yes No
Project info website required? Yes No
Stakeholder list required? Yes No
Project PowerPoint required? Yes No
Is coordination of historic district or enhancements required Yes No

Public meetings (Check all that apply)

None
 Pre-design
 Preliminary design concept
 Interim meeting(s) – estimated # 00
 Present final design
 Pre-construction
 Construction – estimated # 00

Special requirements

Mailed notifications
 English only
 Spanish and English
 Other: Description

IV. DESIGN ISSUES

Governing Specifications: Description

Roadways

Functional Classification for each roadway: Narrative

Design Speed: ## mph

Preliminary Lane configuration

- ## Number of lanes
- ## Width of lanes
- Dual Left Turn Lane Width: ##
- Type Curbed Median/surface treatment (concrete, grass, landscape, etc.)
- Bike Facilities (check all that apply)
- Bike Lanes How many: ##
- Bike Accommodation Lanes
- Bike Paths

Sidewalk locations: Description

Bus stop pads: Yes No

Clear Zone width: ##

Conceptual parkway restoration approach: Description

Controlling geometric design criteria

- UDC
- AASHTO
- Other: Describe

Are any design waivers anticipated? Yes No
If so, what are they? Describe

Roadway Illumination

- Intersections only
- Continuous lighting

Photometric Design by:

- CPS
- Design Consultant

Traffic

Are additional traffic studies/counts required? Yes No
Describe if yes: Describe

Are there major generators in the project area? Yes No
Describe if yes: Describe

Minimum Design Level of Service desired: A

Traffic signals

Signal head orientation Horizontal Vertical

Mast arm Span wire/strain poles

Controller Type

Type 2070 (City maintained)

NEMA (TxDOT maintained)

Will controller maintenance be transferred to City? Yes

Are signal coordination communications facilities desired? Yes

School Zone Flashers

None (school zone signs only)

Roadside

Overhead

Intelligent traffic systems issues

Storm Drainage

Design/Analysis Frequency (in years):

-year rainfall event Streets (may depend on functional classification)

-year rainfall event Inlets

-year rainfall event Underground storm drains

-year rainfall event Open channels

-year rainfall event Cross drainage facilities

-year rainfall event Creeks, rivers, etc delineated as Zone A on FIRM

Hydrology analyzed for: (Choose one of the following)

existing conditions only

ultimate conditions

Runoff methodology: (Choose one of the following)

Rational method

TR55

TxDOT

Other

Minimum number of un-flooded lanes to be provided for design storm: ##

On-grade/Sump inlet preferences: Description

Grate inlet preferences: Description

Open channel preferences

Earth lined (max side slope ##:1)

Geotextile armored (max side slope ##:1)

Concrete armored (max side slope ##:1)

Gabion armored

Full channel

Pilot channel only

Vertical wall concrete channel

Outfall preferences

Concrete chutes/scuppers

Pipe/box culvert to toe of slope

Preliminary Maintenance Access Ramp locations: Description

Construction Phasing

Preliminary construction phasing preferences:

- Half at a time
- Section by Section
- Other: Describe

Temporary illumination to be provided? _____

Design Enhancements

Describe preliminary design enhancements desired (concept, location, budget, etc): Description

Overhead Utility Conversion? _____

V. PROJECT JOURNAL

Date Initially Created:	<u>MM/DD/YYYY</u>
Date Modified/Updated:	<u>MM/DD/YYYY</u>
Description: <u>Describe</u>	
Date Modified/Updated:	<u>MM/DD/YYYY</u>
Description: <u>Describe</u>	
Date Modified/Updated:	<u>MM/DD/YYYY</u>
Description: <u>Describe</u>	
Project Closed:	<u>MM/DD/YYYY</u>

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Appendix 2-C ~ City of San Antonio Capital Improvement Projects Generalized Scope of Services

1. Initial Scope Meeting

- 1.1. Complete DSR, Meeting and minutes
- 1.2. Prepare Preliminary Engineering Report (if required)

2. Right of Way Surveying

- 2.1. Acquire Ownership information
- 2.2. Secure Right of Entry
- 2.3. Survey ROW
 - 2.3.1. Boundary
 - 2.3.2. Apparent ROW only
- 2.4. Monument ROW
- 2.5. Prepare ROW Map
- 2.6. Prepare plats and field notes of parcels to be acquired
- 2.7. Flag existing corners, set new corners, etc.

3. Topographic Surveying/ Base Mapping

- 3.1. Establish Primary Project Control
- 3.2. Establish Secondary Project Control
- 3.3. Set Project centerline or baseline
 - 3.3.1. Interval _____
- 3.4. Survey topographic features
- 3.5. Survey Cross sections / spot elevations to develop DTM/cross sections
 - 3.5.1. To ROW only
 - 3.5.2. _____ feet into adjacent property [everywhere] [where required] [only where ROE can be secured]
- 3.6. Secure utility maps
 - 3.6.1. Water
 - 3.6.2. Sanitary Sewer
 - 3.6.3. Natural Gas
 - 3.6.4. Underground Electric
 - 3.6.5. Overhead Electric
 - 3.6.6. Underground Telephone
 - 3.6.7. Overhead Telephone
 - 3.6.8. Underground Cable Television
 - 3.6.9. Overhead Cable Television
- 3.7. Survey Quality Level C locates
 - 3.7.1. Water
 - 3.7.1.1. Valve Box elevations
 - 3.7.1.2. Valve Stem elevations
 - 3.7.2. Sanitary Sewer
 - 3.7.2.1. Manhole Rings and Covers elevations

- 3.7.2.2. Invert elevations and details (sizes, configurations, flow directions, north arrow)
- 3.7.3. Natural Gas
 - 3.7.3.1. Valve Box elevations
 - 3.7.3.2. Valve Stem elevations
 - 3.7.3.3. Test box elevations
- 3.7.4. Storm Drainage
 - 3.7.4.1. Manhole rings and covers elevations
 - 3.7.4.2. Invert elevations and details
 - 3.7.4.3. Curb inlets
 - 3.7.4.3.1. Top elevations
 - 3.7.4.3.2. Floor and invert elevations
 - 3.7.4.3.3. Lateral details (sizes, configurations, flow directions, north arrow)
 - 3.7.4.4. Outfall elevations
 - 3.7.4.5. Culvert and headwall dimensions and elevations
- 3.7.5. Underground Electric
 - 3.7.5.1. Manhole rings and covers elevations
 - 3.7.5.2. Vault elevations and dimensions
 - 3.7.5.3. Conduit elevations at Vaults
- 3.7.6. Underground Telephone
 - 3.7.6.1. Manhole rings and covers elevations
 - 3.7.6.2. Vault elevations and dimensions
 - 3.7.6.3. Conduit elevations at Vaults
- 3.7.7. Underground Cable Television
 - 3.7.7.1. Manhole rings and covers elevations
 - 3.7.7.2. Vault elevations and dimensions
 - 3.7.7.3. Conduit elevations at Vaults
- 3.7.8. Develop Utility Basemap
- 3.7.9. Mains only
- 3.7.10. Mains and services
- 3.8. Survey Trees
 - 3.8.1. All trees
 - 3.8.2. All trees with trunk diameter > 4"
 - 3.8.3. Show
 - 3.8.3.1. Species
 - 3.8.3.2. Trunk diameter
 - 3.8.3.3. Spread
- 3.9. Survey Bridges and Structures
 - 3.9.1. Full measure up (secure all relevant measurements needed)
 - 3.9.2. Locate Columns, abutments, and bridge deck only
 - 3.9.3. Profile grade lines
 - 3.9.3.1. Centerline
 - 3.9.3.2. Break back line(s)
 - 3.9.3.3. Curblines

4. Roadway and Drainage Design

- 4.1. Establish Typical Roadway Cross sections showing lane, sidewalk, and clear zone widths, etc. for various roadways in project area
- 4.2. Develop Plan and Profile sheets for 1" = ____' plans; Existing ground profiles at
 - 4.2.1. Centerline
 - 4.2.2. ____ feet left of centerline
 - 4.2.3. ____ feet right of centerline
- 4.3. Establish Horizontal Roadway alignments showing
 - 4.3.1. Centerline geometry (centerline bearings, PI, PC, and PT stations, centerline curve data, curb return radii, etc.)
 - 4.3.2. Curb locations and geometry
 - 4.3.3. Lane widths
 - 4.3.4. Sidewalk widths and locations
 - 4.3.5. Transitions and extent of construction of intersecting streets (coordinate with SAWS)
 - 4.3.6. Prepare Retaining wall plans for all retaining walls in excess of 3'
- 4.4. Establish Horizontal Channel alignments showing
 - 4.4.1. Centerline geometry (centerline bearings, PI, PC, and PT stations, centerline curve data, etc.)
 - 4.4.2. Bottom width, horizontal distance to top of design section slope, etc
- 4.5. Establish Roadway profiles
 - 4.5.1. Estimate storm drainage velocities
 - 4.5.2. Establish maximum flow capacity
- 4.6. Establish Design Discharges
 - 4.6.1. Delineate drainage areas and establish flow patterns
 - 4.6.2. Develop runoff coefficients
 - 4.6.3. Develop times of concentration and related intensities
 - 4.6.4. Calculate preliminary design discharges
- 4.7. Design storm drainage facilities
 - 4.7.1. Roadways
 - 4.7.1.1. Establish inlet locations and design discharges
 - 4.7.1.2. Develop storm drainage facility sizes, incremental times of concentration, effective drainage areas, design discharges, friction and junctions losses, etc
 - 4.7.1.3. Establish preliminary horizontal and vertical alignments of storm drainage facilities (Max EGL is 1.3 feet below top of curb)
 - 4.7.1.4. Identify potential utility conflicts and locations for SUE
 - 4.7.1.5. Establish lateral sizes
 - 4.7.1.6. Lateral details [with] [without] underground utilities
 - 4.7.2. Channels
 - 4.7.2.1. Model existing drainage channel
 - 4.7.2.2. Establish analysis nodes
 - 4.7.2.3. Develop channel sizes, slopes, velocities, incremental times of concentration, effective drainage areas, design discharges, friction and structure losses, etc.
 - 4.7.2.4. Develop pre-project and post-project water surface profiles
 - 4.7.2.5. Identify and design energy dissipation facilities
 - 4.7.2.6. Establish channel armoring and erosion control areas

4.7.3. Bridges

4.7.3.1. Model bridges and bridge class structures pre-project and post project

4.7.4. Regulatory Coordination

4.7.4.1. Tie to FEMA models

4.7.4.2. Secure CLOMR

4.7.4.3. Secure LOMR

5. Pavement Design

5.1 Design pavement sections using CoSA Pavement Design Standards – Appendix 10-A

6. Prepare Cross sections

6.1. Roadway cross sections

6.2. Channel cross sections

6.3. Box culvert excavation cross sections

7. Proposed Utility Plans

7.1. Prepare Sanitary Sewer plan and profiles

7.1.1. Coordinate with SAWS on service history, video results, adequacy, etc.

7.1.2. Establish extent of sanitary sewer construction (to nearest manhole) (coordinate with roadway design)

7.2. Prepare Water line plans

7.2.1. Coordinate with SAWS on service history, adequacy, etc.

7.2.2. Establish extent of water construction (coordinate with roadway design)

7.3. Prepare Gas line plans

7.3.1. Probe main

7.3.2. Probe services

7.3.3. Establish extent of gas line construction

8. Other Plans

8.1. Prepare Pavement Marking and Signing Plan

8.2. Prepare Traffic Signal Plans

8.3. Prepare Construction Sequencing Plan

8.4. Prepare Traffic Control Plan

8.5. Prepare SW3P

8.6. Prepare Driveway Plats

9. Meetings and Coordination (including meeting minutes)

9.1. Public meetings

9.2. Utility coordination meetings

9.3. Initial scope meeting

9.4. Complete Streets Public Meeting and Field Analysis Checklist

9.5. Preliminary Engineering Report Review

9.6. 40% Plans Review Meeting

9.7. 70% Plans Review Meeting

9.8. 95% Plans Review Meeting

9.9. 100% Plan Review Meeting

- 9.10. Pre bid Meeting
- 9.11. Pre-Construction meeting

10. Cost Estimating

- 10.1. Preliminary Engineering Report Cost Estimate (if required)
- 10.2. 40% Plans Cost Estimate
- 10.3. 70% Plans Cost Estimate
- 10.4. 95% Plans Cost Estimate
- 10.5. Evaluate bids and recommend award, etc

11. Construction Phase

- 11.1. Stake center line (or ROW) of roadway and/or channel for utility adjustment prior to the project bid
- 11.2. Reestablish project control points for contractor's use before construction
- 11.3. Attend citizen meeting(s) at the start of construction
- 11.4. Assist in preparation and review of the monthly pay estimates
- 11.5. Assist in preparation and review of change orders
- 11.6. Review shop drawings
- 11.7. Respond to request for information
- 11.8. Perform a minimum of two (2) project site visits per month and prepare a report for each visit to the City regarding progress of construction
- 11.9. Participate in final inspection of project
- 11.10. Prepare over and under quantities for project closeout
- 11.11. Prepare project record drawings
- 11.12. Participate in one-year warranty inspection of project

Plan Production Information

Provide following plans

- ___ [full size] [half size] sets of 40% review plans
- ___ [full size] [half size] sets of 70% review plans
- ___ [full size] [half size] sets of 95% review plans
- ___ [full size] [half size] sets of 100% review plans
- ___ [full size] [half size] sets of bid documents

Composition of plan sets at designated milestones:

40% ,70%, 95% , Bid Documents

General Sheets

- ___ ___ ___ ___ **City** Title Block
- ___ ___ ___ ___ Summary of Estimated Quantities Sheet
- ___ ___ ___ ___ Index sheet
- ___ ___ ___ ___ Project layout sheet(s)
- ___ ___ ___ ___ Typical sections (existing and proposed for all conditions/locations)
- ___ ___ ___ ___ General Notes and Specifications

Traffic Control Sheets

- ___ ___ ___ ___ Sequence of Construction Layouts
- ___ ___ ___ ___ Detour Plan/Profile/Typical Sections
- ___ ___ ___ ___ Traffic Control Plan

Environmental Sheets

- ___ ___ ___ ___ SW3P Narrative
- ___ ___ ___ ___ SW3P Layouts
- ___ ___ ___ ___ EPIC sheet
- ___ ___ ___ ___ Environmental Waste Management Plan, Specifications, Quantities and Plan Details
- ___ ___ ___ ___ Transite Pipes Removal Plan, Specifications, Quantities and Plan Details

Roadway Sheets

- ___ ___ ___ ___ Roadway plan and profile sheets
- ___ ___ ___ ___ Intersection grading sheets
- ___ ___ ___ ___ Roadway detail sheets
- ___ ___ ___ ___ Retaining Wall Layouts

Drainage Sheets

- ___ ___ ___ ___ Drainage Overall
- ___ ___ ___ ___ Drainage Area Map and Table
- ___ ___ ___ ___ Hydraulic Calculations
- ___ ___ ___ ___ Storm Drainage plan and profile sheets
- ___ ___ ___ ___ Lateral details and cross sections
- ___ ___ ___ ___ Drainage details
- ___ ___ ___ ___ Channel Plan and Profile

Bridge Sheets

- ___ ___ ___ ___ Bridge layouts
- ___ ___ ___ ___ Bridge details

Pavement Markings and Signing Sheets

- ___ ___ ___ ___ Pavement markings and signing details
- ___ ___ ___ ___ Traffic signal layouts
- ___ ___ ___ ___ Traffic signal details

Illumination Sheets

- ___ ___ ___ ___ Illumination plans and conduit layouts
- ___ ___ ___ ___ Illumination details

Landscaping and Design Enhancement Sheets

- ___ ___ ___ ___ Landscaping plans and details
- ___ ___ ___ ___ Enhancement plans and details

Cross Sections

- ___ ___ ___ ___ Street Cross Sections
- ___ ___ ___ ___ Drainage Cross sections

Utility Sheets

- ___ ___ ___ ___ [*Joint bid utility*] plans and details
- ___ ___ ___ ___ [*Joint bid utility*] plans and details
- ___ ___ ___ ___ [*Joint bid utility*] plans and details

Misc Standard detail sheets

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Appendix 2-D ~ Project Work Plan

Project Name	Quantity	Estimating Unit	Unit Cost	Project Manager	Project Engineer	EIT	Engineering Tech	CADD Tech	Project Surveyor	Survey Tech	2 Man Crew	3 Man Crew	4 Man Crew	Clerical/Admin	Task Budget
Date				\$ 150.00	\$ 125.00	\$ 110.00	\$ 75.00	\$ 60.00	\$ 110.00	\$ 75.00	\$ 125.00	\$ 135.00	\$ 145.00	\$ 40.00	
Prepared By															
40% Design Phase				160	135	120	115	100	160	165	205	215	225	90	\$ 56,800.00
1. Initial Scope Meeting															\$ 1,500.00
1.1. Complete DSR, Meeting and minutes				10											\$ 1,500.00
2. Right of Way Surveying and Mapping															\$ 7,600.00
2.1. Acquire Ownership information										10					\$ 750.00
2.2. Secure Right of Entry											10				\$ 1,250.00
2.3. Survey ROW												10			\$ 1,350.00
2.3.1. Boundary												10			\$ 1,350.00
2.3.2. Apparent ROW only													10		\$ 1,450.00
2.4. Monument ROW													10		\$ 1,450.00
3. Topographic Survey/Base Mapping															\$ 14,800.00
3.1. Establish Primary and Secondary Project Control					10										\$ 1,250.00
3.2. Set Project centerline or baseline						10									\$ 1,100.00
3.2.1. Interval _____							10								\$ 750.00
3.3. Survey topographic features								10							\$ 600.00
3.4. Survey Cross sections / spot elevations to develop DTM/cross sections									10						\$ 1,100.00
3.4.1. To ROW only										10					\$ 750.00
3.4.2. _____ feet into adjacent property [everywhere] [where required] [only where ROE can be secured]											10				\$ 1,250.00
3.5. Secure utility maps (Water, Sewer, Gas, Elec, Tel, Cable, Etc...)												10			\$ 1,350.00
3.6. Survey Quality Level C locates													10		\$ 1,450.00
3.7. Tree Survey														10	\$ 400.00
3.7.1 All trees with trunk dia > 4"															
3.7.2 Identify species, dia. and spread															
3.8. Survey Bridges and Structures													10		\$ 1,450.00
3.9. Survey Ordinary High Water Mark (Coordinate with Environmental Division)															
3.10. Develop Project Layout Sheet w/Control Points												10			\$ 1,350.00
3.11. Stake Storm Drain Outfall alignment (Coordinate with Environmental Division)											10				\$ 1,250.00
3.12. Centerline/ROW Staking for utility relocation prior to project bid / Reestablish Control Points										10					\$ 750.00
4. Roadway Design															\$ 5,200.00
4.1. Establish Exist and Prop Typ Sections (lanes, sidewalks, ROW, etc...)														10	\$ 400.00
4.2. Establish Horizontal Roadway alignment													10		\$ 1,450.00
4.3. Establish Roadway Profiles												10			\$ 1,350.00
4.4. Develop Plan & Profile sheets for 1" = _____' plans											10				\$ 1,250.00
4.5. Street Cross Sections										10					\$ 750.00

Project Name	Quantity	Estimating Unit	Unit Cost	Project Manager	Project Engineer	EIT	Engineering Tech	CADD Tech	Project Surveyor	Survey Tech	2 Man Crew	3 Man Crew	4 Man Crew	Clerical/Admin	Task Budget
Date				\$ 150.00	\$ 125.00	\$ 110.00	\$ 75.00	\$ 60.00	\$ 110.00	\$ 75.00	\$ 125.00	\$ 135.00	\$ 145.00	\$ 40.00	
Prepared By															
5. Drainage Design															\$ 7,650.00
5.1. Drainage Calculations														10	\$ 400.00
5.2. Prepare Drainage Area Map													10		\$ 1,450.00
5.3. Design Storm Drainage facilities (Plan & Profiles)												10			\$ 1,350.00
5.3.1. Storm Drain System											10				\$ 1,250.00
5.3.2. Channels										10					\$ 750.00
5.3.3. Bridges									10						\$ 1,100.00
5.3.3.1. Model bridges & bridge class structures pre-project and post project								10							\$ 600.00
5.4. Channel Cross Sections							10								\$ 750.00
6. Pavement Design and Geotech Engineering														10	\$ 400.00
7. Utility Plans														10	\$ 5,200.00
7.1. Develop Utility Basemap												10			\$ 1,350.00
7.1.1. Mains only											10				\$ 1,250.00
7.1.2. Mains and services										10					\$ 750.00
7.2. Insert Joint-Bid Utility Plans (Water, Sanitary Sewer, Gas)									10						\$ 1,100.00
7.3. Utility Coordination and Mtgs. (Sect. 5 of DGM)							10								\$ 750.00
8. Traffic Plans															\$ 2,450.00
8.1. Prepare Preliminary Construction Phasing Plan for CoSA and Joint-Bid Utility Improvements (Include sequence of work narrative)								10							\$ 600.00
8.2. Prepare Intersection Layouts									10						\$ 1,100.00
8.3. Complete Streets Assessment and Field Analysis Checklist (Prior to 40% submittal)										10					\$ 750.00
9. Other Plans and Misc															\$ 1,850.00
9.1. Title Block, Index of Sheets, and Gen Notes														10	\$ 400.00
9.2. Preliminary Project Schedule													10		\$ 1,450.00
10. Environmental Coordination															\$ 2,600.00
10.1. Coordination												10			\$ 1,350.00
10.1. Delineation of OHWM and Disturbed Area											10				\$ 1,250.00
11. Meetings and Coordination															\$ 3,850.00
11.1. Initial Scoping Meeting and minutes (Prepare DSR)											10				\$ 1,250.00
11.2. Initial (Complete Streets) Public meeting and exhibits, prior to 40% Public Meeting.										10					\$ 750.00
11.3. 40 % Public meeting and exhibits										10					\$ 750.00
11.4. 40% Plans Review and Utility Coordination Meetings and minutes									10						\$ 1,100.00
12. Cost Estimating															\$ 1,350.00
12.1. Prepare Summary of Estimated Quantity Sheet								10							\$ 600.00
12.2. 40% Plans Cost Estimate							10								\$ 750.00
13. Additional Items															\$ 2,350.00
12.1. Additional Task						10									\$ 1,100.00
12.2. Additional Task					10										\$ 1,250.00

