CORPUS CHRISTI

TEXAS

FINAL REPORT

AD HOC RESIDENTIAL STREET INFRASTRUCTURE ADVISORY COMMITTEE

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Section 1 – The Residential Street Problem and the Ad Hoc Committee

Corpus Christi is a difficult environment to maintain smooth streets. Large parts of the City have subsoil consisting of clay that expands and contracts in both seasonal and moisture-related cycles. The weather of the region can include hurricane-induced deluges and long-cycle droughts. The City has a 150 year history, with many road problems inherent to outdated materials, methods, and designs of the original construction causing problems with road base, drainage, and utility facilities. Finally, there have been periods of underspending in maintenance and reconstruction which started long ago and continue today in comparison with the requirements and size of the in-place street network.

The Street Committee consists of nine volunteer individuals who have been empaneled for a short period of time without independent resources. It is the opinion of the Chair of the Committee that each individual has brought common sense, experience, and good faith to the process.

Our goal is to define a sustainable lifecycle maintenance and replacement program for the entire residential street network.

The Street Committee wishes to acknowledge and thank the City Manager, City Management, and City Staff for their support throughout this effort. The conclusions of this report and suggestions for improvement are testament to their willingness and ability to make the streets and services to the citizens better – it is not a criticism of the individuals. The people that we have met at all levels of City street processes are knowledgeable, hardworking, and caring. We appreciate the time, advice, and support that they have given the Committee.

The Street Committee would like to thank the contractor community. We believe that the Contractor service to the City has been commendable. There is an extraordinary group or prime contractors and sub-contractors who work very hard and have an enormous amount of pride in the quality of the work product. We appreciate the testimony and advice that they have provided to the Committee.

The Street Committee would like to thank the engineering community. We believe that the professional services community has a deep understanding of local conditions and they have delivered substantial value to the City in terms of their paid professional services and their unpaid advice in service to the community overall. We appreciate the testimony and advice that they have provided to the Committee.

The Street Committee would like to thank the Mayor and City Council. The opportunity to serve has been a wonderful personal experience. We know that difficult choices are ahead, and we hope to have provided guidance and understanding to make their process easier.

1.0 Fixing the Residential Streets

Streets are of primary importance in society. The streets move people, commercial goods, and waste products to and from every residence and business in a city. Streets must be well designed and maintained in order to minimize the social costs of safety to the public, damage to vehicles, and unproductive loss of traffic backups. In addition to the aforementioned criteria, citizens also focus on a smooth ride quality and uniform appearance as being factors associated with their satisfaction.

Streets have a finite lifespan that is determined by initial build quality/design, maintenance, environmental conditions, sub-surface characteristics, and vehicle utilization. There is also a utilities component which has its own lifecycle needs, but can force replacement or repairs to the street surface.

Because streets are a common social good, streets are a necessary and proper responsibility of municipal government. In order to service the streets, the City must provide for funding, asset management, operational maintenance, and planning for future streets.

Corpus Christi City Council has empaneled the Ad Hoc Residential Street Infrastructure Advisory Committee to formulate recommendations to maximize value for residential street spending and to suggest best practices.

The streets require a perpetual maintenance and rebuild cycle which is very expensive. Even with the most efficient plan in place, the degree to which the streets are repaired or replaced is ultimately a question of funding.

The general mileage or dollars in the following table are important to understand the general magnitude of the ongoing cost of street construction and required maintenance.

PER MILE COST OF TOTAL REBUILD OF RESIDENTIAL STREETS INCLUDING UTILITIES
IN 2016 CONSTANT DOLLARS COST PER MILE:

Scenario Name	Street Lifespan	Major Maint Cycle	Upfront Cost ($000)	Cumul Overlay Cost ($000)	Cuml Seal Coat Cost ($000)	Total Cost per mile ($000)	Total Cost per mile per year ($000)
No Major Maint	30 years	N/A	$2,455	- $0 -	- $0 -	$2,455	$82
Overlay Only	30 years	15 years	$2,455	$475	- $0 -	$2,930	$98
Overlay and Seal	30 years	7.5 years	$2,455	$475	$475	$3,405	$114
No Major Maint	60 years	N/A	$2,455	- $0 -	- $0 -	$2,455	$41
Overlay Only	60 years	15 years	$2,455	$1,426	- $0 -	$3,881	$65
Overlay and Seal	60 years	7.5 years	$2,455	$1,426	$950	$4,831	$81