Project Name	Quantity	Estimating Unit	Unit Cost	Project Manager	Project Engineer	EIT	Engineering Tech	CADD Tech	Project Surveyor	Survey Tech	2 Man Crew	3 Man Crew	4 Man Crew	Clerical/Admin	Task Budget
Date				\$ 150.00	\$ 125.00	\$ 110.00	\$ 75.00	\$ 60.00	\$ 110.00	\$ 75.00	\$ 125.00	\$ 135.00	\$ 145.00	\$ 40.00	
Prepared By															
70% Design Phase				170	135	140	105	80	160	125	165	175	175	60	\$ 35,800.00
1. Roadway Design															\$ 4,600.00
1.1. Update Plan & Profile sheets				10											\$ 1,500.00
1.2. Establish Horizontal Roadway alignments					10										\$ 1,250.00
1.2.1. Update Street Cross Sections						10									\$ 1,100.00
1.2.2. Prepare Retaining wall plans							10								\$ 750.00
2. Drainage Design															\$ 10,950.00
2.1. Update Plan & Profiles									10						\$ 1,100.00
2.2. Update Drainage Calcs and Drainage Area Map										10					\$ 750.00
2.3. Storm Drain System (HGL & EGL)											10				\$ 1,250.00
2.4. Channels (EGL & HGL)												10			\$ 1,350.00
2.5. Bridges													10		\$ 1,450.00
2.6. Regulatory Coordination														10	\$ 400.00
2.7. Update Channel Cross Sections													10		\$ 1,450.00
2.8. Inlet Cross Sections														10	\$ 400.00
2.9. Floodplain Permit													10		\$ 1,450.00
2.10. Prepare SW3P and Narrative												10			\$ 1,350.00
3. Utility Plans															\$ 3,100.00
3.1. Update Utility Basemap											10				\$ 1,250.00
3.2. Insert Joint-Bid Utility Plans (Water, Sanitary Sewer, Gas)															\$ 750.00
3.3. Utility Coordination (Sect 5.0 of DGM)									10						\$ 1,100.00
4. Traffic Plans															\$ 5,050.00
4.1. Update Construction Phasing and Sequence of Work								10							\$ 600.00
4.2. Prepare Traffic Control Plan									10						\$ 1,100.00
4.3. Prepare Pavement Marking and Signing Plan										10					\$ 750.00
4.4. Prepare Traffic Signal Plans (Include elevations)											10				\$ 1,250.00
4.5. Update Intersection Layout												10			\$ 1,350.00
5. Other Plans and Misc															\$ 5,650.00
5.1. Prepare Driveway Summary sheet												10			\$ 1,350.00
5.2. Tree Survey and Preservation Plan										10					\$ 750.00
5.3. Art Enhancement coordination									10						\$ 1,100.00
5.4. Update Project Schedule								10							\$ 600.00
5.5. List of Governing Specifications, Special Provisions and Special Specs							10								\$ 750.00
5.6. Special Details and Non-CoSA Details						10									\$ 1,100.00
6. Environmental Coordination				10											\$ 1,500.00
7. Meetings and Coordination															\$ 1,850.00
7.1. Public meetings and exhibits						10									\$ 1,100.00
7.2. 70% Plans Review and Utility Coordination Meetings and minutes							10								\$ 750.00
8. Cost Estimating															\$ 1,100.00
8.1. 70% Cost Estimate									10						\$ 1,100.00
9. Additional Items															\$ 2,000.00
9.1. Additional Task										10					\$ 750.00
9.2. Additional Task											10				\$ 1,250.00

Project Name	Quantity	Estimating Unit	Unit Cost	Project Manager	Project Engineer	EIT	Engineering Tech	CADD Tech	Project Surveyor	Survey Tech	2 Man Crew	3 Man Crew	4 Man Crew	Clerical/Admin	Task Budget
Date				\$ 150.00	\$ 125.00	\$ 110.00	\$ 75.00	\$ 60.00	\$ 110.00	\$ 75.00	\$ 125.00	\$ 135.00	\$ 145.00	\$ 40.00	
Prepared By															
95% Design Phase				0	10	0	20	30	20	40	30	20	40	20	\$ 22,800.00
1. Roadway Design															\$ 1,450.00
1.1. Finalize P&P sheets and roadway cross sects.													10		\$ 1,450.00
2. Drainage Design															\$ 5,200.00
2.1. Finalize Plan & Profile sheets														10	\$ 400.00
2.1.1. Finalize Drainage Calcs													10		\$ 1,450.00
2.1.2. Channel Cross sections												10			\$ 1,350.00
2.1.3. Finalize Bridge design											10				\$ 1,250.00
2.2. Finalize SWPPP and Narrative										10					\$ 750.00
3. Utility Plans															\$ 2,450.00
3.1. Finalize Utility Basemap									10						\$ 1,100.00
3.2. Insert Joint-Bid Utility Plans (Water, Sanitary Sewer, Gas)								10							\$ 600.00
3.3. Utility Coordination (Sect 5.0 DGM)							10								\$ 750.00
4. Traffic Plans															\$ 2,450.00
4.1. Finalize Traffic Control Plan								10							\$ 600.00
4.2. Finalize Pavement Marking and Signing Plan									10						\$ 1,100.00
4.3. Finalize Traffic Signal Plans										10					\$ 750.00
5. Other Plans and Misc															\$ 5,900.00
5.1. Special Details and Non-CoSA Details													10		\$ 1,450.00
5.2. Finalize Project Schedule														10	\$ 400.00
5.3. Finalize Art Enhancement Coordination													10		\$ 1,450.00
5.4. Finalize List of Govern Specs, Special Provisions and Special Specs												10			\$ 1,350.00
5.5. TDLR											10				\$ 1,250.00
6. Environmental Coordination										10					\$ 750.00
7. Meetings and Coordination															\$ 1,350.00
7.1. Public meetings and exhibits								10							\$ 600.00
7.2. 95% Plans Review and Utility Coordination Meeting and minutes							10								\$ 750.00
8. Cost Estimating															\$ 1,250.00
8.1. 95% Cost Estimate					10										\$ 1,250.00
9. Additional Items															\$ 2,000.00
9.1. Additional Task										10					\$ 750.00
9.2. Additional Task											10				\$ 1,250.00
Bid Phase				150	125	110	85	70	120	85	145	145	155	40	\$ 8,500.00
1. Final Plans															\$ 1,350.00
1.2. City Street and Drainage							10								\$ 750.00
1.3. Insert Joint-Bid Utilities								10							\$ 600.00
2. Final Specifications															\$ 1,100.00
2.1. Assist City in preparing advertising documents (Contract docs, unit price list, etc..)									10						\$ 1,100.00

Project Name	Quantity	Estimating Unit	Unit Cost	Project Manager	Project Engineer	EIT	Engineering Tech	CADD Tech	Project Surveyor	Survey Tech	2 Man Crew	3 Man Crew	4 Man Crew	Clerical/Admin	Task Budget
Date				\$ 150.00	\$ 125.00	\$ 110.00	\$ 75.00	\$ 60.00	\$ 110.00	\$ 75.00	\$ 125.00	\$ 135.00	\$ 145.00	\$ 40.00	
Prepared By															
3. Plan Distribution and Advertising															\$ 2,000.00
3.1. Distribute Plans and Specs to Contractors and Plan Rooms (Maintain Plan Holder's List)										10					\$ 750.00
3.2. Answer Contractor questions. Prepare and distribute necessary Addenda											10				\$ 1,250.00
4. Meetings and Coordination															\$ 4,050.00
4.1. Attend 100% Review Meeting and minutes											10				\$ 1,250.00
4.2. Attend Pre-Bid Meeting and minutes												10			\$ 1,350.00
4.3. Prepare Bid Tabulation and Letter of Recommendation													10		\$ 1,450.00
Construction Phase				20	20	20	20	10	10	10	10	0	0	0	\$ 12,900.00
1. Construction Management															\$ 9,800.00
1.1. Reestablish project control points for contractor's use during construction											10				\$ 1,250.00
1.2. Attend citizen meeting prior to start of construction										10					\$ 750.00
1.3. Assist in preparation and review of the monthly pay estimates									10						\$ 1,100.00
1.4. Assist in preparation and review of change orders								10							\$ 600.00
1.5. Review shop drawings							10								\$ 750.00
1.6. Respond to request for information (RFI's)						10									\$ 1,100.00
1.7. Perform a minimum of two (2) project site visits per month & prepare a report for each visit to the City regarding process of construction					10										\$ 1,250.00
1.8. Participate in final inspection of project				10											\$ 1,500.00
1.9. Finalize TDLR				10											\$ 1,500.00
2. Project Close-Out															\$ 3,100.00
2.1. Prepare over and under quantities for project closeout					10										\$ 1,250.00
2.2. Prepare project as-built drawings						10									\$ 1,100.00
2.3. Participate in one-year warranty inspection for project							10								\$ 750.00
Additional Services				0	0	0	0	0	0	10	10	0	0	0	\$ 9,500.00
1. Prepare CLOMR										10					\$ 750.00
2. Prepare LOMR											10				\$ 1,250.00
3. Prepare Driveway Plats	5	Plat	\$ 500.00												\$ 2,500.00
4. Subsurface Utility Engineering (SUE)	5	Pothole	\$ 500.00												\$ 2,500.00
5. Prepare ROW Map, plats, field notes of parcels to be acquired & set corners,etc...	5	Parcel	\$ 500.00												\$ 2,500.00

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Appendix 2-E ~ Construction Contract

Construction Contract documents shall consist of the successful respondent's bid proposal, all contract documents identified in Table "A" of the City's Form 010, "Formal Invitation for Bids (IFB) and Contract" released in connection with the project, and all Addenda to the IFB. The successful respondent or bidder, by submitting its bid in response to the City's IFB, and signing the City's Form 010, "Formal Invitation for Bids (IFB) and Contract," acknowledges that he/she has received and read the entire Bid and Contract Document and agrees to be bound by the terms therein, that he/she has received all Addenda, and agrees to the terms, conditions, and requirements of the respondent's bid proposal and all documents listed in TABLE "A" of the IFB.

The "Formal Invitation for Bids (IFB) and Contract" integrates the document that form the entire Contract upon approval by the City Council. A written award acceptance (manifested by a City Ordinance) and appropriation (evidence by a Purchase Order) mailed or otherwise furnished to the successful respondent shall result in a binding contract without further action by either party.

A binding contract between the City and the Contractor will be an integration of the following items: City Council approval of the award of the contract, the ordinance (written award accepting the Contractor's bid), and appropriation of funds. A Contractor enters into this contract by signing Form 010 – "Formal Invitation for Bids and Contract".

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Appendix 2-F ~ Bidding Process

It is the City Project Manager's responsibility to coordinate with the Design Consultant regarding bid document preparation 3 to 4 weeks in advance of the anticipated advertisement date. CIMS Contract Services, Plans and Records Section should be involved early in the process to ensure that the correct/most current forms are used in the development of the project specifications. These forms as well as the City's Standard Construction Specifications, the referenced Wage Decision, and other pertinent information will be accessible on the CIMS web-site at www.sanantonio.gov/cims in the "Contracting Opportunities" tab.

Ten working days prior to the anticipated advertisement date, the City Project Manager should submit a fully completed and signed "Request to Advertise" form to the Plans and Records Section of the CIMS Department Contract Services Division, and the Section's Contract Officer or responsible staff member will develop the advertisement and forward to the City Clerk's Office for processing (the City Clerk's Office is responsible for contacting the appropriate newspapers). The "Request to Advertise" form is located on CIMS Contracts Sharepoint in the folder titled "Contract Template Docs." The Plans and Records Office will also ensure that the appropriate documents such as the 010 – Invitation for Bid or 011 – Invitation for Competitive Sealed Proposals and the 020 – Bid Form are prepared within 3 working days of receipt of the Request to Advertise and will forward these forms to the City Project Manager for his or her approval. Plans and Records receipt of the Request to Advertise 10 days in advance of the anticipated advertisement date ensures adequate turn-around time for Plans and Records, and for the review and approval of the 010 and 020 forms by the City Project Manager.

It is the City Project Managers' responsibility to communicate with the Design Consultant regarding the upcoming advertisement date and to forward the 010 and 020 forms to the Design Consultant such that the Design Consultant can have the plans & specifications completed, printed and ready for purchase on the date the project is first advertised.

Upon receipt of the appropriate bid forms and documents from the Project Manager, the Design Consultant shall prepare the specification documents to include a Unit Pricing Form (025) if required, and shall ensure that all the required documents are sent to the Project Manager and/or the Plans and Records Office (to include any Special Conditions) that it intends to include in the Specifications.

The Design Consultant will include all documents listed in Table A of the Form 010 or 011 in the project specification book. The City will not distribute plans or specifications to interested bidders other than electronically. Therefore, Design Consultant shall provide Plans & Records office (through the Project Manager) with an electronic version of the plans, specifications, special conditions and the Unit Pricing Form. Design Consultant will provide copies of the plans and fully completed specification book (including all forms and the wage decision) to the City Project Manager.

Copies of the plans and fully completed specification book shall be provided for the following individuals:

1. City Project Manager
2. City Inspector
3. City Inspections Manager
4. Contracts Division (received by Plans & Records) to be used as the contract and provided to the City Clerk as a record for contract award
5. Construction Contractor (Design Consultant to provide a copy at the Pre-construction meeting)
6. If joint design, one set for each utility

It is the City Project Manager's responsibility to check all documents to ensure that the correct forms are included in the specifications.

The Plans and Records Office will be responsible for posting all specification documents and required bid/proposal forms to the City's web-site and to the State Comptroller's website at <http://www.window.state.tx.us/>.

The Design Consultant is not required to provide an envelope to prospective bidders along with the Plans and Specifications. The Design Consultant shall post the plans and specifications to the Plans Rooms utilized by the City (names of Plans Rooms currently in use and contact information to be provided by Contract Services). The Design Consultant shall be responsible for all printing costs and for the sale of the Plans and Specifications to prospective bidders.

Pre-bid or Pre-submission Conferences should be held two weeks after the first advertisement date. Design Consultant is required to attend conferences along with the City Project Manager and appropriate team members. A representative of the Contract Services Division will also attend all pre-bid or pre-submission conferences. The City Project Manager and Design Consultant shall be responsible for facilitating the meeting and for providing the Contract Services Division with an agenda and a record of all attendees for the contract file.

Should changes to the plans or specifications be required, an Addendum shall be prepared by the Design Consultant and forwarded to the City Project Manager. Following his or her approval of the addendum, the City Project Manager should forward the addendum to the Plans and Records office for posting to the City's web-site. It shall be the Design Consultant's responsibility to ensure that all firms that have purchased plans and specifications are sent a copy of the addendum. All addenda shall include an acknowledgment form that shall require the prospective bidder's signature. The acknowledgment form or forms must be included with all bids submitted.

Should an addendum be required to be released with less than 7 days remaining before the bid due date, the addendum shall also extend the time allowed to submit bids for at least one week.

Barring holidays, bids shall be received on Wednesdays at 1:00 P.M. All bids are submitted to the City Clerk's Office and opened and read aloud immediately after receipt. The Contract Services Section will conduct bid openings with the assistance of the City Clerk's Office. The Design Consultant and City Project Manager should attend all bid openings in connection with their respective projects.

Following the bid opening, the as-read bid tabulation is checked and posted to the City's web-site by Contract Services. The City Clerk's Office maintains all bid bonds. The original bids are kept by the Contract Services Section, and a copy of all bids are delivered to the City Project Manager. Contract Services shall also provide a copy of the as-read bid tabulation to the City Project Manager. The City Project Manager will provide a copy of the as-read bid tabulation to the Design Consultant.

It is the Design Consultant's responsibility to check the bids, and to prepare a final bid tabulation. The final bid tabulation shall be provided to the City Project Manager within 5 days of bid opening, along with a recommendation letter (recommending the lowest responsible bidder for contract award), notice of any items that exceeded the budget by 5% or more, and a scoping letter. If the Design Consultant is concerned about the qualifications of the low bidder, the low bidder's ability to complete the work or an irregularity in the bid, the Design Consultant should notify the City Project Manager in writing about these concerns. When there are concerns about the qualifications or responsibility of a bidder, the City Project Manager should notify the City's Capital Programs Manager to determine if an Administrative Hearing is desired. If an Administrative Hearing is desired, the City Project Manager will ask the Contract Administrator to coordinate the Administrative Hearing. Design Consultant is required to attend the Administrative Hearing which is not considered to be an outside stakeholder meeting.

The City Project Manager shall provide Contract Services with a copy of the final bid tabulation and notice of which alternates (if any) are being accepted. The Contract Services Section is responsible for contacting recommended low bidder to request payment & performance bonds and insurance certificates prior to award of contract.

At the City Project Manager's or Contract Services discretion, an Administrative Hearing may be scheduled at which the recommended low bidder may be asked to provide additional information as to their capacity to perform the work, to include financial statements, lists of equipment and personnel or any other information deemed necessary to mitigate risk to the City.

Contract Services will provide the Economic Development Department with a copy of the lowest qualified bidder's Good Faith Effort Plan for review and approval. Should the Economic Development Department not approve the contractor's Good Faith Effort Plan, they will notify Contract Services and/or the City Project Manager and will work with the contractor regarding their good faith efforts. Contract Services will notify the City

Project Manager when approval of the Good Faith Effort Plan or the revised Good Faith Effort Plan (if required) is received.

The City Project Manager shall begin drafting the Request for Council Action item as soon as the Design Consultant’s recommendation is accepted. City Project Manager will notify the Design Consultant when City Council has approved the construction contract and invite the Design Consultant to the pre-construction meeting.

Pre-Construction Meeting:

Design Consultant will attend the pre-construction meeting and bring a final copy of the plans and specifications to give to the Contractor. If plan rooms have returned copies of plans and specifications, Design Consultant will provide those to the selected contractor as well.

CHECKLIST FOR BID PROCESS

Step	Task	Timeline	Responsibility
1	Coordinate with Design Consultant regarding bid document preparation	4 weeks prior to bid advertisement date	City Project Manager
2	Finalize plans, specifications, special conditions, and detailed pricing sheet (Form 025) and provide to City Project Manager for review	3 weeks prior to bid advertisement date	Design Consultant
3	Provide Design Consultant with final comments on plans, specifications, special conditions, and unit pricing form (Form 025)	10 working days prior to bid advertisement date	City Project Manager
4	Submit fully completed and signed Request to Advertise Form to Plans & Records Section of CIMS Contract Services Division	10 working days prior to bid advertisement date	City Project Manager
	Submit Special Provisions and Project Specific Documents to City Project Manager	10 working days prior to bid advertisement date	Design Consultant
5	Complete bid front-end boilerplate documents and provide electronic version of these documents to City Project Manager for review	7 working days prior to bid advertisement date	Plans & Records Section of Contract Services Division, CIMS
6	Complete the review of bid front-end documents and submit to Design Consultant along with approval of plans, specifications, special conditions, and unit pricing form (Form 025)	5 working days prior to bid advertisement date	City Project Manager

Step	Task	Timeline	Responsibility
7	Provide electronic version of plans, specifications, special conditions, and unit pricing form (Form 025) to Plans & Records section of Contract Services Division	5 working days prior to bid advertisement date	City Project Manager
8	Prepare bid packet using City provided forms, as well as plans, specifications and special conditions and provide to City Project Manager for review	5 working days prior to bid advertisement date	Design Consultant
9	Ensure that bid packet is in proper form and all necessary documents and forms are included	3 working days prior to bid advertisement date	City Project Manager (Plans & Records Section of Contract Services will provide support and assistance)
10	Prepare advertisement for posting and submit to City Clerk and State website	3 working days prior to bid advertisement date	Plans & Records Section of Contract Services Division, CIMS
11	Print copies of bid packages as follows: <ol style="list-style-type: none"> 1. City Project Manager 2. City Inspector 3. City Inspections Manager 4. Contracts Division (received by Plans & Records) to be used as the contract and provided to the City Clerk as a record for contract award 5. Construction Contractor (Design Consultant to provide a copy at the Pre-construction meeting) 6. If joint design, one set for each utility 	Bid advertisement date	Design Consultant
12	Provide copies of plans and specifications to the Plan Rooms utilized by the City	Bid advertisement date	Design Consultant
13	Sell plans and specifications to prospective bidders and notify bidders that all forms can be found on City's website for download	From date of bid advertisement through date of bid opening	Design Consultant

Step	Task	Timeline	Responsibility
14	Prepare addenda as necessary and provide copies of addenda to City Project Manager and all plan holders.	From date of bid advertisement through not less than 7 days prior to bid opening	Design Consultant
15	Forward addenda to Plans & Records Section of Contract Services Division, CIMS	Upon receipt of addenda	City Project Manager
16	Post addenda to website	Within 2 working days of receipt of addenda	Plans & Records Section of Contract Services Division, CIMS
17	Receive bids at Office of the City Clerk. Open bids and read them aloud.	Bid open date (always 1:00 pm local time Wednesdays)	Plans & Records Section of Contract Services Division, CIMS
18	Attend bid opening	Bid open date	City Project Manager, Design Consultant (as required)
19	Post "As-Read" Bid Tab on CIMS Website	Bid open date	Plans & Records Section of Contract Services Division, CIMS
20	Provide one original of each bid package to City Project Manager and scan other original for electronic filing.	Bid open date	Plans & Records Section of Contract Services Division, CIMS
21	Maintain all bid bonds	Bid open date	City Clerk
22	Check bids, prepare final bid tabulation, and provide recommendation letter to City Project Manager	Within 5 working days after bid opening	Design Consultant
23	If administrative hearing is required, follow procedures for Administrative Hearing	Within 7 working days after bid opening	City Project Manager notifies and coordinates with Plans & Records Section of Contract Services for support and assistance.
24	Provide a copy of the recommendation letter and final bid tabulation to Contract Services Division. Include which alternates (if any) are being accepted.	Within 7 working days after bid opening	City Project Manager

Step	Task	Timeline	Responsibility
25	Provide Small Business Division of the Economic Development Department with copy of recommended bidder's Good Faith Effort Plan	Within 10 working days after bid opening (upon receipt of recommendation letter)	Plans & Records Section of Contract Services Division, CIMS
26	Contact recommended low bidder to request payment/performance bonds and insurance certificates. If project is not low bid, then the proper contract must be drafted and sent to the recommended bidder.	Within 10 working days after bid opening (upon receipt of recommendation letter)	Plans & Records Section of Contract Services Division, CIMS
27	Begin drafting Request for Council Action (RFCA) memo – coordinate with Fiscal and Contracts	Upon receipt of recommendation letter	City Project Manager
28	Create Purchase Requisition for contract in SAP	Upon receipt of draft RFCA from City Project Manager	CIMS Fiscal Division
29	Create Contract Record in SAP and provide contract number to City Project Manager for inclusion in RFCA	Upon receipt of draft RFCA from City Project Manager	CIMS Contract Services Division
30	Receives memo from Small Business Division of the Economic Development Department and provides a copy to Project Manager for RFCA	When received	CIMS Contract Services Division
31	Schedule pre-construction meeting. Provide date, time and location of preconstruction meeting to Design Consultant and Contract Services Division	Prior to Council action	City Project Manager
32	Provide Portal Team with a copy of the selected bidder's Unit Pricing Form (Form 025) and the anticipated date for Council Action and pre-construction meeting	Prior to Council Action	City Project Manager
33	Notify Design Consultant of City Council approval	Date of Council Action	City Project Manager
34	Create Purchase Order in SAP and provide Purchase Order number to Portal Team and City Project Manager	Date of Council Action	CIMS Contract Services Division

Step	Task	Timeline	Responsibility
35	Request cost-loaded schedule for contractor and provide to Portal Team when received	No later than date of Council Action	City Project Manager
36	Send Notice of Award and copy of Ordinance and Purchase Order to selected contractor	Friday immediately following Council approval	CIMS Contract Services Division
37	Get an invoice from Portal Team	Prior to pre-construction meeting	City Project Manager
38	Attend pre-construction meeting and bring final copy of Bid package (including all addenda) and the final plans/specifications for the contractor. If plan rooms have returned copies of plans/specifications, provide those to selected contractor as well.	Date of pre-construction meeting (not less than 10 days after the City Council Action date)	Design Consultant, and representatives from CIMS Contract Services Division - Wage & Hour and SBEDA or DBE
39	Facilitate pre-construction meeting and provide contractor with invoice from Portal Team	Date of pre-construction meeting	City Project Manager
40	Attend pre-construction meeting to ensure the contractor has Change Of Subs form and appropriate Wage Decision	Date of pre-construction meeting	CIMS Contract Services Division
41	Provide contractor with Notice to Proceed (copy to CIMS Contract Services Division)	Preferably, date of pre-construction meeting	City Project Manager

Appendix 2-G ~ Variance Letter

CONSULTANT LETTERHEAD

Date

Administrative Exception/Variance Request Review
c/o Assistant City Engineer
Capital Improvements Management Services Department
City of San Antonio
114 W. Commerce
San Antonio, TX 78205

Re: Project name
City's Project Manager:
Administrative Exception/Variance

Dear Assistant City Engineer:

At a minimum, provide the following information in your Administrative Exception/Variance Request letter:

- *Introduction: Identify the project and state that you are requesting consideration for an administrative exception.*
- *Code Issue: Identify the specific Unified Development Code (UDC) section for which the exception is proposed.*
- *Discussion/Justification: Provide rationale and supporting information, such as technical data, engineering calculations, results of actual field tests, requirements or allowances in other standard engineering references, etc. that provide the basis for the City to accept the request. Proposed design documents (e.g., architectural or engineering plans, photos, etc) and supporting information listed above should be attached to the request as needed to clarify proposed request. Specifically, provide:*
 - *Rationale as to why the Administrative Exception/Variance will not be contrary to the spirit and intent of the UDC and the specific regulations from which an exception is requested;*
 - *Assertion that the applicant has taken all practicable measure to minimize any adverse impacts on the public health, safety and public welfare;*
 - *Justification stating that under the circumstances, the public interest underlying the proposed exception outweighs the public interest underlying the particular regulation for which the exception /variance is granted;*

- *Identify the alternatives or consequences of the City not approving this request.*

- *Conclusion: Provide a summary statement such as “In my/our professional opinion, the proposed administrative exception/variance remains in harmony with the spirit and intent of the UDC as it will not adversely affect the health, safety, or welfare of the public”.*

Sincerely,

Title
P.E. License # _____

Attachment(s)

Approved

Rejected

Reason for rejection

Assistant City Engineer

Date

Appendix 2-H ~ Plan of Record (As-Builts) Submittal Requirements

- Submit all the requirements below to the City’s Project Manager (PM)
- Submit one set of Plan of Record plans for review
- Add the following to the Title Sheet

PLAN OF RECORD

CONTRACTOR: _____ (Name of General/Prime Contractor)

PROJECT NUMBER: _____ (Project No, i.e., 40-00022)

CONSTRUCTION COMPLETION: __ (Date of Final Acceptance)

TDLR No. _____ (TDLR Inspection Number)

- Plan of Record must show ALL modifications made to the original design. These changes include, but are not limited to pavement section, project limits, types of driveways, storm sewer/culvert alignment and elevations, signage/pavement markings, traffic signals and bridge drill shaft locations, etc... If needed, these changes must be accompanied by documentation, i.e., change orders.
- When there is a change in street reconstruction limits, or a change of location of manholes or inlets, the Plan of Record must reflect these station changes as per Contractor’s redline plans.
- When there is a change in the proposed street or storm sewer system slope, the Plan of Record must reflect these elevation changes as per Contractor’s redline plans.
- Label each plan sheet with the following note: “Plan of Record”
- After acceptance of review copy by PM, then a final hard copy of the Plan of Record can be submitted along with an electronic copy in PDF and DGN format.
- Plan of Record must be signed and sealed by a Professional Engineer.

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Appendix 3-A - Survey

Parcel No.: P06-386
Project Name: IH-22 16-Inch Water Main:
Woods /at Fair Oaks & Village Green
Owner's Name: Green Land Ventures, LTD.
Page 1 of 3

FIELD NOTES
DESCRIPTION OF A 30' WATER, SEWER AND RECYCLE WATER
EASEMENT
0.119 OF ONE ACRE TRACT OF LAND
(5,205 sq. ft.)

Being 0.119 of one acre (5,205 sq. ft.) of land in Bexar County, Texas, being out of and part of a 4.333 acre tract of land recorded in Volume 8888, Page 2222, Official Public Records of Real Property of Bexar County, Texas, out of and part of a 31.812 acre tract of land recorded in Volume 8888, Page 2222, Official Public Records of Real Property of Bexar County, Texas and out of and part of a 2.338 acre tract of land recorded in Volume 7777, Page 444, Official Public Records of Real Property of Bexar County, Texas, and being more particularly described by metes and bounds as follows:

BEGINNING at a ½" iron rebar with a "JDS" plastic cap found on the northeast right-of-way line of Interstate Highway 22 (R.O.W. ~ varies) at the south end of the cutback line from said northeast right-of-way line to the southeast right-of-way line of Woodland Parkway, The Woods Subdivision Unit 2 recorded in Volume 9999, Page 111, Deed and Plat Records of Bexar County, Texas, being the southwest corner of the remaining portion of said 4.333 acre tract and of this easement;

THENCE North 14°09'05" East, along said cutback line and northwest line of said remaining portion of a 4.333 acre tract, a distance of 35.36 feet to a ½" rebar with a "JDS" plastic cap found on the said southeast right-of-way line of Woodland Parkway and the north line of said remaining portion of said 4.333 acre tract for an angle point of this easement;

THENCE North 59°09'05" East, along the said southeast right-of-way line of Woodland Parkway, a distance of 5.00 feet to a ½" rebar with a "JDS" plastic cap set for the northeast corner of this easement, said point bears South 59°09'05" East, a distance of 4.89 feet from a ½" iron rebar with a "JDS" plastic cap found for a point of curvature for said Woodland Parkway;

THENCE South 30°50'55" East, crossing said remaining portion of said 4.333 acre tract, 2.338 acre tract and 31.812 acre tract, a distance of 181.83 feet to a point on the common line of the south line of said remaining portion of a 31.812 acre tract and the north line of Lot 2, Block 1, of The Woods Subdivision Unit 2, being the southeast corner of this easement, from which a set ½" iron rebar with a "JDS" plastic cap bears South 30°50'55" East a distance of 2.00 feet;

THENCE South 51°13'35" West, along the said common line, a distance of 30.29 feet to a ½" rebar with a "JDS" plastic cap set on the existing northeast right-of-way line of Interstate

Project No.: 06-1222-133
Parcel No.: P06-386
Page 2 of 3

Highway 22, for the southwest corner of said remaining portion of a 31.812 acre tract and the northwest corner of said Lot 2, being the southwest corner of this easement;

THENCE North 30°50'55" West, along said northeast right-of-way line, a distance of 161.00 feet to the **POINT OF BEGINNING** and containing 0.119 of one acre (5,205 sq. ft.) of land, more or less.

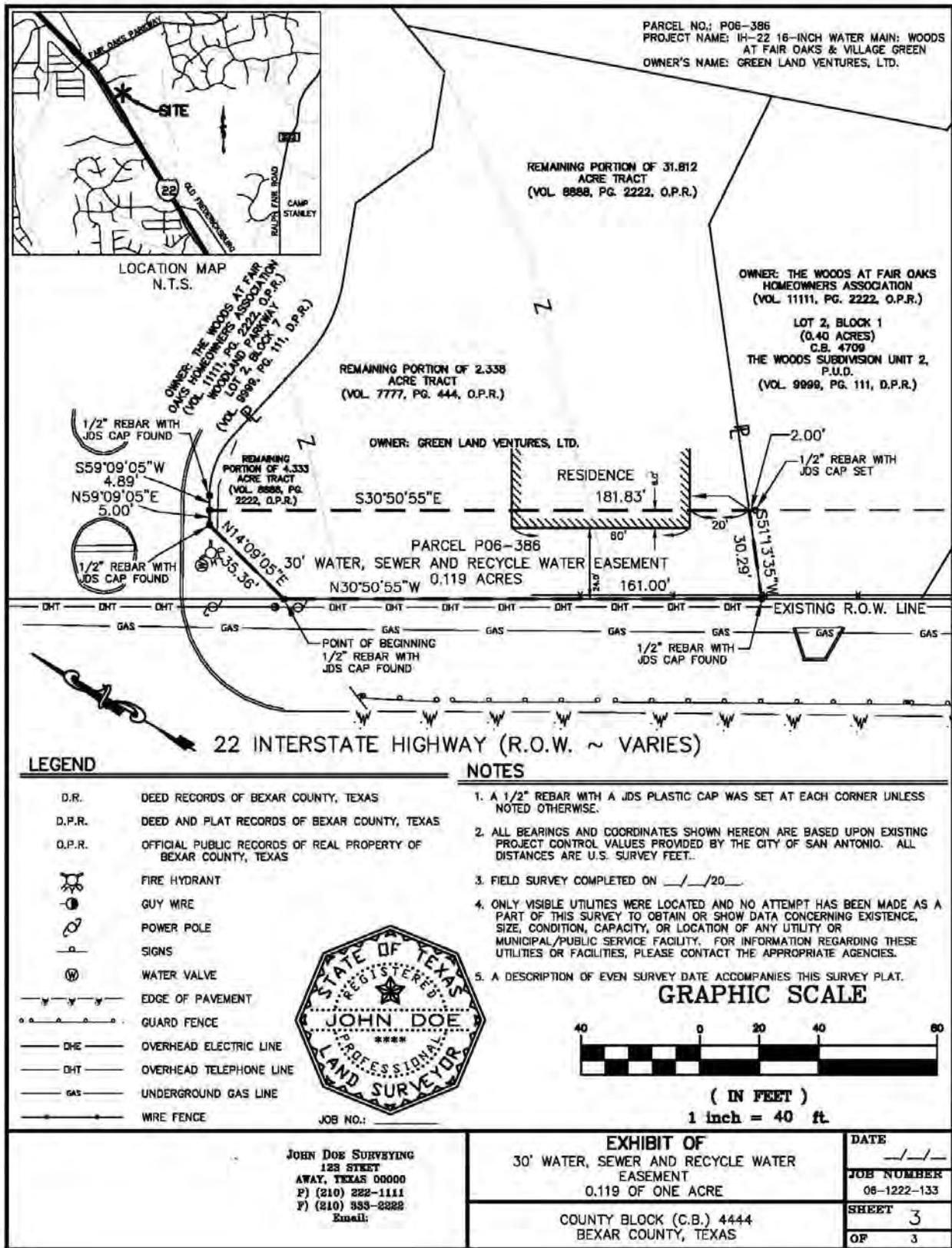
All bearings and controls shown hereon are based upon existing project control values provided by the City of San Antonio. All distances are U.S. survey feet.

This description was prepared from a survey made on the ground by employees of John Doe Surveying (JDS).

A survey plat of even survey date accompanies this metes and bounds description.

John Doe R.P.L.S. # 0000

Date



Project: Mon December 04 09:19:38 2006

Parcel name: P06-386

Point of Beginning

North: 13810593.3871 East : 2075955.8374
Line Course: S 30-50-55 E Length: 181.83
North: 13810437.2815 East : 2076049.0746
Line Course: S 51-13-35 W Length: 30.29
North: 13810418.3125 East : 2076025.4597
Line Course: N 30-50-55 W Length: 161.00
North: 13810556.5351 East : 2075942.9035
Line Course: N 14-09-05 E Length: 35.36
North: 13810590.8220 East : 2075951.5485
Line Course: N 59-09-05 E Length: 5.00
North: 13810593.3858 East : 2075955.8411

Perimeter: 413.47 Area: 5,205 sq.ft. 0.119 acres

Mapcheck Closure - (Uses listed courses, radii, and deltas)

Error Closure: 0.0040 Course: S 71-40-32 E

Error North: -0.00124 East : 0.00375

Precision 1: 103,370.00

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Appendix 3-B ~ Standard Feature Codes

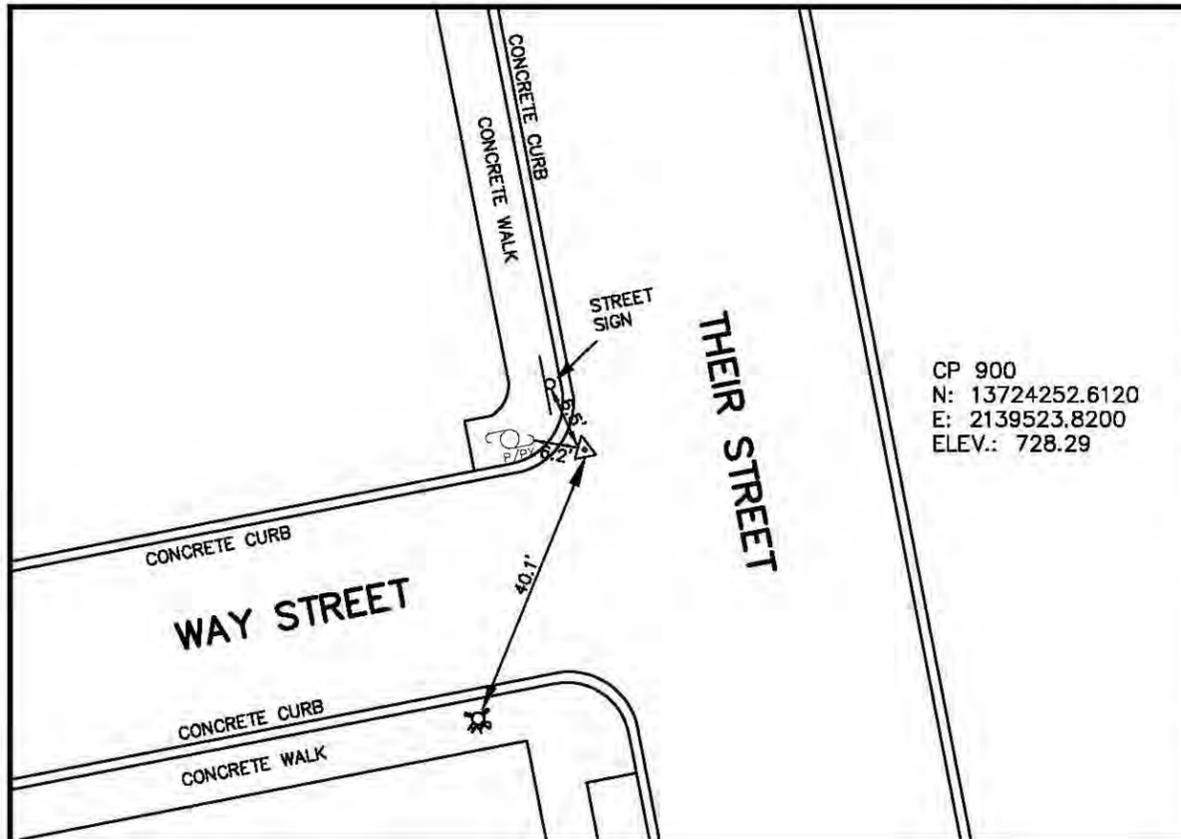
COSA Codes Alphabetical by Feature								
Above Ground Tank	AGT	*, F, *F	Coniferous Tree	PINE	G	Guard Post	GP	F
Abutment (Bridge) (Goes to Zone 1)	ABUT	*, G, *G	Construction Point	CNP	F	Guard Rail - Cable	GRC	*, G, *F
Aerial Target	AT	F	Control Point	CP	F	Gutter Flow Line	GUT	*, G, *G
Air Conditioner	AC	*, F, *F	Corrugated Metal Pipe	CMP	*, G, *F	Gutter Inlet	GI	*, G, *G
Air Vent	VA	F	Cotton Spindle	SPIN	F	Guy Anchor	GUY	G
Antenna	ANT	F	Country Line	CTR	*, F, *F	Guy Pole (Deadman)	GPL	G
Asphalt	ASPH	G	County Line	COLN	F	Handicap Ramp	HCR	*, G, *F
Attenuation System	AS	*, G, *G	Crown of Road	CR	*, G, *G	Handrail	HR	*, F, *F
Azimuth Mark (Existing)	AZ	F	Culvert (Box)	CLV	*, G, *F	Headwall	HDW	*, G, *G
Azimuth Mark (New)	AZM	F	Culvert (Pipe)	PCLV	*, G, *F	Headwall (Back)	HDWB	*, G, *G
Back of Curb	CRB	*, G, *G	Culvert Structure	STRU	*, G, *G	Headwall (Forward)	HDWF	*, G, *G
Bank (Top, Bottom)	BNK	*, G, *G	Curb - Back	CRB	*, G, *G	Hedge	HDG	*, G, *F
Barn	BRN	*, G, *G	Curb Cut Ramp	CCR	*, G, *G	High Mast Lighting Tower	HMLT	F
Baseline	BL	*, F, *F	Curb Inlet	CI	*, G, *G	High Point	HI	G
Bench/Bus Stop	BEN	*, F, *F	Dam (Earthen)	ED	*, G, *G	High Voltage Transmission Line	HV	*, G, *F
Benchmark (Azimuth)	BAZ	F	Digital Photograph Taken	PHOTO	F	Horizontal Panel (Flight?)	HP	F
Benchmark (Magnetic)	BMAG	F	Digital Photograph Taken	PHOTO	F	Horizontal Pipe Runner	PRH	*, G, *G
Benchmark (New)	BM	F	Directional Arrow (Pavement Marking)	DA	*, G, *F	Hour-Glass Panel	HGP	F
Benchmark (Reference)	BREF	F	Dirt Road	DR	*, G, *G	House	H	*, G, *G
Benchmark (Temporary)	BTMP	F	Ditch (Back)	BDT	*, G, *G	Hub & Tack	HT	F
Benchmark (Triangulation)	BTRI	F	Ditch (Bottom)	DTB	*, G, *G	Incinerator	INC	*, F, *F
Benchmark (Traverse)	BTRA	F	Ditch (Top)	DTT	*, G, *G	Invert Electric (Flow Line) (Zone 3)	INE	F
Bikeway	BIKE	*, G, *G	Ditch Bottom Inlet	DBI	*, G, *G	Invert Storm Sewer	INS	F
Billboard	BLB	*, G, *F	Ditch Pavement	DPV	*, G, *G	Invert Telephone (Flow Line) (Zone 3)	INT	F
Bottom of Slope	SLPB	*, G, *G	Drain Feature (Special)	SDF	*, G, *F	Invert Wastewater (Flowline) (Zone 3)	INV	F
Box Culvert	CLV	*, G, *F	Drain Pipe (Storm)	STM	*, G, *F	Iron Bar	IB	F
Box Panel (Flight)	BOX	F	Drill Cores	BORE	F	Iron Pipe	IP	F
Brace Pole	BPL	G	Driveway	DRV	*, G, *G	Iron Rod	IR	F
Brass Cap	BC	F	Drop Inlet	DI	*, G, *G	Irrigation Stand Pipe	ISP	G
Brick Fence	BFN	*, G, *G	Dumpster	TD	F	Island	ISL	*, G, *G
Bridge Abutment (Goes to Zone 1)	ABUT	*, G, *G	Earthen Dam	ED	*, G, *G	Junction Box	JB	G
Bridge Approach Slab (Zone 1)	BAS	*, G, *G	Easement Lines	ES	*, G, *F	Junction Box (Electric)	JBE	G
Bridge Approach Slab (Zone 1)	BAS	*, G, *G	Easement Lines	ES	*, G, *F	Junction Box (Telephone)	JBT	G
Bridge Armor Joint	BAJ	*, G, *G	Edge of Concrete	EC	*, G, *G	Lane Line	LL	*, G, *G
Bridge Bent	BBT	*, G, *G	Edge of Concrete Paving	ECPV	*, G, *G	Levee	LEV	*, G, *G
Bridge Centerline	BCL	*, G, *G	Edge of Gravel	EG	*, G, *G	Light Base	LB	F
Bridge Curb	BCRB	*, G, *G	Edge of Pavement	EP	*, G, *G	Lot Corner	LOT	F
Bridge Deck	DECK	*, G, *G	Edge of Trees/Woods	WDS	*, G, *F	Low Point	LO	G
Bridge Elements	BE	*, G, *G	Edge of Water	EW	*, G, *F	Luminare Standard	LS	F
Bridge Gutter	BGUT	*, G, *G	Electric Junction Box	JBE	G	Mailbox	MB	F
Bridge Overhang	BOV	*, G, *G	Electric Manhole	MHE	G	Manhole (Electric)	MHE	G
Bridge Rail (Metal, Concrete)	BRL	*, G, *G	Electric Meter	EM	F	Manhole (Generic)	MH	G
Bridge Sidewalk	BSW	*, G, *G	Electric Service Pole	SPLE	G	Manhole (Storm Drain)	MHS	G
Bridge Spot Elevation	BSE	G, *G	Electric Tower, Single Column	TWR	F	Manhole (Telephone)	MHT	G
Bridge Stripe Dashed	BPSD	*, G, *G	Electric Transformer	TRNS	F	Manhole (Wastewater)	MHW	G
Bridge Stripe Solid	BPS	*, G, *G	Electrical Pedestal	EPED	F	Marker Post	MP	F
Bridge Truss (Railroads)	BTR	*, G, *G	Elevation of Water	WE	*, G, *F	Marsh	MAR	*, G, *G
Building (Foundation, Wall, etc)	BLD	*, G, *G	Encasement Pipe	ENP	*, F, *F	Match Line	ML	G
Cable Guard Rail	GRC	*, G, *F	End Wall	EWL	*, G, *G	Miscellaneous Line	MIS	G, *G
Cable in Pavement Detector	CAB	*, G, *F	End Wall (Special)	SEW	*, G, *G	Miscellaneous Point	MISC	G
Cable TV Line	CTV	*, G, *F	Entrance - Private	PE	*, G, *F	Mitered End Section	MES	*, G, *G
Cable TV Pedestal	CPED	F	Faucet	FAU	F	Nail (60d, Conc, w/Shiner)	NAIL	F
Cable TV Service Box	CSB	F	Fence (Generic)	FN	*, G, *F	Nail and Shiner	NS	F
Camp Stove/Grill	GRL	F	Fence Gate	GAT	*, G, *F	Natural Ground	NG	**, G, *G
Canal	CAN	*, G, *G	Fiber Optic Cable	FOC	*, G, *F	NGS Marker (Horizontal & Vertical)	HVM	F
Catch Basin	CBS	*, G, *G	Filler Cap	G	F	NGS Marker (Horizontal Only)	HM	F
Cattle Guard	CG	*, G, *G	Fire Hydrant	FH	F	NGS Marker (Horizontal Only)	NGS	F
Cemetery	CEM	*, G, *F	Flag Pole	FP	F	NGS Marker (Vertical Only)	VM	F
Center Line	CL	*, G, *G	Flared End Section	FLR	*, G, *G	Noise Wall	NW	*, G, *F
Center of Road	CR	*, G, *G	Flight Panel (?) (Horizontal)	HP	F	Orchard Trees	OTR	G
Center of Stream	CST	*, G, *G	Flight Panel (Box Panel)	BOX	F	Orchard/Grove	ORCH	*, G, *F
Center Section Corner	CTRS	F	Flight Panel (Vertical Only)	HPV	F	Ornamental Plant	OP	G
Chain Link Fence	CFN	*, G, *F	Flight Panel (Vertical Panel Point)	VPT	F	Overhead Electric (Power Line)	OE	*, G, *F
Channel	CH	*, G, *G	Flow Line	FL	*, G, *G	Overhead Telephone (Telephone Line)	OT	*, G, *F
Channel (Concrete)	CCH	*, G, *G	Flume	FLM	*, G, *G	Paint Stripe (Dashed)	PSD	*, G, *G
Chiseled Plus (SCRIBE)	CHP	F	Footing (Concrete for signs)	FT	*, G, *G	Paint Stripe (Solid)	PS	*, G, *G
Chiseled, Drilled or Plug Mark	CHM	F	Garage	G	*, G, *G	Paint Stripe Yellow (Dashed)	PSDY	*, G, *G
Cinder Block Fence	CBFN	*, G, *G	Gas Line	GL	*, G, *F	Paint Stripe Yellow (Solid)	PSY	*, G, *G
Clean Out	CO	F	Gas Meter	GM	F	Parcel	PAR	*, F, *F
Column	COL	G	Gas Pump	GPU	F	Parcel (Take)	PARTK	*, F, *F
Concrete - Edge of	EC	*, G, *G	Gas Pump Island	GPI	*, G, *G	Parcel Remainder	PARR	*, F, *F
Concrete Channel	CCH	*, G, *G	Gas Tank (Underground)	UGT	*, G, *F	Parking Lot	PKL	*, G, *G
Concrete Guard Fence	GFC	*, G, *F	Gas Tank Cover	TC	F	Parking Meter	PMT	F
Concrete Marker (Cast Type 1)	CMKR	F	Gas Valve	GV	F	Path	PATH	*, G, *G
Concrete Monument (Poured Type 2)	MON	F	Gas Valve Cover	VCG	F	Pavement - Concrete	CPV	*, G, *G
Concrete Pavement	CPV	*, G, *G	Gas Vent	VG	F	Pavement - Edge of	EP	*, G, *G
Concrete Paving - Edge of	ECPV	*, G, *G	Gate (Fence gate)	GAT	*, G, *F	Pedestrian Signal Box	PSB	F
Concrete Pipe (Reinforced)	RCP	*, G, *F	Gauge (Stream or Tide)	GAU	F	Picket Fence	PFN	*, G, *F
Concrete Traffic Barrier (Permanent)	CTB	*, G, *G	GPS Monument	GPS	F	Piling/Pier	PIR	*, G, *F
Concrete Traffic Barrier (Temp)	CBT	*, F, *F	Grade Break	GB	*, G, *G	Pipe Culvert	PCLV	*, G, *F
Conduit Electric	CNDE	*, G, *F	Gravel - Edge of	EG	*, G, *G	Pipe Runner (Horizontal)	PRH	*, G, *G
Conduit Telephone	CNDT	*, G, *F	Gravel Road	GRV	*, G, *G	Pipe Runner (Vertical)	PRV	*, G, *G
PK Nail	PK	F	Guard Fence	GF	*, G, *F	Pipeline	PIP	*, G, *F
			Guard Fence - Concrete	GFC	*, G, *F	Pit, Fill	PIT	*, G, *G
			Storm Drain Manhole	MHS	G	Wood Fence	WDFN	*, G, *F

Design Guidance Manual

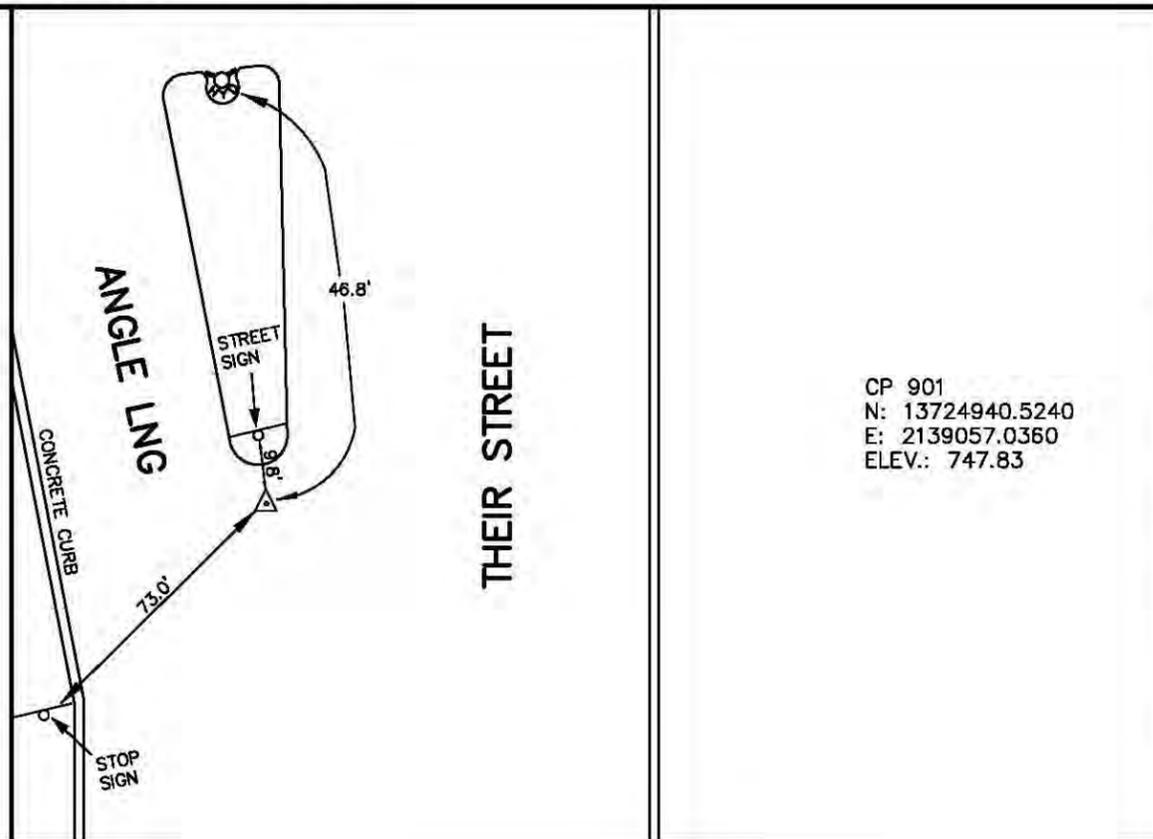
Planter	PLT	*, G, *F	Storm Drain Pipe	STM	*, G, *F	Wooden Post	WP	G
Plat Corner	PLAT	F	Storm Sewer Drain Line	SDL	*, G, *F	Yard Drain	YD	*, G, *F
Playground	PLAY	*, G, *G	Storm Sewer Invert	INS	F			
Point of Continuous (Compound) Curve	PCC	G	Storm Shelter	STC	*, F, *F			
Point of Curvature	PC	G	Storm Water Drain Line	SDL	*, G, *F			
Point of Intersection	PI	G	Storm Water Drain Line	SDL	*, G, *F			
Point of Reverse Curve	PRC	G	Stream (Center)	CST	*, G, *G			
Point of Tangency	PT	G	Stream Gauge	GAU	F			
Point on Curve	POC	G	Structure	STRU	*, G, *G			
Point on Tangent	POT	G	Subdivision/Block/Lot/Property Line	PL	*, F, *F			
Pole (Generic)	POLE	G	Survey Station	STA	F			
Porch	POR	*, G, *G	Swimming Pool	POL	*, G, *G			
Portable Toilet	TOIL	F	Tank (Above Ground)	AGT	*, F, *F			
Post (Generic)	PST	G	Tank Cover (Gas)	TC	F			
Power Line (Overhead Electric)	OE	*, G, *F	Telephone Booth	TB	F			
Power Line (Underground)	UE	*, G, *F	Telephone Junction Box	JBT	G			
Power Pedestal	PPED	F	Telephone Line (Overhead Telephone)	OT	*, G, *F			
Power Pole	PP	G	Telephone Line (Underground)	UT	*, G, *F			
Principal Point	PPT	F	Telephone Manhole	MHT	G			
Private Entrance	PE	*, G, *F	Telephone Pedestal	TPED	F			
Property Corner	PCR	G	Telephone Pole	TP	G			
Pull Box	PBX	F	Telephone Service Pole	SPLT	G			
Pull Box	PBX	F	Test Holes	BORE	F			
Pump House	PHSE	*, G, *G	Tide Gauge	GAU	F			
Quarry	QRY	*, G, *G	Toilet (Portable)	TOIL	F			
Radius Point	RP	G	Top of Slope	SLPT	*, G, *G			
Railroad Control Box	RRCB	F	Tower, Single Column	TWR	F			
Railroad Crossing Sign	RRX	F	Tractor Crossing	TRX	*, G, *G			
Railroad Mile Post	RRMP	F	Traffic Barrier - Concrete (Permanent)	CTP	*, G, *G			
Railroad Signal Standard	RRSS	F	Traffic Barrier - Concrete (Temp)	CBT	*, F, *F			
Railroad Spike	RRSP	F	Traffic Separator	TSP	*, G, *F			
Railroad Switch	RRSW	F	Traffic Signal Light Pole (Single)	TSLP	F			
Railroad Tracks	RR	*, G, *G	Trail	TRL	*, G, *G			
Reference Marker	RM	F	Transformer	TRNS	F			
Reinforced Concrete Pipe	RCP	*, G, *F	Transmission Line Tower Leg	HVTL	G			
Reinforcement Bar	RBAR	F	Trash Disposal	TD	F			
Retaining Wall	RW	*, G, *G	Traverse/Turn Point	TPT	** , F, *F			
Ridge Line	RIDG	*, G, *G	Tree	TR	G			
Ring and Bolt	RB	F	Tree Drip Lines	DRIP	*, G, *F			
Rip Rap (Top or Bottom)	RIP	*, G, *G	Tree Farm Outline	TFO	*, G, *F			
Road - Dirt	DR	*, G, *G	Tree Stump	STMP	F			
Road - Gravel	GRV	*, G, *G	Tree, larger than TR	TRE	G			
Road Center	CR	*, G, *G	Tree, larger than TRE	TREE	G			
Road Crown	CR	*, G, *G	Tree, larger than TREE	TREES	G			
Road Shoulder	SHD	*, G, *G	Type 1 Monument	CMKR	F			
Rock Wall	ROCK	*, G, *G	Type 2 Monument	MON	F			
Rock Wall Fence	RWFN	*, G, *G	Type 3 Monument	DM	F			
Rod with Cap Type 3	DM	F	Underground Electric (Power Line)	UE	*, G, *F			
Roof Tops (Goes to Zone 6)	ROOF	*, F, *F	Underground Gas Tank	UGT	*, G, *F			
ROW (Existing)	ROWE	*, G, *F	Underground Tank Gas	UGT	*, G, *F			
ROW (Proposed)	ROW	*, F, *F	Underground Telephone	UT	*, G, *F			
Ruins	RNS	*, F, *F	User-Defined Point or Line	UA	*, U, *U			
Safety End Treatment	SET	*, G, *F	User-Defined Point or Line	UB	*, U, *U			
Satellite Dish	SDSH	F	User-Defined Point or Line	UC	*, U, *U			
Seawall	SWL	*, G, *G	Valve (Generic)	VLV	F			
Section Corner	SECT	F	Valve Cover (Gas)	VCG	F			
Septic Tank/Cover	SEP	F	Valve Cover (Generic)	VC	F			
Septic Vent	VS	F	Valve Cover Water	VCW	F			
Service Pole Electric	SPLE	G	Valve Water	WV	F			
Service Pole Telephone	SPLT	G	Vent (Air)	VA	F			
Sewage Dump Station	SDS	*, G, *F	Vent (Generic)	VENT	F			
Shed	SHED	*, G, *G	Vent (Septic)	VS	F			
Shoulder (of Road)	SHD	*, G, *G	Vent Gas	VG	F			
Shrub	SHB	G	Vent Wastewater	VW	F			
Sidewalk	SW	*, G, *G	Vent (Air)	VA	F			
Sign and Pole (Single)	SGN	F	Vertical Panel Point (Flight Point)	VPT	F			
Sign Footing (Concrete)	FT	*, G, *G	Vertical Pipe Runner	PRV	*, G, *G			
Sign with Double Support	DSN	F	Wastewater Invert (Flowline) (Zone 3)	INV	F			
Signal Control Panel	SCP	F	Wastewater Line	WW	*, G, *F			
Signal Pedestal	SPED	F	Wastewater Manhole	MHW	G			
Signal/Span Wire Support/Mast Arm	SS	F	Wastewater Vent	WV	*, G, *F			
Signal/Span Wire Support/Mast Arm	SS	F	Water (Edge of)	EW	*, G, *F			
Silo	SIL	*, G, *G	Water Elevation	WE	*, G, *F			
Slab	SLB	*, G, *G	Water Line	WL	F			
Slope Bottom	SLPB	*, G, *G	Water Meter	WM	F			
Slope Top	SLPT	*, G, *G	Water Valve	WV	F			
Special Drain Feature	SDF	*, G, *F	Water Valve Cover	VCW	F			
Special End Wall	SEW	*, G, *F	Water Well/ Pump	WEL	F			
Spillway	SPL	*, G, *G	Web Wall (Goes to Zone 1)	WEB	*, G, *G			
Spot Elevation	SE	G	Windmill	WML	F			
Sprinkler Head	SPK	F	Wing Panel Point (Vertical Control)	WING	F			
State Border	STB	*, F, *F	Wing Wall	WNG	*, G, *G			
Steps	STP	*, G, *G	Wire Fence	WFN	*, G, *F			
			Witness Corner	WIT	F			

* Indicates a LINEAR pattern
 ** Indicates a LINEAR pattern
 F Indicates Feature
 G Indicates

APPENDIX 3-C



CP 900
 N: 13724252.6120
 E: 2139523.8200
 ELEV.: 728.29



CP 901
 N: 13724940.5240
 E: 2139057.0360
 ELEV.: 747.83

1. HORIZONTAL DATUM
 * BEARINGS ARE BASED ON NAD83(CORS), TEXAS STATE PLANE COORDINATES SYSTEM, SOUTH CENTRAL ZONE (4204). COORDINATES AND DISTANCES ARE IN U.S. SURVEY FEET. DISPLAYED COORDINATE VALUES ARE SURFACE VALUES DERIVED BY MULTIPLYING GRID COORDINATES BY 1.00017 (SAF: 1.00017).

* THE HORIZONTAL CONTROL COORDINATE VALUES WERE OBTAINED BY GPS OBSERVATIONS TO THE FOLLOWING CONTINUOUSLY OPERATING REFERENCE STATIONS (CORS):

CORS ID: TXAN
 DESCRIPTION: SAN ANTONIO RRP CORS ARP
 PID: DF4371
 COUNTY: BEXAR

CORS ID: TXBO
 DESCRIPTION: BOERNE CORS ARP
 PID: DJ7862
 COUNTY: KENDALL

CORS ID: TXSE
 DESCRIPTION: SEGUIN CORS ARP
 PID: DJ7872
 COUNTY: GUADALUPE

2. VERTICAL DATUM
 BASED ON NAVD83. DERIVED FROM GPS OBSERVATIONS TO:

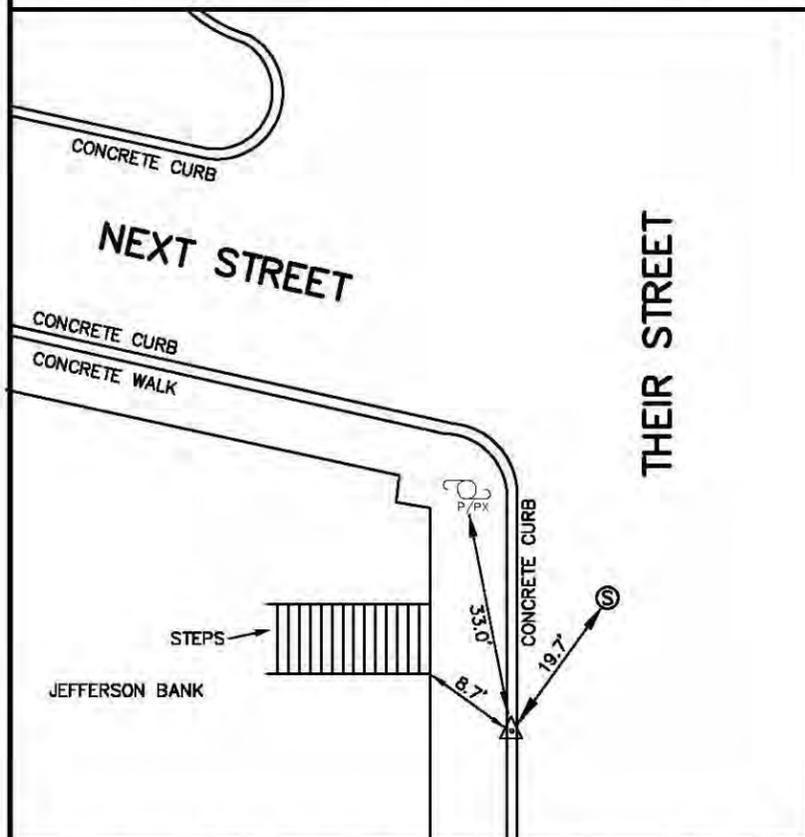
CORS ID: TXAN
 DESCRIPTION: SAN ANTONIO RRP CORS ARP
 PID: DF4371
 COUNTY: BEXAR

CORS ID: TXBO
 DESCRIPTION: BOERNE CORS ARP
 PID: DJ7862
 COUNTY: KENDALL

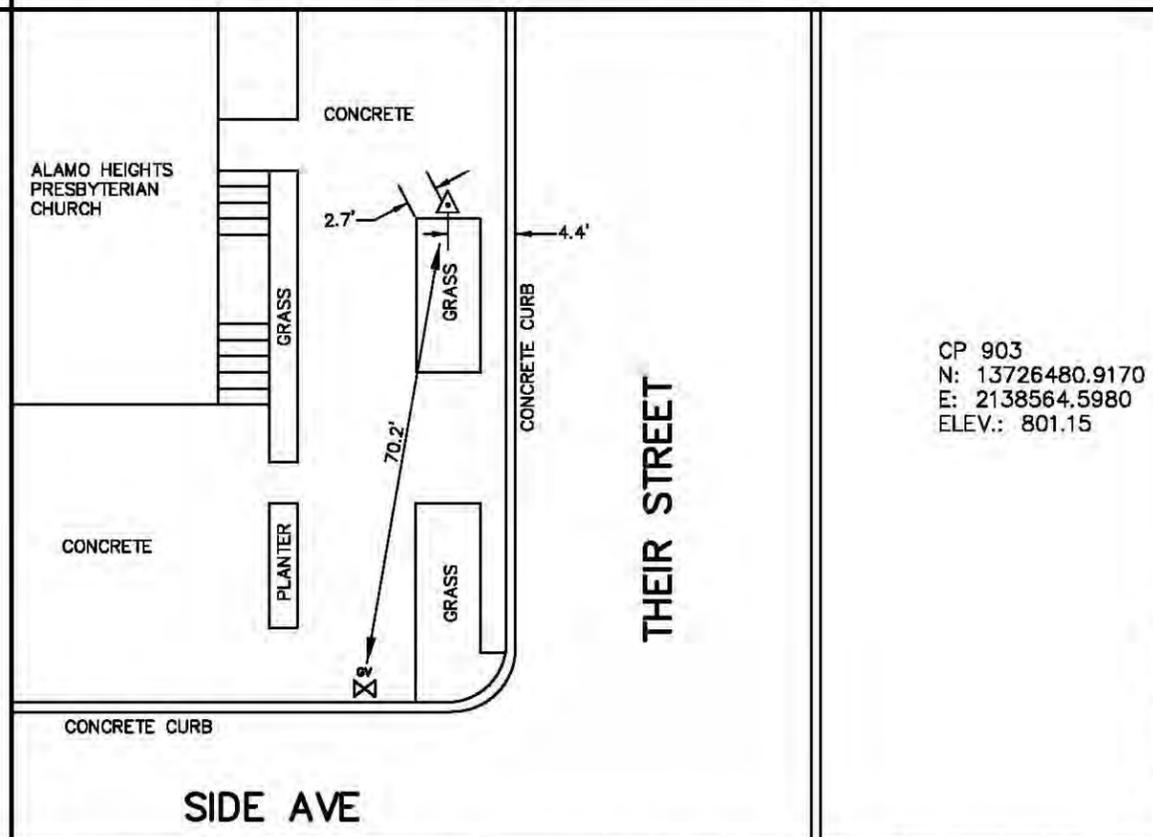
CORS ID: TXSE
 DESCRIPTION: SEGUIN CORS ARP
 PID: DJ7872
 COUNTY: GUADALUPE

SET MAG NAIL WITH "JDS" WASHER AT THE NORTHWEST INTERSECTION OF WAY STREET AND THEIR STREET

SET MAG NAIL WITH "JDS" WASHER AT THE INTERSECTION OF ANGLE LNG AND THEIR STREET



CP 902
 N: 13725812.4150
 E: 2138701.4000
 ELEV.: 779.76



CP 903
 N: 13726480.9170
 E: 2138564.5980
 ELEV.: 801.15



NOT TO SCALE

No.	Revision	Drawn	Approved	Date

CITY OF SAN ANTONIO
 DEPARTMENT OF PUBLIC WORKS



CONSULTANT
 CONSULTANT ADDRESS
 CITY, STATE ZIP CODE
 PHONE NUMBER

PROJECT TITLE
 THEIR STREET
 RIGHT-OF-WAY

SET MAG NAIL WITH "JDS" WASHER ON TOP OF CURB AT THE SOUTHWEST INTERSECTION OF NEXT STREET AND THEIR STREET

SET MAG NAIL WITH "JDS" WASHER ON CONCRETE WALK AT THE NORTHWEST INTERSECTION OF SIDE AVE AND THEIR STREET

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Appendix 5-A ~ Utility Points of Contact

Points of contact for primary utility companies in San Antonio can be found in the Table presented below. This list is not all inclusive. There may be other utility companies that need to be contacted.

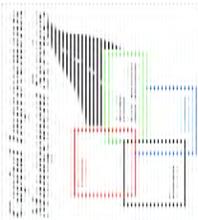
Table 1
Utility Coordinators

1	SAN ANTONIO WATER SYSTEMS	GOVERNMENTAL RELOCATION	(210) 233-3466 (210) 233-3705
2	CPS ENERGY (CITY OF SAN ANTONIO PROJECTS)	JOHN OFFER	(210) 353-2012
3	CPS ENERGY (PROJECTS OTHER THAN CITY OF SAN ANTONIO PROJECTS)	RICHARD RODRIGUEZ	(210) 353-2226
4	ATT	SANTIAGO PRINCE, LONG DISTANCE THOMAS HARPER, LOCAL	(210) 471-0022 (210) 283-1990
5	TIME-WARNER	STEPHON ROBERTSON	(210) 352-4306
6	MCI/VERIZON	JERRY REEVES	(214) 674-0555
7	GREY FOREST GAS	VANESSA LOPEZ	(210) 695-5992
8	BEXAR METROPOLITAN WATER DISTRICT	LEONARD MARTIN	(210) 354-6537
9	GRANDE COMMUNICATION	GABRIEL MORALES	(210) 389-6011
10	VIA	ERNEST SWEET	(210) 362-4816
11	TXDOT	CURTIS RABENALDT, SIGNALS BRAD ADAMI, TRANSGUIDE	(210) 207-7765 (210) 731-5109
12	COSA TRAFFIC	ADRIAN OLGUIN	(210) 207-7769

Appendix 5-B ~ Utility Conflict Matrix

UTILITY CONFLICT MATRIX

Project Name:
Limits:
Project No:
Design Consultant:
Submittal: %
Date:



UTILITY	OWNER	LOCATION	STATION	CONFLICT DESCRIPTION	ACTION REQ'D	RESPONSE
WATER (PROPOSED)						
16" WATER	SAWS	Flores St	12+067	crosses exist UG Telephone	verify vertical clearance	AT&T will abandon UG line
6" WATER		Flores St	12+161	crosses storm drain lateral	verify vertical clearance	will adjust water
STORM DRAIN (PROPOSED)	COSA	Main Rd	12+230	crosses exist UG Telephone	verify vertical clearance	AT&T will abandon UG line
48" RCP		Commerces St	11+708	crosses exist 4" gas	coordinate w/CPS	information sent to CPS
POWER (EXISTING)						
UNDERGROUND ELECTRIC	CPS Energy	Main Rd	12+336 to 12+370	duct/cable in pavement approx 0.50 ft below subgrade	vertical adjustment req'd	information sent to CPS and coordinating design
OVERHEAD ELECTRIC		Main Rd	11+753	power pole in prop roadway	relocate power pole	power pole will be adjusted and it is included in CPS design sketch
UG TELEPHONE	AT&T	Main Rd	12+036	power pole in prop sidewalk	verify clearance/ADA	power pole will be adjusted and it is included in CPS design sketch
BURIED CABLE (EXISTING)						
		Commerces St	11+663 to 11+818	buried line in pavement approx 0.50 ft below subgrade (based on asmt'd depth=2.0 ft from exist grade)	verify vertical clearance / adjust	Buried cable to be adjusted by AT&T to resolve conflicts
		Commerces St	12+041	manhole in pavement	adjust top MH	AT&T will adjust MH frame & cover during construction (information included in the plans)
		Commerces St	12+060 to 12+260	buried line in pavement approx 0.50 ft below subgrade (based on asmt'd depth=2.0 ft from exist grade)	verify vertical clearance / adjust	Buried cable to be adjusted by AT&T to resolve conflicts
DUCT BANK (EXISTING)						
		Commerces St	11+820 to 11+885	under sidewalk	verify vertical/horizontal location	AT&T will pothole to verify conflict

Appendix 5-C ~ CPS “Things to Consider...”



Things to consider when designing or constructing a project around CPS Energy Utilities:

- Consider overhead line clearances and locations where large equipment may be used.
- Consider location of existing overhead lines for construction and design purposes. Sleeving of overhead primary lines will be a cost to the contractor. The shielding/sleeving of lines is for reference, not for protection from electrical shock.
- De-energizing of primary lines or transmission lines for construction purposes will be a cost to the contractor. De-energizing may not be possible in all instances.
- Consider possible need for temporary relocation of poles during construction. Associated costs will be the responsibility of the party making the request.
- Consider locations of both existing guy wires and proposed new guy wires. These could cause unforeseen construction interference. Any temporary bracing needed will be a cost to the contractor.
- Width, depth, and location of trenching or excavation must be considered around utility poles. This could necessitate bracing/shoring during construction at a cost to the contractor.
- Contractors are responsible for requesting a gas leak survey. Allow 10 working days to survey and 10 working days to adjust gas valves. All requests need to be coordinated through the agency inspectors.
- Gas subcontractors are responsible for adjusting gas valves that are within the project area. Agency Inspectors must notify their Utility Coordinators to request adjustments needed for valves that are inside the project area but not part of the joint bid.
- The Right-of-Way width must be considered for placement of relocated utilities.
- Include utility inspections and time needed where necessary in schedules.
- Call for locates before excavating.

The list provided above is not intended to be exclusive nor comprehensive but is provided for reference only. The information and data on this list is provided “as is” and without any warranties of any type, express or implied by CPS and CPS Energy does not warrant, represent or guarantee that the information or data provided on this list is correct, accurate or fit for any particular purposes. Recipient understands that its use of this document is at its sole risk.

Appendix 7-A ~ Preliminary Design Conference

Suggested Agenda

Prior to the Preliminary Design Conference, the City and Consultant Project Managers should meet or discuss the project to review existing conditions. Additional correspondence should be made with the Program Manager, traffic operations, construction and maintenance personnel and/or local citizens groups to gather as much pertinent data as possible to adequately address the important issues regarding the project. This agenda generally follows the Design Summary Report (DSR) format.

Project Data

- Scheduling
- Funding (street, drainage, and utilities)
- Necessary agreements
- Delivery process

Background

- Existing elements
- Roadway
- Drainage
- ROW
- Environmental issues
- Coordination: RR, airports, utilities, TxDOT, FHWA, SARA, USACOE, emergency services

Survey

- Available data
- Control requirements
- ROW/property issues

Geotechnical Needs

Permitting Issues

Community Relations

Design Issues

- Roadway/Pedestrian/Bicycle
- Traffic
- Drainage
- Construction/TCP/Phasing constraints
- Enhancements/Landscaping

Joint Bid Utility Plans

- Identify utility owners

- Agreements

Miscellaneous

- Access driveways
- Maintenance issues
-

Organization/Project Management

- Points of contact (City, Utilities and Consultant(s))
- Key staff roles and responsibilities
- Design schedule
- Portal Issues
- Agreements between conference attendees

Assignment for preparation and distribution of meeting minute

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Appendix 7-B ~ City of San Antonio CIMS - Preliminary Engineering Report Checklist

The following is a list of recommended requirements for a PER Submittal. The Design Consultant must provide as much information as possible to assist City staff in the review and to simplify approval for the following submittal. The Consultant must coordinate closely with City Project Manager to meet project's needs

PROJECT NAME: _____

SUBMITTED TO: _____ (CITY PM)

SUBMITTED BY: _____ (CONSULTANT PM)

REVIEWED BY: _____

Follow TxDOT criteria for Local Area Management (LAM) Projects

Preliminary Engineering Report

Base Mapping

- Initial Survey Control
- Topographic Map
- Right-of-Way Map

Comments: _____

Traffic Engineering Study

Existing Conditions

- | | | |
|---|--|--|
| <input type="checkbox"/> Existing Roadway Geometry and typical cross sections | <input type="checkbox"/> Existing Condition Capacity and Level of Service Analysis | <input type="checkbox"/> Existing Alternative Transportation Modes |
| <input type="checkbox"/> Existing Auxiliary Lanes | <input type="checkbox"/> Traffic Control Devices Inventory | <input type="checkbox"/> Existing Intersection and Roadway Lighting |
| <input type="checkbox"/> Turning Movement Traffic Counts for Critical Intersections | <input type="checkbox"/> Speed Limit Data | <input type="checkbox"/> Existing Intelligent Transportation Systems |
| <input type="checkbox"/> Hourly Approach Traffic Volume | <input type="checkbox"/> K and D factors | |
| <input type="checkbox"/> Directional Average Daily Traffic | <input type="checkbox"/> Peak Hour Factor by Approach and Speed | |
| <input type="checkbox"/> Collision Data | <input type="checkbox"/> Heavy Vehicle Percentage | |

Proposed Conditions

- | | | |
|---|--|--|
| <input type="checkbox"/> Typical Section | <input type="checkbox"/> Proposed peak hour volumes for all roadways | <input type="checkbox"/> Identification of Design Vehicle(s) |
| <input type="checkbox"/> Typical Section Alternatives | <input type="checkbox"/> Design year traffic volumes | <input type="checkbox"/> Projected level of service |

- | | | |
|--|--|---|
| <input type="checkbox"/> Potential Traffic Signal Improvements | <input type="checkbox"/> Access Management Requirements | <input type="checkbox"/> Signs |
| <input type="checkbox"/> Potential Intersection Improvements | <input type="checkbox"/> School Requirements | <input type="checkbox"/> Pavement Marking |
| <input type="checkbox"/> Bicycle/Pedestrian Facilities | <input type="checkbox"/> Railroad Coordination | |
| | <input type="checkbox"/> Potential Traffic Handling Issues During Construction | |

Comments: _____

Drainage Study

- | | | |
|--|---|---|
| <input type="checkbox"/> Existing Condition Drainage Area Map | <input type="checkbox"/> Floodplain Analysis (HECRAS Calculation and Summary) | <input type="checkbox"/> Outlet stabilization Plan |
| <input type="checkbox"/> Existing Condition Discharge Calculations | <input type="checkbox"/> Alternative Analysis | <input type="checkbox"/> Outfall Stabilization Plan |
| <input type="checkbox"/> Storm Sewer Layout | <input type="checkbox"/> Culvert Layout(s) | |
| <input type="checkbox"/> Storm Sewer Layout Alternatives | <input type="checkbox"/> Erosion and Stabilization BMPs | |

Comments: _____

Utility Coordination

- | | | |
|--|--|--|
| <input type="checkbox"/> Identify Apparent Utilities in Project Corridor | <input type="checkbox"/> Show Existing Utilities on Project Base-map | <input type="checkbox"/> Coordinate Utility Adjustment Design with Utility Companies |
| <input type="checkbox"/> Determine Utility Renewal and Replacement Requirements | <input type="checkbox"/> Identify Potential Utility Conflicts and Notify Utility Companies | <input type="checkbox"/> Develop Record of All Communications |
| <input type="checkbox"/> Present Minutes from Initial Utility Coordination Meeting | <input type="checkbox"/> Identify Follow-on Utility Location Requirements with Utility Companies | |

Comments: _____

Roadway Design

- Proposed Roadway Alignment Alternative Layouts
- Proposed Construction Phasing Alternatives
- Potential Design Enhancement Alternatives

Comments: _____

Preliminary Geotechnical Study

- | | | |
|--|--|---|
| <input type="checkbox"/> Proposed Pavement Design | <input type="checkbox"/> Hydrologic Inferences | <input type="checkbox"/> Preliminary Stabilization Requirements |
| <input type="checkbox"/> Pavement Section Alternatives | <input type="checkbox"/> Terrain and Cut/Fill Estimation | <input type="checkbox"/> Subsurface Exploration Guidance |
| <input type="checkbox"/> Proposed Alignment(s) | <input type="checkbox"/> Geologic Model | <input type="checkbox"/> Non-Destructive Testing Plan |
| <input type="checkbox"/> Project Type | <input type="checkbox"/> Soil Identification from Published Data | |
| <input type="checkbox"/> Feasibility Evaluation | <input type="checkbox"/> Soil Characteristics Estimation | |
| <input type="checkbox"/> Position of Natural Drainage Features | <input type="checkbox"/> Soil Properties Estimation | |

Comments: _____

Permitting

- Permitting Agency Jurisdictional Assessment
- Design Alternatives

Comments: _____

Public Involvement

- Initial Needs Assessment
- Public Involvement Plan

Comments: _____

Other

- Class 4 Cost Estimate
- Project Schedule

Comments: _____

Submittal to City

- Preliminary Engineering Report
- Design Summary Report
- Signed QA/QC Certification Form
- CD with PDF's of All Deliverables (Upload to Web Portal)
- Schedule PER Review Meeting

Appendix 7-C ~ City of San Antonio CIMS 40 % Design Checklist

The following are minimum requirements for a 40% Submittal. The Design Consultant must provide as much information as possible to assist City staff in the review and to simplify approval for the following submittal. A submittal will be classified as incomplete if any of the items identified below are missing.

PROJECT NAME: _____

SUBMITTED TO: _____ (CITY PM)

SUBMITTED BY: _____ (CONSULTANT PM)

REVIEWED BY: _____

Follow TxDOT criteria for Local Area Management (LAM) Projects

Front-End Plan Sheets

- City Title Block
- Index of Sheets
- Project Layout/Control Points
- General Notes
- Summary of Estimated Quantities

Comments: _____

Existing Typical Section

- ROW
- Lane Widths
- Medians
- Curbs
- Sidewalks
- Bike Lanes

Proposed Typical Section

- ROW
- Lane Widths
- Lane Direction
- Shoulders
- Curb
- Baseline/Centerline
- Pavement Design
- Bike Lanes
- Medians

Comments: _____

Sequence of Work Outline for Traffic Control

- Preliminary Construction Phasing Plan
(This should show the basic concept of how to handle traffic during construction, including preliminary phasing and sequence of work narrative. Construction shall include City and all joint bid utility improvements)

Comments: _____

Plan & Profile Sheets

Plan View

- | | |
|---|---|
| <input type="checkbox"/> Min Design Values met | <input type="checkbox"/> Prop. Lane Dimensions |
| <input type="checkbox"/> Existing & Prop ROW Lines | <input type="checkbox"/> Flow Direction Arrow |
| <input type="checkbox"/> Existing Utilities | <input type="checkbox"/> Cross-Slopes PC/PT Sta. |
| <input type="checkbox"/> Existing Edge of Pavement | <input type="checkbox"/> P.I. Curve Data |
| <input type="checkbox"/> Existing Sidewalks, Curb, Driveways, Medians | <input type="checkbox"/> Cross Drainage Structures |
| <input type="checkbox"/> Existing Drainage Structures | <input type="checkbox"/> Legal Description/Property Owner Information/Addresses |
| <input type="checkbox"/> Prop. Roadway Alignments | |
| <input type="checkbox"/> Prop. Curb, Sidewalks & Drvwy | |

Profile View

- | | | |
|--|---|--|
| <input type="checkbox"/> Min Design K Values met | <input type="checkbox"/> LT and RT ROW | <input type="checkbox"/> Cross Drainage Structures |
| <input type="checkbox"/> Proposed Vertical Alignment (LT & RT top of curb) | <input type="checkbox"/> Vertical Clearances (where required) | |
| <input type="checkbox"/> Natural Ground | <input type="checkbox"/> Grades | |
| | <input type="checkbox"/> VPI Curve Data | |

Comments: _____

Drainage

- Drainage Area Map
- Drainage Calcs (Hard Copy, executable digital copy and PDF)
- Storm Drain System Plan and Profiles
- Plan and Report Submittal Requirements – As per *Section 4 - Drainage*

Comments: _____

Traffic Engineering

- Intersection Layout
- Bicycle and Pedestrian Facilities Layout
- School Zone Layout
- Complete Streets Assessment and Field Analysis Checklist (Complete prior to 40% submittal)

Comments: _____

Environmental

- Confirm Phase I Environmental Site Assessment has been completed
- Survey Ordinary High Water Mark (OHWM) and show on plans. Coordinate with EMD.
- After 40% submittal, coordinate staking of storm sewer outfall with EMD.

Comments: _____

Other

- Street Cross Sections
- Channel Cross Sections
- Base Map of Existing Utilities w/Quality Level identification

Submittal to City

- | | |
|--|--|
| <input type="checkbox"/> 40% Constr Plans (5 bound sets) | <input type="checkbox"/> Signed QA/QC Certification Form |
| <input type="checkbox"/> Utility Coordination Report | <input type="checkbox"/> CD with *PDF's and **DGN's of all deliverables (Upload to Web Portal) |
| <input type="checkbox"/> Cost Estimates | <input type="checkbox"/> Complete Streets Public Meeting (If Req'd) |
| <input type="checkbox"/> Project Schedule | <input type="checkbox"/> Coordinate Public Meeting (If Req'd) |
| <input type="checkbox"/> Geotechnical Engineering & Pavement Design Report | <input type="checkbox"/> Coordinate 40% Review Meeting |
| <input type="checkbox"/> Written Response to All Comments | |
| <input type="checkbox"/> Insert Joint Bid Utility Plan Sheets | |

General Comments: _____

*PDF files for the construction plans must be split into the following categories as shown in the index of sheets:

1. General
2. Traffic Control Plan
3. Roadway Plans
4. Drainage Plans
5. SWPP & Environmental Plan
6. Landscaping Plan
7. Traffic Items
8. SAWS Water and Sewer Plans
9. CPS Gas Plans

**DGN file must be a complete base drawing to include topography and all proposed improvements (roadway, drainage, water, etc...) Do not break down into sheets. AutoCADD files will not be accepted.

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Appendix 7-D ~ City of San Antonio CIMS 70 % Design Checklist

The following are minimum requirements for a 70% Submittal. The Design Consultant must provide as much information as possible to assist City staff in the review and to simplify approval for the following submittal. A submittal will be classified as incomplete if any of the items identified below are missing.

PROJECT NAME: _____

SUBMITTED TO: _____ (CITY PM)

SUBMITTED BY: _____ (CONSULTANT PM)

REVIEWED BY: _____

Follow TxDOT criteria for Local Area Management (LAM) Projects

Front-End Plan Sheets

- | | |
|--|---|
| <input type="checkbox"/> City Title Block | <input type="checkbox"/> Update Summary of Estimated Quantities |
| <input type="checkbox"/> Index of Sheets | <input type="checkbox"/> Driveway Summary Sheet |
| <input type="checkbox"/> Project Layout/Control Points | <input type="checkbox"/> Existing Typical Sections |
| <input type="checkbox"/> General Notes | <input type="checkbox"/> Prop Typical Sections |

Comments: _____

Sequence of Work Outline for Traffic Control

- Traffic Control Plan (TCP should show a comprehensive method of how traffic is being handled during the duration of the project. These sheets should contain typical construction sections, work zone pavement marking, channelization devices, signing appropriate for the various phases, detour routes, temporary signals, dynamic message signs, etc.)
- Update Construction Phasing and Sequence of Work Narrative

Comments: _____

Plan & Profile Sheets

Plan View

- | | | |
|---|---|---|
| <input type="checkbox"/> Min Design Values met | <input type="checkbox"/> Existing Drainage Structures | <input type="checkbox"/> Proposed Storm Drain (gray scale) |
| <input type="checkbox"/> Existing & Prop ROW | <input type="checkbox"/> Prop. Roadway Alignments | <input type="checkbox"/> Cross-Slopes PC/PT |
| <input type="checkbox"/> Existing Utilities | <input type="checkbox"/> Prop. Curb, SW, Drvwy | <input type="checkbox"/> P.I. Curve Data |
| <input type="checkbox"/> Existing Edge of Pavement | <input type="checkbox"/> Prop. Drvy Penetrations | <input type="checkbox"/> Cross Drainage Structures |
| <input type="checkbox"/> Existing Sidewalks, Curb, Driveways, Medians | <input type="checkbox"/> Prop. Lane Dimensions | <input type="checkbox"/> Legal Descrp/ Property Owner Info /Addresses |
| | <input type="checkbox"/> Flow Direction Arrow | |

Profile View

- | | | |
|--|---|--|
| <input type="checkbox"/> Min Design K Values met | <input type="checkbox"/> LT and RT ROW | <input type="checkbox"/> Cross Drainage Structures |
| <input type="checkbox"/> Proposed Vertical Alignment (LT & RT top of curb) | <input type="checkbox"/> Vertical Clearances (where required) | <input type="checkbox"/> Retaining Wall Plans |
| <input type="checkbox"/> Natural Ground | <input type="checkbox"/> Grades | |
| | <input type="checkbox"/> VPI Curve Data | |

Comments: _____

Drainage

- | | |
|---|---|
| <input type="checkbox"/> Updated Drainage Calculations | |
| <input type="checkbox"/> Drainage Area Map | |
| <input type="checkbox"/> Storm Drain System Plan and Profiles | |
| <input type="checkbox"/> Storm Sewer & Channel Hydraulic Calculations (EGL/HGL) | <input type="checkbox"/> Plan Submittal Requirements As per <i>Section 4 - Drainage</i> |
| <input type="checkbox"/> Storm Water Pollution Prevention Plan and narrative | |
| <input type="checkbox"/> Inlet Cross Sections | |
| <input type="checkbox"/> Floodplain Permit | |

Comments: _____

Traffic Engineering

- Intersection Layouts
- Traffic Signal Layouts, Equipment and Elevations
- Sign Layouts
- Pavement Marking Layouts

Comments: _____

Standard Details(As Req'd)

- | | |
|---|---|
| <input type="checkbox"/> CoSA Standard Details by Reference Only (www.sanantonio.gov/CIMS) | <input type="checkbox"/> TxDOT Standard Details |
| <input type="checkbox"/> Special Details | <input type="checkbox"/> Other |

Comments: _____

Environmental

- Confirm Phase II Environmental Site Assessment has been completed
- Check permitting status
- Incorporate environmental information provided by EMD

Comments: _____

Other

- Street Cross Sections
- Channel Cross Sections
- Base Map of Existing Utilities w/ updated Quality Level identification
- Art Enhancement
- Tree Survey & Preservation Plan

Comments: _____

Submittal to City

- 70% Construction Plans (5 bound sets)
- Utility Coordination Report
- Updated Cost Estimates
- Project Schedule
- Written Response to All Comments
- List of Governing Specifications, Special Provisions, and Special Specifications.
- Insert Joint Bid Utility Plan Sheets
- Signed QA/QC Certification Form
- CD with *PDF's and *DGN's of all deliverables (Upload to Web Portal)
- Schedule Test Shutdown of Water System with SAWS Rep
- Coordinate 70% Review Meeting

* See comments on 40% Checklist

General Comments: _____

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Appendix 7-E ~ City of San Antonio CIMS 95 % Design Checklist

The following are minimum requirements for a 95% Submittal. The Design Consultant must provide as much information as possible to assist City staff in the review and to simplify approval for the following submittal. A submittal will be classified as incomplete if any of the items identified below are missing.

PROJECT NAME: _____

SUBMITTED TO: _____ (CITY PM)

SUBMITTED BY: _____ (CONSULTANT PM)

REVIEWED BY: _____

Follow TxDOT criteria for Local Area Management (LAM) Projects

Front-End Plan Sheets

- | | |
|--|---|
| <input type="checkbox"/> City Title Block | <input type="checkbox"/> General Notes |
| <input type="checkbox"/> Index of Sheets | <input type="checkbox"/> Final Summary of
Estimated Quantities |
| <input type="checkbox"/> Project Layout/Control | <input type="checkbox"/> Driveway Summary Sheet |
| <input type="checkbox"/> Existing Typical Sections | |
| <input type="checkbox"/> Final Typical Sections | |

Comments: _____

Sequence of Work Outline for Traffic Control

- Final Traffic Control Plan (TCP should show a comprehensive method of how traffic is being handled during the duration of the project. These sheets should contain typical construction sections, work zone pavement marking, channelization devices, signing appropriate for the various phases, detour routes, temporary signals, dynamic message signs, etc.)
- Final Construction Phasing and Sequence of Work Narrative

Comments: _____

Plan & Profile Sheets

Plan and Profile View

- Final Street Design
- Minimum Design Values met

Comments: _____

Drainage

- Final Drainage Calculations and DA Map
- Final Storm Drain System P & P's
- Final Storm Sewer & Channel Hydraulic Calculations (EGL/HGL)
- Final Storm Water Pollution Prevention Plan
- Plan Submittal Requirements As per *Section 4 - Drainage*

Comments: _____

Traffic Operations

- Final Intersection Layouts
- Final Traffic Signal and Equipment Layout
- Final Sign Layout
- Final Pavement Marking Layouts

Comments: _____

Standard Details (As Req'd)

- CoSA Standard Details by Reference Only (www.sanantonio.gov/CIMS)
- Special Details
- TxDOT Standard Details
- Other

Comments: _____

Environmental

- Finalize all Environmental Coordination
- Check permitting status
- Incorporate EPIC Sheet provided by EMD

Comments: _____

Other

- Final Street Cross Sections
- Final Channel Cross Sections
- Final Base Map of Existing Utilities w/ Final Quality Level identification
- Final Art Enhancement Design and Details
- Final Tree Survey and Preservation Plan
- Driveway Plats

Submittal to City

- 95% Construction Plans (5 bound sets)
- Final Design Summary Report
- Final Utility Coordination Report
- Final Cost Estimate
- Final Project and Construction Schedule
- Written Response to All Comments
- Final List of Governing Specs, Special Provisions, and Specifications
- Insert Joint Bid Utility Plans and Specifications
- Signed QA/QC Certification Form
- CD with *PDF's and *DGN's of all Deliverables (Upload to Web Portal)
- Schedule Site Visit with SAWS and All Utilities Prior to Bid Phase
- TDLR
- Coordinate Public Meeting (If Req'd)
- Coordinate 95% Review Meeting

* See comments on 40% Checklist

General Comments:

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Appendix 7-F ~ City of San Antonio CIMS

Bid Phase Checklist

The following are minimum requirements for the Bid Phase Submittal. The Design Consultant must provide as much information as possible to assist City staff in the review and to simplify approval for the following submittal. A submittal will be classified as incomplete if any of the items identified below are missing.

PROJECT NAME: _____

SUBMITTED TO: _____ (CITY PM)

SUBMITTED BY: _____ (CONSULTANT PM)

REVIEWED BY: _____

Follow TxDOT criteria for Local Area Management (LAM) Projects

Construction Specifications

Assist CoSA PM in preparing Advertising documents

- Submit 100% Specifications (1 bound set and PDF)
 - Form 010 – Invitation for Bid (Bid Opening and Pre-Bid dates to be set after 100% mtg)
 - Form 020 – Bid Form
 - Form 025 – Unit Pricing Form
 - Joint Bid Utility Special Provisions
 - Technical Specifications
 - o Governing Specifications
 - o Special Provisions
 - o Special Specifications
 - o Latest Project Sign
 - o Joint Bid Utility Specifications
 - o Environmental Management Specifications/Plan

Construction Plans

- Submit 100% Plans including Joint-Bid Utilities (3 bound sets and PDF)

100% Review Meeting

- Coordinate 100% Meeting to discuss the following:
 - o Finalize Constructability Issues (It is expected that the Design Consultant has been addressing all constructability issues during the early design stages)
 - o Review Utility Conflict Matrix and address pending items
 - o Finalize Review Comment and Resolution form to ensure all comments have come to a resolution
 - o Make the Construction Inspector and Inspections Supervisor aware of any special conditions and/or revisions to our standard details and specifications

- If required, coordinate and attend on-site meeting with all utilities and pertinent parties.

Advertisement and Bid Opening

ONLY After CoSA PM approval

- Distribute Plans and Specifications to Contractors
- Distribute Plans and Specifications to Plan Rooms
- Maintain updated list of Planholder's List
- Answer Contractor questions
- Prepare and distribute addenda if required
- Attend Pre-Bid Meeting, Prepare and Distribute Meeting Minutes
- Prepare Bid Tabulation and Letter of Recommendation
- Load 100% plans, specs, and addenda to web portal

Appendix 8-A ~ Permitting Contacts

Presented below in Tables 1, 2, and 3 are lists of agency contacts for the permits discussed in this section. This list will be updated from time to time as required.

Table 1
Federal Permit Contacts

Agency	Contact Name	Title	Department	Address	City, State & Zip Code	Primary Phone	E-mail
National Park Service	James Oliver	Acting Chief	Professional Services Div., San Antonio Missions, National Historical Parks	2202 Roosevelt Ave	San Antonio, TX 78210	(210) 534-8833	james_oliver@nps.gov
U. S. Army Corps of Engineers	Fred Land	Project Manager	Regulatory Branch	P.O. Box 17300	Fort Worth, TX 76102	(817) 886-1729	Fred.J.Land@usace.army.mil
U. S. Department of Defense,							
U. S. Fish and Wildlife Service	Tanya Sommer					512-490-0057	

Table 2
State and Local Permit Contacts

Agency	Contact Name	Title	Department	Address	City, State & Zip Code	Primary Phone	E-mail
Edwards Underground Water District							
San Antonio River Authority	Claude Harding, SR/WA	Real Estate Administrator	Real Estate	P.O. Box 839980	San Antonio, TX 78283-9980	(210) 227-1373	charding@sara-tx.org
San Antonio Water System	Phil Handley	Environmental Svcs. Supervisor	Storm water Department	1001 E. Market	San Antonio, TX 78205	(210) 704-7467	phandley@saws.org
Texas Commission on Environmental Quality	Joseph Strouse, P.E.	Team Leader	Rate Analysis & Plan Review Team	P.O. Box 13087	Austin, TX 78711-3087	(512) 239-6953	jstrouse@tnrcc.state.tx.us
Texas Commission on Environmental Quality	L'Oreal Stepney	Section Manager	Water Resources Division, WW Permitting Section	P.O. Box 13087	Austin, TX 78711-3087	(512) 239-1321	lstepney@tnrcc.state.tx.us
Texas Commission on Environmental Quality	Mark Fisher	401 Certification Coordinator	Water Quality Standards	P.O. Box 13087	Austin, TX 78711-3087	(512) 239-4586	mfisher@tnrcc.state.tx.us
Texas Department of Health							
Texas Department of License and Regulation			Architectural Barriers	P.O. Box 12157	Austin, TX 78711	(512) 463-6599	techinfo@license.state.tx.us
Texas Department of Transportation	Melani McBride	N/A	Utility/Access Permits	4615 NW Loop 410	San Antonio, TX 78229	(210) 615-6430	mmcbride@dot.state.tx.us
Texas Department of Transportation	Diane Guerrero	Permit Coordinator	Utility/Access Permits	4615 NW Loop 410	San Antonio, TX 78229	(210) 615-5865	dguerre@dot.state.tx.us
Texas Historical Commission	Mark Denton	Project Reviewer	Archeological Division	P.O. Box 12276	Austin, TX 78711-2276	(512) 463-5711	mark.denton@thc.state.tx.us

Agency	Contact Name	Title	Department	Address	City, State & Zip Code	Primary Phone	E-mail
Texas Parks & Wildlife	Robert Sweeney	Legal Counsel	N/A	4200 Smith School Rd.	Austin, TX 78744-3291	(512) 389-4433	robert.sweeney@tpwd.state.tx.us

Local Area Permitting Agencies

Agency	Contact Name	Title	Department	Address	City, State & Zip Code	Primary Phone	E-mail
Bexar County	Joe Aceves	Executive Director	Infrastructure Services	233 N. Pecos #420	San Antonio, TX 78207	(210) 335-6782	jaceves@bexar.org
City of San Antonio	Mark Bird	City Arborist	Development Services	1901 South Alamo	San Antonio, TX 78204	(210) 207-0278	Mark.Bird@sanantonio.gov
City of San Antonio		Asst. Drainage Engineer	Development Services	114 W. Commerce, 7th Floor	San Antonio, TX 78205	(210) 207-8048	
City of San Antonio	Shanon Peterson	Historic Preservation Officer	Planning and Community Development	1901 South Alamo	San Antonio, TX 78204	(210) 207-0015	shanon.peterson@sanantonio.gov
City of San Antonio	Kay Hinds	Archeologist	Planning and Community Development	1901 South Alamo	San Antonio, TX 78204	(210) 207-8316	kay.hinds@sanantonio.gov
City of San Antonio	James LeFlore	Public Art Manager	Capital Improvements Management Services	114 W. Commerce, Suite 804	San Antonio, TX 78205	(210) 207-4433	designenhancement@sanantonio.gov
City of San Antonio	Robert Perez	Utility Coordinator	Public Works	5103 Old Hwy. 90 W.	San Antonio, TX 78227	(210) 207-6949	Robert.perez@sanantonio.gov

**Table 3
Private Permits**

Agency	Contact Name	Title	Department	Address	City, State & Zip Code	Primary Phone	E-mail
Union Pacific Railroad	Alex Fischer	Mgr., Industry & Public Projects	Engineering Design	1711 Quintana Road	San Antonio, TX 78224	(210)240-4570	
Union Pacific Railroad	Mary Gross	Contract Representative	Contract Utility Group	1800 Farnam Street	Omaha, NE 68102	(402) 997-3623	maryc.gross@up.com

Appendix 10-A ~ City of San Antonio Pavement Design Standards

Introduction

Article 5 Section 35-506 Subsection (p) of the Unified Development Code (UDC) (dated January 1, 2006) titled “Pavement Standards” provides guidance on the design of pavements and also includes recommended curb and gutter as well as median and divider details. The pavement design standards included herein are to be used to supplement the pavement design standards found in the UDC and are based upon newer technologies and design methods currently being utilized in the industry.

Pavement Type

Allowable pavement structures for City maintained roadways include both flexible and rigid structures, as defined by the *American Association of State Highway and Transportation Officials (AASHTO)*. Perpetual pavements (see Figure 1), which are considered to be long-life structures using premium hot-mixed asphalt (HMA) mixtures which require periodic maintenance to renew the surface, are also acceptable pavement structures. Pavement type selection shall be based upon the project conditions, economics, and long-term performance or as directed by the City. If necessary, life-cycle

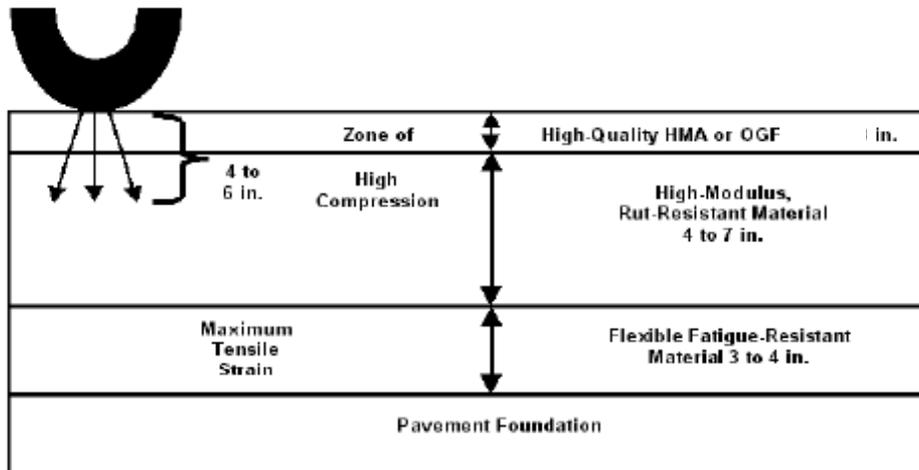


Figure A-1 Perpetual Pavement Design – Typical Cross Section.

cost analysis (LCCA) shall be conducted for pavement type selection.

Pavement Design Methodologies

The design of both flexible and rigid pavement structures shall be in accordance with the *AASHTO Guide for Design of Pavement Structures*, 1993 or latest approved edition. Flexible pavement design may also be conducted using the Texas Department of Transportation (TxDOT) program entitled *Flexible Pavement System 19 for Windows (FPS19w)*.

Perpetual pavement design may be conducted as described in the *TxDOT Pavement Design Manual* (October 2006 edition, Chapter 5 Section 5 or latest edition). Other

methodologies may be utilized, at the design engineer's discretion, if the method is applicable to local conditions and all engineering calculations are provided to the City.

A pavement design report shall be prepared and signed by, or under the supervision of, a professional engineer registered in the State of Texas.

Pavement Design Parameters

The following input variables are utilized when using the procedures detailed in the 1993 Edition of the *AASHTO Guide for Design of Pavement Structures*:

- Performance Period
- Subgrade Foundation Support
- Design Traffic, 18-kip ESALs
- Reliability, %
- Overall Standard Deviation
- Serviceability Indices

Performance Period

Flexible and rigid pavements shall be designed for a twenty-year and thirty-year service life, respectively.

Subgrade Foundation Support

A soil investigation must be performed for the design of pavement structures. The number of borings and locations shall be sufficient to accurately determine the stratum along the roadbed. Any existing soil information that is available either from the city or from private sources will be evaluated and, if determined to be applicable and valid, will be allowed in place of new soil tests. Refer to the City's *Design Guidance Manual* for further information.

Resilient Modulus

For flexible pavement design, the resilient modulus shall be determined directly, backcalculated from deflection data, or estimated based upon other soil strength or

$$M_r = k_1 \sigma_d^{k_2} \sigma_3^{k_3}$$

characteristic properties and correlated to the resilient modulus. The AASHTO T 307-99 (or latest version) entitled "Standard Method of Test for Determining the Resilient Modulus of Soils and Aggregate Materials" shall be used when the subgrade resilient modulus is measured directly in the laboratory. Specimens shall be compacted to 95% of the maximum density at the optimum moisture content. Results from the testing shall be utilized to determine the nonlinear relationship between the soil resilient modulus and the stress state of the soil using the following equation:

where: M_r = resilient modulus of the soil, psi
 k_1 , k_2 , and k_3 = regression coefficients
 σ_d = deviator stress, psi
 σ_3 = confining pressure, psi

The pavement designer should determine the design resilient modulus of the soil at the in-situ stress state using an iterative procedure. Seasonal variation of the design resilient modulus shall be considered by assuming the following:

- 4 months of the year the modulus will be as determined at the optimum moisture content.
- 3 months of the year the soil will be considered saturated and the modulus will be reduced 33%.
- 5 months of the year the soil will be considered dry and the modulus will be increased by 25%.

If correlations are used to determine the soil resilient modulus from other soil strength parameters (e.g. California Bearing Ratio, shear strength, etc.), the correlation shall be disclosed with appropriate backup information provided in the geotechnical report.

Modulus of Subgrade Reaction

For rigid pavement design, concrete slab support is characterized by the modulus of subgrade/subbase reaction, otherwise known as the k-value with units typically shown as psi/in. A subbase layer is typically recommended for higher traffic volume roadways or in areas where additional concrete slab support is warranted. Recommended subbase options include:

- four inches of asphaltic concrete pavement (ACP) or asphalt stabilized subbase or
- a one-inch asphalt concrete bond breaker over six inches of a cement stabilized subbase.

An effective k-value shall be used in the design of rigid pavements if a subbase is utilized. If a subbase is not used and the concrete slab will be placed directly on a fine-grained soil, it is recommended that the subgrade be treated with lime or cement to facilitate construction as well as to provide additional support to the pavement structure. It is also recommended that significant volume changes in the subgrade resulting from moisture variations or other causes be minimized through the use of select fill in the upper subgrade.

Subgrade Treatment

Roadbed soil having a plasticity index (PI) greater than twenty (20) shall be treated with lime. Application rate of lime shall be determined based on laboratory testing and shall be the lowest percentage of lime that provides:

- a pH of 12.4 or the highest pH achieved in accordance with TxDOT's standard test procedure TEX-121-E,
- a PI of less than 20 with TxDOT's standard test procedure TEX-106-E,
- an unconfined compressive strength of at least 50 psi with TxDOT's standard test procedure TEX-121-E, Part I, and
- a swell value of less than 1% when tested by ASTM D4546 *Standard Test Methods for One-Dimensional Swell or Settlement Potential of Cohesive Soils*.

In no case shall the lime be less than fifteen (15) pounds/yd² for six (6) inches of lime treated subgrade.

Portland cement may also be used for treatment of recycled base and/or subgrade soils. Research has shown that cement, with or without fly-ash, can effectively reduce the PI of clays with a PI in excess of 35 as well as provide significant strength gain. Cement treatment may also be considered when construction duration is limited and sulfate bearing soils (i.e. sulfate contents in excess of 3,000 parts per million, ppm) have been encountered. Recycled base materials treated with cement should be limited to a 7 day unconfined compressive strength of 300 psi. The pavement designer should consider the use of a Crack Attenuating Mixture (CAM) or Reflective Crack Relief Interlayer (RCRI) directly above cement treated mixtures if shrinkage cracking is a possibility. Utilize TxDOT's standard test procedure TEX-120-E to determine optimum cement content.

Treated subgrade will be included as a "structural layer" within the pavement design calculations.

Sulfate Bearing Soils

If lime treatment is considered as a method to improve pavement subgrade conditions, it is also recommended to perform additional laboratory testing to determine the concentration of soluble sulfates in the subgrade soils, in order to investigate the potential for adverse reaction to lime in certain sulfate-containing soils. The adverse reaction, referred to as sulfate-induced heave, has been known to cause cohesive subgrade soils to swell in short periods of time, resulting in pavement heaving and possible failure.

Techniques for determining the quantity of soluble sulfates, stabilization selection, and construction guidelines shall be followed according to TxDOT's "Guidelines for Modification and Stabilization of Soils and Base for Use in Pavement Structures," published by the *Construction Division; Materials & Pavements Section; Geotechnical, Soils & Aggregates Branch* dated September 2005 or latest edition.

Rock Subgrade

Where the roadbed is in a rock excavation a "structural layer" within the pavement design calculations can be used that is equivalent to a 6 inch structural layer for stabilized subgrade. If a roadbed structural layer is used in the pavement calculation for rock subgrade an engineering report will be provided to the City addressing the consistency of the subgrade prior to base placement. A rock subgrade is defined as in-tact, massive rock formations that must be excavated through blasting or with the use of a milling machine. A rock subgrade is typically not a rippable material, nor would it contain significant interspersed expansive clay materials.

To take the "rock credit" in the pavement design clay lenses exposed in rock formations, which will serve as the roadbed foundation, shall be removed and filled with a material that provides similar strength properties to the surrounding rock. In addition, exposed karst features shall also be filled with a material that provides similar strength to the surrounding rock. Unexposed, shallow karst features that are known to exist shall be filled, to the extent possible and to the satisfaction of the Engineer, with a material that provides similar strength to the surrounding rock subgrade⁶.

⁶ Fill materials shall comply with the rules and regulations of the Texas Commission on Environmental Quality (TCEQ).

Design Traffic Levels

Characterization of traffic load for input to the pavement design will be based upon the cumulative expected 18-Kip equivalent single axle loads (ESAL) for the pavement's service life. The city has predetermined 20 year flexible pavement ESAL values for the street classifications defined in Table 506-1: *Functional Classification System Description* found in Article 5 Section 35-506 of the UDC. The expected range of vehicles per day for the streets defined by the functional classification system are shown in Article 5 Section 35-502 Subsection (a) Part 9 of the UDC. The predetermined flexible pavement ESAL values are shown in Table 506-6 *Pavement Specifications* of the UDC and are reiterated below in Table A-1 *Minimum Acceptable ESAL Values for Pavement Design*.

The UDC does not address ESAL values for rigid pavement design. Therefore, the 30 year predetermined ESAL values shown below for rigid pavement shall be utilized.

Table A-1
Minimum Acceptable ESAL Values for Pavement Design.

Roadway Functional Classification	Flexible Pavement 18-kip ESALs	Rigid Pavement 18-kip ESALs
Primary and Secondary Arterials	3,000,000	4,500,000
Collector and Local Type B streets	2,000,000	3,000,000
Local Type A street with bus traffic	1,000,000	1,500,000
Local Type A street without bus traffic	100,000	150,000

In most cases, the ESAL values shown above will be appropriate for design. However, it is important for the designer to understand if other site specific circumstances are present that will cause the predetermined ESAL values to be inappropriate. A review of the Traffic Impact Analysis (TIA) by the pavement designer should be conducted to determine if a modification to the predetermined ESAL values is justified. The predetermined ESAL values will not be lowered in any circumstances unless specifically allowed by the City Engineer.⁷

In situations where the design number of ESALs needs to be determined by the pavement designer, the 1993 AASHTO method for conversion of traffic to ESALs shall be utilized. ESALs are determined by:

$$\text{ESAL} = (\text{ADT}) * (\text{ESAL Factor}) * \text{DD} * \text{LDF} * \% \text{ Trucks} * \text{TFGR} * \text{TVGR} * 365 \text{days} * \text{design years}$$

Using the following parameters:

- **ADT:** Two-Way Daily Traffic in terms of the number of vehicles per day;

⁷ Predetermined ESAL values for primary and secondary arterials, collectors, and local type B streets include bus traffic. The pavement designer shall also consider the use of appropriate paving materials and details to accommodate busses, which may include bus pads and improved surface course HMA mixtures in the bus lane.

- **ESAL Factor:** Average Initial Truck Factor (ESALs/Truck) which can range from 0.85 to 4.35 depending on the traffic mix;
- **DD:** % of Trucks in Design Direction (typically 50%; however, a directional distribution factor should be applied if the traffic is unevenly distributed between the two directions, e.g. if one side services an industrial facility);
- **LDF:** % of All Trucks in Design Lane (Table A-2 provides the City’s recommended lane distribution factors or LDF’s);
- **% Trucks:** % of Heavy Trucks (typically FHWA vehicle classes 4 through 13);
- **TFGR:** Annual Truck Factor Growth Rate; and
- **TVGR:** Annual Truck Volume Growth Rate

Table A-2 Recommended Lane Distribution Factors.
(from TXDOT Pavement Design Guide - October 2006 Edition)

Total Number of Lanes in Both Directions	LDF
≤ 4	1.0
6	0.7
≥ 8*	0.6
*Unless Field Observations Show Otherwise	

Reliability

Both pavement type design procedures (flexible and rigid) provide a common method for incorporating reliability by applying a reliability factor based on a shift in the design traffic. The pavement reliability level is defined by AASHTO as the probability that the actual design traffic to terminal serviceability is greater than or equal to the actual design period traffic. The reliability factor to be used for each roadway functional classification is assigned by the City and shown below in Table A-3 *Reliability Factor for Flexible and Rigid Pavement Design*.

Table A-3
Reliability Factor for Flexible and Rigid Pavement Design.

Roadway Functional Classification	Reliability Factor
Primary and Secondary Arterials	95
Collector and Local Type B streets	90
Local Type A street with bus traffic	70
Local Type A street without bus traffic	70

Overall Standard Deviation

Overall standard deviation accounts for both chance variation in the traffic prediction and normal variation in pavement performance prediction for a given traffic level. The AASHTO Design Guide recommends a range of values for S_0 based on the data analysis from the AASHO Road Test and are:

- 0.40 - 0.50 for Flexible Pavements
- 0.30 - 0.40 for Rigid Pavements

Higher values represent more variability; thus, the pavement thickness increases with higher overall standard deviations. Designs conducted for the City shall utilize a standard deviation (S_0) as follows:

- 0.45 for flexible pavements and
- 0.35 for rigid pavements.

Serviceability

The serviceability of a pavement is defined as the pavement's ride quality and its ability to serve the type of traffic (automobiles and trucks) which uses the facility. The initial serviceability index (P_0) for flexible pavements shall be 4.2 and for rigid pavement shall be 4.5. The minimum terminal serviceability index (P_t) for local streets shall be 2.0 and for collectors and arterials shall be 2.5.

Design Parameters Specific to Rigid Pavements

There are several design parameters required by the 1993 AASHTO Guide that are specific to rigid pavements. The following sections provide guidance regarding these parameters for roadways designed for the City.

28-day Concrete Modulus of Rupture, M_r

The M_r of concrete is a measure of the flexural strength of the concrete as determined by breaking concrete beam test specimens. A modulus of rupture of 600 psi at 28 days shall be used with the current City specification for concrete pavement. If a different value is used it must be documented with an explanation.

28-day Concrete Elastic Modulus

Elastic modulus of concrete is an indication of concrete stiffness and varies depending on the coarse aggregate type used in the concrete. A modulus of 4,000,000 psi shall be used for City pavement designs. If a different value is used it must be documented with an explanation.

Load Transfer Coefficient

The load transfer coefficient is used to incorporate the effect of dowels, reinforcing steel, tied shoulders, and tied curb and gutter on reducing the stress in the concrete slab due to traffic loading and therefore causing a reduction in the required concrete slab thickness. The coefficients recommended in the AASHTO Guide are based on findings from the AASHTO Road Test and are shown in Table A-4.

Table A-4 Recommended Load Transfer Coefficients.
(from TXDOT Pavement Design Guide - Revised October 2006)

CRCP or Load transfer devices at transverse joints	Tied PCC shoulders, curb and gutter, or greater than two lanes in one direction	
	Yes	No
Yes	2.9	3.2
No	3.7	4.2

The City prefers that tied PCC shoulders be provided, if sufficient right-of-way (ROW) is available or there are no other geometric constraints. In case it is not feasible to provide tied PCC shoulders, the use of a minimum 2-ft wider outside lane should be considered.

Drainage Coefficient

The drainage coefficient characterizes the quality of drainage of the subbase layers under the concrete slab. Good draining pavement structures do not give water the chance to saturate the subbase and subgrade; thus, pumping is not as likely to occur. Subbase shall be designed to be dense-graded, non-erosive, and stabilized. For the City of San Antonio and surrounding areas a drainage coefficient of 1.01 to 1.03 shall be utilized for rigid pavement design and is based upon an average annual rainfall of 28 to 31 inches per year.

Rigid Pavement Standards/Details

All applicable standards and details are to be included in the pavement design report. See the following lists for applicable details that are utilized by TxDOT and are acceptable to the City:

- BAS-94, Bridge Approach Slab (2 Sheets) - apply to approaches to bridge structures.
- CRCP (1)-03, Continuously Reinforced Concrete Pavement, One-Layer Steel Bar Placement - applies to CRCP that is from 8 to 13 inches thick.
- FDRCP-94, Full-Depth Repair of Concrete Pavement - used for repairing existing concrete pavement.
- CPCD-94, Concrete Pavement Details, Contraction Design (CPCD) – standard for plain jointed concrete pavement and covers pavement thickness from 8 to 15 inches.
- TA (CP)-99, Terminal Anchorage for Concrete Pavement - shows a terminal anchorage system usually constructed near bridge ends to restrain the movement at the joint between the bridge approach slab and the end of the pavement. Restraining the slab movement will hopefully reduce the chance of damaging adjacent structures. Such anchors are mainly used for CRCP, but they can also be used for CPCD as well.
- JS-94, Concrete Paving Details, Joint Seals - specifies joint sealing requirements for concrete pavement.

Joint Spacing and Details

Construction joint spacing should not exceed 15 ft in either the longitudinal or transverse direction. The depth of saw cut should be a minimum of $\frac{1}{4}$ of the slab depth ($\frac{1}{3}$ the slab depth is recommended) if utilizing a conventional saw or 1 inch when using an early entry saw (early entry sawing is recommended). The width of the joint will be a function of the sealant chosen to seal the joint. It is recommended that a joint seal be utilized to minimize the introduction of incompressible material into the joint.

It is recommended that dowel bars be used to provide load transfer and reduce differential movement (or faulting) across transverse joints. Dowels should be smooth #9 bars (Grade 60 steel) spaced 12 inches on center with an embedment length of at least 8 inches.

Tie bars should be used to tie longitudinal joints within the pavement lanes and at the shoulder. Tie bars should be deformed #4 bars at a minimum (Grade 60 steel) spaced 36 inches on center with a minimum length of 30 inches.

Isolation joints must be used around fixed structures including light standard foundations and drainage inlets to offset the effects of differential horizontal and vertical movements. Premolded joint fillers should be used around the fixed structures prior to placing the concrete pavement to prevent bonding of the slab to the structure and should extend

through the depth of the slab but slightly recessed from the pavement surface to provide room for the joint sealant.

Acceptable Materials for Structural Pavement Layers

Alternative pavement materials may be used where the existing soil or subsurface conditions, or the alternative materials, provide comparable, better, pavement performance to the materials otherwise required by this section. Proposals for alternative pavement materials with supporting engineering documentation may be submitted to the city for consideration. Over the last few years, newer pavement material technologies have been developed and used to extend pavement service lives and reduce maintenance costs.

The combination of the following materials will be allowed to develop pavement structures:

- Lime Treated Subgrade
- Cement Treated Subgrade
- Cement Treated Base
- Flexible Base (Type A, Grades 1 or 2 are recommended in most situations)
- Prime Coat (non-structural)
- Tack Coat (non-structural)
- Hot Mixed Asphaltic Concrete Pavement (HMAC)
 - Dense Graded Surface Course
 - Dense Graded Base Course⁸
 - Premium Mixtures for Surface Course (with approval by the City Engineer)
- Jointed Plain Concrete Pavement (JPCP) with Dowels and Tie Bars as needed⁹
- Continuously Reinforced Concrete Pavements (with approval by the City Engineer)
- Base Reinforcement (Geogrids)

HMAC premium mixtures shall include stone-matrix asphalt, Superpave, ultra-thin bonded wearing courses, and porous friction courses. Premium mixtures with high permeability shall not be used on streets with integral curb and gutters, unless approved by the City Engineer.

Flexible Pavement Structural Coefficients

Structural layer coefficients for flexible pavement design are recommended as the following:

- Lime Treated Subgrade – 0.08

⁸ Asphalt treated base is rarely used by the Texas Department of Transportation and is generally being replaced with Type B asphaltic concrete. Use of Type A asphaltic concrete is also being discouraged by TxDOT due to the difficulties with determining an appropriate maximum theoretical specific gravity that can be used for compaction control during placement.

⁹ Research into the performance of Portland cement concrete pavements indicates that jointed, unreinforced concrete with dowel bars at the transverse joints and tie bars at the longitudinal joints consistently performs better than jointed, reinforced concrete pavements and requires less maintenance. The American Concrete Pavement Association (ACPA) also encourages the use of JPCP for city streets and other highway applications.

- Cement Treated Subgrade – 0.08
- Cement Treated Base
 - Target 7 day unconfined compressive strength = 150 psi – 0.12
 - Target 7 day unconfined compressive strength = 300 psi – 0.18
- Flexible Base
 - Type A Grades 1 or 2 – 0.14
 - Type A Grades 1 or 2 (With base reinforcement within the flexible base, geogrids) – 0.17
 - Type A Grade 3 – 0.10 (Use of Grade 3 must be approved by the City Engineer)
- Hot Mixed Asphaltic Concrete Pavement (HMAC)
 - Dense Graded Surface Course – 0.44
 - Dense Graded Base Course – 0.38
 - Premium Mixtures for Surface Course – 0.48¹⁰

Performance graded binders shall be used as stated in Item 205 unless there is a compelling reason to deviate. Deviations shall be submitted in the pavement design report with appropriate backup.

Required Structural Pavement Sections

A range of acceptable pavement thicknesses are required by the City and are a function of the roadway classification. The acceptable ranges for both flexible (in terms of the structural number) and rigid (in terms of slab thickness) pavements are shown in Table A-5.

Table A-5
Acceptable Pavement Structural Sections.

Roadway Functional Classification	Flexible Pavement Structural Number		Rigid Pavement Slab Thickness	
	Minimum	Maximum	Minimum	Maximum
Primary and Secondary Arterials	3.80	5.76	9.0	13.0
Collector and Local Type B streets	2.92	5.08	7.0	9.0
Local Type A street with bus traffic	2.58	4.20	6.0	8.0
Local Type A street without bus traffic	2.02	3.18	5.0	6.0

Minimum Compacted Layer Thicknesses

If the following compactable pavement materials are utilized in proposed pavement sections, the minimum compacted thickness for the components shall be as shown in Table A-6.

¹⁰ Values in excess of 0.44 shall be approved by the City Engineer with appropriate backup to justify the use of a higher value.

Table A-6
Minimum Compacted Layer Thicknesses.

Pavement Layer	Minimum Thickness, inches
Hot Mixed Asphaltic Concrete Surface	1.5
Hot Mixed Asphaltic Concrete Binder	2.5
Hot Mixed Asphaltic Concrete Base	4.0
Flexible (Granular) and Treated Base	6.0
Lime and Cement Treated Subgrade	6.0

Pavement Design on Expansive Soils

Several areas throughout the city will have roadways directly over expansive subgrade soils. The City expects designers to consider the harmful effects of swell when developing pavement sections over expansive soils.

The AASHTO procedure includes provisions to account for roadbed swelling through a reduction in serviceability or ride quality over time as the roadbed swells. The AASHTO Guide states on page II-10, “If...roadbed swelling...can lead to a significant loss in serviceability or ride quality during the analysis period, then it should be considered in the design analysis for all pavement structural types...” The intent of this portion of the AASHTO design procedure is to take into consideration what will happen to the pavement section if underlying expansive soils are wetted to a point where they will swell due to exposure to water. In many soils, additional pavement structure may be sufficient and cost effective to reduce the affect of swell due to expansive soils. Therefore, it is recommended that pavement designers utilize this procedure to reduce the effect of soil induced swell on pavement performance.

In deep, highly expansive soils, other mitigation techniques, like over excavation and select fill replacement may also need to be considered in the pavement design to further reduce the potential for underlying clay soils to swell and cause damage to the pavement section. Additionally, other design features should be considered to protect the underlying expansive clays from being wetted by transient ground water.

The estimated Potential Vertical Rise (PVR) for roadways should be determined using the empirical procedure, TxDOT’s standard test procedure Method Tex-124-E, *Method for Determining the Potential Vertical Rise (PVR)* and included in the pavement design report. An appropriate surcharge load, active zone, and moisture conditions should be considered in estimating the PVR values. Boring depths shall be sufficient to determine the active zone for the expansive soil. Other methods for determining swell may be utilized if detailed in the pavement design report and have been approved by the City Engineer.

Options to Reduce the Effect of Soil Heave on Pavements

Provided pavement sections are sufficiently designed and constructed to perform in the native soil environments, pavements constructed over highly expansive clays require significant routine maintenance to correct pavement roughness caused by underlying soil swelling. Swell can be reduced through various measures but cannot be totally eliminated without full removal of the problematic soil in the first place. Measures acceptable to the City for reducing swell include the following:

- Chemical Injection of Soil
- Soil Treatment with Lime or Cement
- Geogrids
- Removal and Replacement of High PI Soils
- Drains or Barriers to Collect or Inhibit Moisture Infiltration

Chemical Injection

Chemical stabilization/injection techniques are used to treat expansive clay soils. The method involves the injection of potassium based chemical(s) into the soil to supply cations to the clay and neutralize the clay's imbalanced electrical charge. Some methods consists of drilling one to two inch diameter holes in the soil to depths ranging from one to ten feet on a grid (a 2 x 2 foot grid is typical). Chemical injection is completed using high injection pressures of about 200 to 300 psi and is injected through the access holes for a period of time. This injection time may vary depending on the soil conditions and project requirements (a few hours to several days may be needed).

Chemical stabilization is best utilized on soils that are in an in-situ condition that is dryer than the optimum moisture content of the questionable soil as well as soils that have cracks and fissures and/or a soil matrix that is “open” or in other words allows the pressure injected chemicals to easily permeate the soil matrix. Non-fissured soils can be chemically treated given ample time and high enough pressures for the chemical to permeate the soil.

Soil Treatment

Soil treatment with lime or cement is typically used to reduce the swelling potential of the upper portion of the pavement subgrade. Lime or cement and water are mixed with the top 6 to 12 inches (or possibly more) of the subgrade and allowed to mellow or cure for a period of time. After curing the treated soil mixture is compacted to form a strong soil matrix that can improve pavement performance and reduce soil heave.

Lime shall be placed in slurry form only, unless written permission is granted by the Engineer and a safety and containment plan is submitted to the Engineer by the Contractor seven days prior to use. In circumstances where it would be beneficial to utilize lime for “drying” subgrade materials to expedite construction, the Contractor may request approval from the Engineer to use pelletized lime.

Geogrids

The primary function of geogrids used in pavements is reinforcement, in which the geogrid mechanically improves the engineering properties of the pavement system. The three primary uses of a geogrid in a pavement system are to:

1. serve as a construction aid over soft subgrades,

2. improve or extend the pavement's projected service life, and
3. reduce the structural cross section for a given service life.

Biaxial geogrid is also an acceptable for improving pavement performance over subgrades that are weak and tend to swell with moisture. Past experience with flexible base pavement sections on highly expansive clay soils indicates that the use of a geogrid base reinforcement provides considerable tensile strength to the pavement section. This tensile strength is achieved without making the section more brittle, as occurs with many other subgrade or base stabilization methods. The added tensile strength and flexibility allows the pavement section to move and flex, as the expansive clay subgrade undergoes the normal shrink and swell with changes in climatic conditions.

Geogrid should conform to TxDOT Departmental Material Specification (DMS) – 6240, Geogrid for Base/Embankment Reinforcement Type 1 for Local Type A without Bus Traffic city streets and Type 2 for Primary and Secondary Arterials, Collectors, Local Type B, and Local Type A with Bus Traffic city streets when tested with TxDOT's standard test procedure Tex-621-J, Testing Geogrids. Geogrid should be installed in accordance with the manufacturer's specifications and constructed in accordance with City of San Antonio Standard Specification Item 234 – *Base Reinforcement*. Geogrid should be placed on top of the prepared subgrade in instances that the total thickness of the overlying compacted base material is 10 inches or less. In instances that the total thickness of the compacted base material layer is greater than 10 inches the Geogrid should be placed at the mid-section of the compacted base material layer.

Removal and Replacement

Removal of highly expansive soils and replacement with lower PI soil or select fill significantly reduces the potential for vertical rise or heave of soils underlying a pavement. The amount of soil to remove and replace is dependent upon the acceptable amount of swell, the PI of the natural soil, the available moisture, and the overburden pressure from the overlying pavement. Removal and replacement can be a very effective method for minimizing heave but can be labor intensive and cause complications in construction depending on the job site conditions. However, the resulting cost savings to future maintenance can make this technique cost effective over the life cycle of the pavement. With highly expansive clays removal of up to 5 or 6 feet or more of the subgrade and replacement with a non-expansive select fill typically would reduce the PVR to acceptable levels.

Drains and Moisture Barriers

Capturing water infiltration via French drains, pavement edge drains, or inhibiting water through the use of vertical moisture barriers would reduce the potential for heave since one important component of the heaving mechanism, water, would be reduced.

Pavement Rehabilitation Design

Currently, the UDC does not explicitly consider pavement rehabilitation design and thus infers that pavement rehabilitation only includes reconstruction. There are rehabilitation methods available other than complete reconstruction that may be more cost effective and considerably quicker.

Pavement rehabilitation design should be considered over full pavement reconstruction in situations where practical. The use of Falling Weight Deflectometer (FWD) data and analysis, ground penetrating radar (GPR), and/or profile measurements using an inertial profiler should all be considered when developing appropriate pavement rehabilitation designs. Laboratory testing of existing paving materials should also be considered to characterize the ability of the materials to be recycled when recycling the existing materials is a possible rehabilitation option.

The pavement designer shall determine the appropriate technique for rehabilitation which will be determined based upon the existing condition of the roadway, roadway geometry, site conditions, material availability and/or other factors. Rehabilitation techniques acceptable to the City shall include:

- Non-Structural Surface Treatments or Overlays
 - Cracksealing
 - Patching
 - Single or double treatment surface seals
 - Slurry Seals
 - Microseals
 - Mill and Inlay HMAC
 - Hot In-Place Recycling without Overlay¹¹
 - Ultra-Thin Bonded Wearing Course
- Structural Rehabilitation
 - HMAC Overlay
 - Hot In-Place Recycling with Overlay
 - Partial Depth Reclamation with Overlay
 - Full Depth Reclamation with Overlay

FHWA Vehicle Classifications with Definitions

1. **Motorcycles** -- All two or three-wheeled motorized vehicles. Typical vehicles in this category have saddle type seats and are steered by handlebars rather than steering wheels. This category includes motorcycles, motor scooters, mopeds, motor-powered bicycles, and three-wheel motorcycles. This vehicle type may be reported at the option of the State.
2. **Passenger Cars** -- All sedans, coupes, and station wagons manufactured primarily for the purpose of carrying passengers and including those passenger cars pulling recreational or other light trailers.
3. **Other Two-Axle, Four-Tire Single Unit Vehicles** -- All two-axle, four-tire, vehicles, other than passenger cars. Included in this classification are pickups, panels, vans, and other vehicles such as campers, motor homes, ambulances, hearses, carryalls, and minibuses. Other two-axle, four-tire single-unit vehicles pulling recreational or other light trailers are included in this classification. Because

¹¹ Hot in-place recycling may be used in circumstances where the existing pavement section is structurally adequate and the surface does not contain significant distress (e.g. the pavement should have low severity cracking and raveling). This method should also be limited to use on lower volume roadways where the risk of delamination is reduced.

automatic vehicle classifiers have difficulty distinguishing class 3 from class 2, these two classes may be combined into class 2.

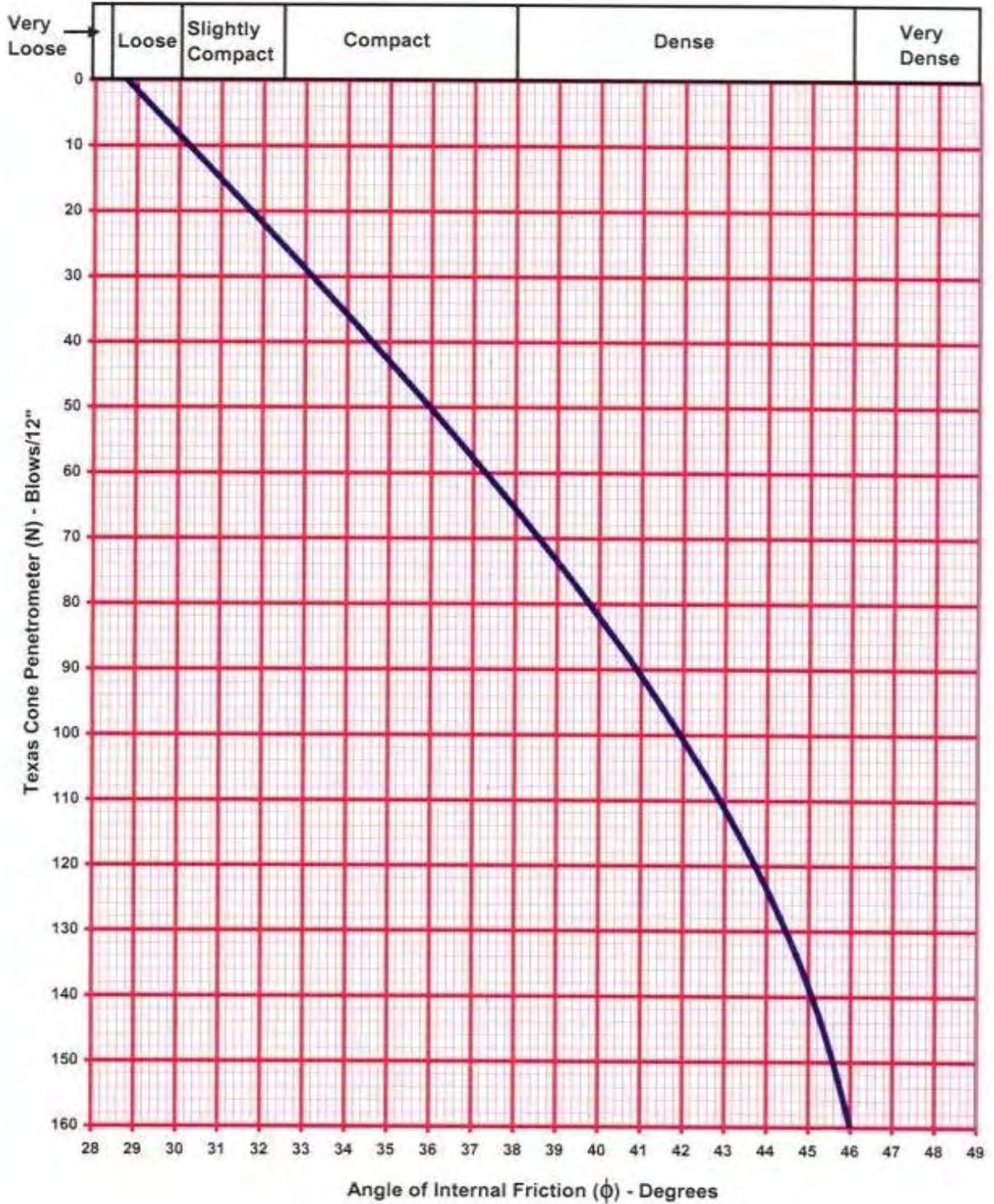
4. **Buses** -- All vehicles manufactured as traditional passenger-carrying buses with two axles and six tires or three or more axles. This category includes only traditional buses (including school buses) functioning as passenger-carrying vehicles. Modified buses should be considered to be a truck and should be appropriately classified.

NOTE: In reporting information on trucks the following criteria should be used:

- Truck tractor units traveling without a trailer will be considered single-unit trucks.
 - A truck tractor unit pulling other such units in a “saddle mount” configuration will be considered one single-unit truck and will be defined only by the axles on the pulling unit.
 - Vehicles are defined by the number of axles in contact with the road. Therefore, “floating” axles are counted only when in the down position.
 - The term “trailer” includes both semi- and full trailers.
5. **Two-Axle, Six-Tire, Single-Unit Trucks** -- All vehicles on a single frame including trucks, camping and recreational vehicles, motor homes, etc., with two axles and dual rear wheels.
 6. **Three-Axle Single-Unit Trucks** -- All vehicles on a single frame including trucks, camping and recreational vehicles, motor homes, etc., with three axles.
 7. **Four or More Axle Single-Unit Trucks** -- All trucks on a single frame with four or more axles.
 8. **Four or Fewer Axle Single-Trailer Trucks** -- All vehicles with four or fewer axles consisting of two units, one of which is a tractor or straight truck power unit.
 9. **Five-Axle Single-Trailer Trucks** -- All five-axle vehicles consisting of two units, one of which is a tractor or straight truck power unit.
 10. **Six or More Axle Single-Trailer Trucks** -- All vehicles with six or more axles consisting of two units, one of which is a tractor or straight truck power unit.
 11. **Five or fewer Axle Multi-Trailer Trucks** -- All vehicles with five or fewer axles consisting of three or more units, one of which is a tractor or straight truck power unit.
 12. **Six-Axle Multi-Trailer Trucks** -- All six-axle vehicles consisting of three or more units, one of which is a tractor or straight truck power unit.
- Seven or More Axle Multi-Trailer Trucks** -- All vehicles with seven or more axles consisting of three or more units, one of which is a tractor or straight truck power unit

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Appendix 10-B ~ TCP vs. Angle of Internal Friction for Cohesionless Soils



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Appendix 13-A ~ City of San Antonio QA/QC Certification Form

Project:				Date:									
Engineer:				Phase:									
Check All Appropriate Boxes, Fill in the Blank or Mark N/A if Not Applicable				YES	NO	N/A	Check All Appropriate Boxes, Fill in the Blank or Mark N/A if Not Applicable	YES	NO	N/A			
Project Management				Contract Documents									
Design Firm's QA/QC Program Followed				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Hardcopy of Roadway and Drainage Plans				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Design Schedule Updated				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Hardcopy of All Joint-Bid Utilities				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Meeting Minutes Posted				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Bid Documents				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Previous Review Comments Addressed				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Bid Proposal				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Design Exceptions Submitted				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Special Provisions				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Constructability Review Performed				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	List of Governing Specifications Included				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Design				Special Specifications Included						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Quantities Checked and Verified				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	PDF and DGN of all Submittals on CD				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Plans Reviewed and Checked for Accuracy				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Documents Posted to Portal				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Applicable Specs Reviewed and Checked				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Drainage Design Calculations on CD				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Surveying and Mapping Complete				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	All Meeting Minutes Documented and Distributed				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drainage Submittal Complete For This Phase				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Project Closeout						
Traffic Engineering Complete For This Phase				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Lessoned Learned Meeting Minutes				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TCP Reviewed and Includes Joint-Bid Utilities				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Recapitulation of Project Cost				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Roadway, Bicycle & Pedestrian Design Complete				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Final Field Alteration				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Permitting Resolved				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Plan of Records Hard Copy and CD				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CADD Standards Met				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							
Geotechnical Complete				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							
Public Involvement Complete For This Phase				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							
Cost Estimate Checked and Verified				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							
Utility Coordination													
Utility Basemap Updated				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							
Utility Quality Levels Updated and Identified				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							
Utility Coordination Report Complete				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							
Conflict Matrix Updated				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							
Every design firm needs an internal, written QA/QC program. It is the design firm's responsibility to ensure the QA/QC program has been followed. The program will act as your guideline for setting and establishing a high quality design and submittal for both the prime and sub-consultants. With the signatures below, the design firm confirms that the QA/QC program has been followed and all requirements as established in the Design Guidance Manual and the approved scope of services have been followed.													
Consultant Remarks:													
Project Manager						Date							
QA/QC Reviewer						Date							

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Appendix 13-B ~ City of San Antonio Review Comment & Resolution Form

City of San Antonio
 Capital Improvements Management Services
 114. W. Commerce
 San Antonio, Tx
 78205

40% Submittal Review Record

Project:		Engineering Design Firm:		Project WBS			
COSA PM:		Engineering Firm Project Manager:		WBS Number (40-XX)			
No.	Sheet No.	Review Comment	CoSA Dept.	Reviewer	Consultant's Response	Complete (Y/N)	Reviewer Response
General Sheets:							
1	1	Use CoSA Standard Sheet	PM Team	XX	Response	Yes	
2	2	Index Should Follow Sheet Order listed in the DGM	Tech Svc	XX	Response	Yes	
3	3	Show Primary and Secondary Control Points on Project Layout	PM Team	XX	Response	Yes	
4	4	Follow Estimated Quantity Sheet as shown in the DGM	Tech Svc	XX	Response	Yes	
5	5	Show Rate of Lime Treatment on Typical Sections	Tech Svc	XX	Response	No	
Traffic Control Plans:							
6	15	Show typical utility installation on section	PM Team	XX	Response	No	
7	15	Show type of temp pavement	Tech Svc	XX	Response	Yes	
8	16	Show limits of Begin Full Construction	Inspections	XX	Response	Yes	
9	18	Show temporary striping	Inspections	XX	Response	No	
10	20	Show temporary traffic barriers	PM Team	XX	Response	Yes	
Roadway Plans:							
11	All Rdwy Plans	Show proposed storm sewer inlets and pipe, using shaded line-style	PM Team	XX	Response	Yes	
12	59	Add note for storm water protection	Environmental	XX	Response	No	
13	59	Use TxDOT detail in TxDOT ROW	PM Team	XX	Response	Yes	
14	63	Add VC to VPI Sta XX+XX.XX	PM Team	XX	Response	No	
Cross Sections:							
15	All X-Sec Sheets	Show UG Utilities	Tech Svc	XX	Response	No	
16	70	Show limits of driveway penetration	PM Team	XX	Response	Yes	
Drainage Plans:							
17	99	Show update Stormwater details	Sirm Wtr	XX	Response	Yes	
18	99	In the profile, show headwater and tailwater elevations at the culvert for the 25 and 100-year storm events.	PM Team	XX	Response	No	
Traffic Plans:							
19	122	Show begin striping Stationing	PM Team	XX	Response	No	
20	122	Add Traffic notes	Traffic	XX	Response	Yes	

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Appendix 13-C ~ Periodic Construction Observation Report

Report No. _____

Project: _____ Date: _____

Contractor: _____ Time: _____

Weather: Clear Rain Humid Temperature: _____

Overcast Light Rain Hot

Partly Cloudy Windy Cool

Equipment on Site:

Cranes Dozers Rollers (Pneumatic) Other: _____

Loaders Scraper Water Trucks

Backhoe (Trk) Rollers (Stl Wh) Pavers

Backhoe (Tire) Rollers (Sheep ft) Motor Graders

Labor Force:

Superintendent Foreman Operator Laborer
 Etc.

Site Conditions:

Work Observed:

Comments: (attach pictures or drawings if necessary)

Consultant Signature

Firm

Date

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GUIDE TO ACRONYMS AND INITIALISMS

A2LA	American Association for Laboratory Accreditation
AACEI	Association for the Advancement of Cost Engineering International
AASHTO	American Association of State Highway and Transportation Officials
AC	Asbestos Cement
ADA	Americans with Disabilities Act
ADAAG	Americans with Disabilities Act Accessibility Guidelines
ADT	Average Daily Traffic
ASCE	American Society of Civil Engineers
ASCII	American Standard Code for Information Interchange
ASTM	American Society for Testing and Materials, <i>now</i> ASTM International
ATMS	Advanced Traffic Management System
BM	Benchmark
BMP	Best Management Practices
BRWM	Bexar Regional Watershed Management Partnership
CAD	Computer-Aided Design
CAF	Combined Surface Adjustment Factor
CBT	City Bid Tabulations
CD	Compact Disk
CI	Construction Institute (ASCE)
CIP	Capital Improvement Project
CIMS	Capital Improvement Management Services
CLEC	Competitive Local Exchange Carrier
CLOMR	Conditional Letter of Map Revision
CMAR	Construction Manager at Risk
COE	Corps of Engineers, U.S. Army
COGO	Coordinate Geometry
CORS	Continuously Operating Reference Stations
COSA	City of San Antonio
CPO	Capital Projects Officer, <i>also</i> Community Relations Planner, Capital Improvements Public Relations Officer
DB	Design-Build
DBB	Design-Bid-Build
DC	Design Consultant
DGM	Design Guidance Manual
DMS	Dynamic Message Sign
DOD	Department of Defense
DS	Downstream
DSR	Design Summary Report
DTM	Digital Terrain Model
E&Q	Estimate and Quantity
EGL	Energy Grade Line
EMS	Emergency Medical Service
EPA	Environmental Protection Agency
EPIC	Environmental Permits, Issues, and Considerations
ESD	Environmental Services Division

FEMA	Federal Emergency Management Agency
FEMA RM	Federal Emergency Management Agency Resource Management
FGCS	Federal Geodetic Control Subcommittee
FHA	Federal Highway Administration, <i>also</i> FHWA
FHWA	Federal Highway Administration, <i>also</i> FHA
FNA	Full Needs Assessment
FS	Factor of Safety
GIS	Geographic Information System
GPS	Global Positioning System
GSOS	Generalized Scope of Services
HDPE	High-Density Polyethylene
HEC	Hydrologic Engineering Center (U.S. Army Corps of Engineers)
HEC-RAS	Hydrologic Engineering Center River Analysis System, <i>also</i> HecRas
HecRas	Hydrologic Engineering Center River Analysis System
HGL	Hydraulic Grade Line
ID	Identification
INA	Initial Needs Assessment
ISBN	International Standard Book Number
ISM	Initial Scope Meeting
ITS	Intelligent Transportation System
LAM	Local Area Management
LOMR	Letter of Map Revision
LOS	Level of Service
MOE	Measure of Effectiveness
MPO	Metropolitan Planning Organization
MSE	Mechanically Stabilized Earth
MUTCD	Texas Manual on Uniform Traffic Control Devices
NAD27	North American Datum of 1927
NAD83	North American Datum of 1983
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NGS	National Geodetic Survey
NPS	National Park Service
NTS	Not to Scale
PC	Point of Curvature
PDF	Portable Document Format
PER	Preliminary Engineering Report
PI	Point of Intersection
PIP	Public Involvement Plan
PK	Parker-Kalon, <i>as in</i> PK nail (surveying)
PM	Project Manager
POC	Point of Commencement
POB	Point of Beginning
PS&E	Plans, Specifications, and Estimates
PT	Point of Tangency
PWP	Project Work Plan
QA/QC	Quality Assurance/Quality Control

QL	Quality Level (A, B, C, D)
RACM	Regulated Asbestos-Containing Material
RAS	River Analysis System (U.S. Army Corps of Engineers)
RINEX	Receiver Independent Exchange (format for GPS files)
RM	Resource Management
ROE	Right of Entry
ROW	Right-of-Way
RPLS	Registered Professional Land Surveyor
RQD	Rock Quality Designation
RRA	Replacement, Relocation, or Adjustment
RTK	Real-Time Kinematic
SAF	Surface Adjustment Factor
SARA	San Antonio River Authority
SAWS	San Antonio Water System
SCOS	Standing Committee on Surveying
SCS	Soil Conservation Service
SCS CM	Soil Conservation Service Curve Number
SDMS [®]	Survey Data Management System (AASHTO)
SPC	State Plane Coordinates
SPT	Standard Penetration Test
SUE	Subsurface Utility Engineering
SW3P	Storm Water Pollution Prevention Plan
TAS	Texas Accessibility Standards <i>or</i> Architectural Barriers Texas Accessibility Standards
TBM	Temporary Benchmark
TBD	To Be Determined
TBPLS	Texas Board of Professional Land Surveying
TCEQ	Texas Commission on Environmental Quality
TCP	Texas Cone Penetration
TCP	Traffic Control Plan
TDLR	Texas Department of Licensing and Regulation
TDS	Tripod Data Systems
TDSHS	Texas Department of State Health Services
TER	Traffic Engineering Report
TESS	Texas Excavation Safety System
THC	Texas Historical Commission
TPDES	Texas Pollution Discharge Elimination System
TSPS	Texas Society of Professional Land Surveyors
TxDOT	Texas Department of Transportation
UDC	Unified Development Code
UPRR	Union Pacific Railroad
US	Upstream
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency

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