SYSTEM WIDE COST OF TOTAL REBUILD OF RESIDENTIAL STREETS INCLUDING UTILITIES
IN 2016 CONSTANT DOLLARS:

Scenario Name	Street Lifespan	Total Cost for 881 mile Residential Street System ($000,000)	Total Cost for 881 mile Residential Street System per Year ($000,000)
No Major Maint	30 years	$2,163	$72
Overlay Only	30 years	$2,581	$86
Overlay and Seal	30 years	$3,000	$100
No Major Maint	60 years	$2,163	$36
Overlay Only	60 years	$3,419	$57
Overlay and Seal	60 years	$4,256	$71

Rebuilding the streets is very expensive. In addition to the street surface itself, there are additional significant costs. These ancillary systems must be upgraded to meet functional standards or as required by law or regulation. Certain street reconstruction treatments may trigger federally mandated ADA improvements adjacent to the street; corner access ramps are a good example. Curb and gutters function as the interface between the roadway and the yard but also function as the primary drainage pathway for stormwater drainage. Understreet utilities have their own finite lifespan for necessary services such as potable water, waste water, and gas.

Because the residential streets are relatively narrow and short as compared with arterials and collector streets, the fraction of expenditure on these required spending categories are relatively larger than in comparison with high-capacity streets. We estimate that for residential street reconstruction the relative spending categories for a street program will be surface cost – 32%, ADA cost – 5%, curb/gutter – 30%, and utilities – 33%.

Finding / Recommendation 1.0:

The Committee finds that the amount of money that Corpus Christi would have to spend to maintain and replace residential streets on a 60 year cycle would be approximately $71 million per year. This amount does not include spending for arterial and collector streets.

The political and fiscal reality is that the available funding will be a small portion of what is would be required for replacement based solely on engineering criteria. The Committee also estimates that market constraints on materials and contractor capacity in the near term limit the size of any program.

Because there is not enough money to rebuild streets in their entirety, it is likely that citizen dissatisfaction with the streets will continue.

The goal of the newly created program described herein is to begin a systematic reconstruction of failed streets and to perform intensive maintenance on all streets in a proactive, systematic manner to address dangerous or damaging conditions and to improve ride quality.

The Committee is an advisory body that is making recommendations to the City Council, City leadership, and City Staff. However, the decision authority and responsibility for implementation remains with the respective responsible groups within the City. We are eager to discuss these findings in addition to providing this written recommendation. The Committee has prepared several presentations that were discussed in open, public session. We encourage review of those recorded sessions to understand the context of these recommendations.

Section 2 – Process Observations

2.1 Job Costing

Finding / Recommendation 2.1:

The Committee recommends that the City track job cost at the street level.

The City does not have a very good handle on individual job cost. It seems to the Committee that the logical unit of understanding job cost is the street. Certainly residents and the media have an expectation that the City should understand the cost of work accomplished within a logical unit that corresponds with the way the average citizen understands streets.

We think that this information discipline would benefit department management to understand:

- Production efficiency in comparing contractor and internal costs in order to conduct a make versus buy decision or to compare relative efficiency between crews.
- Factors or conditions that cause the scope of work to expand or shrink. This is especially important to understand projects that experience a catastrophic expansion where a project with a relatively small budget blows-out to absorb substantial resources.
- Understanding the relative cost of various street treatments so that the least-cost workplan can be implemented.
- Understanding stability of cost over time for unit cost decision making and contract negotiation.
- Understanding the relative value associated with the components of the Indefinite Delivery, Indefinite Quantity contracts.

Currently the City keeps track of invoices presented by contractors. The invoices generally cover regular periods of time which may include only a portion of work or several blocks of work depending on numerous factors. It is clear that even when the correct amount gets paid for a particular volume of work, it just is very difficult if not impossible to tie back to specific work.

Effective job costing is also the first step to clear communication with the public and City Council. It also can serve as a point of discussion with contractors to understand how the City's cost structure for these services may be improved.

2.2 Contracting

Finding / Recommendation 2.2:

The Committee recommends that the City use the contracting methods of IDIQ, Micro-IDIQ, and Project Bid method, in addition to tasking City-internal crews to perform the work to maintain and rebuild the streets. The Micro-IDIQ would represent a recently created method of contracting.

Method 1: Indefinite Delivery, Indefinite Quantity (abbreviated as "IDIQ") Contracting

The City primarily uses the Indefinite Delivery, Indefinite Quantity (abbreviated as "IDIQ") method of contracting for the Street Preventative Maintenance Program and the Minor Pavement Improvement Program. The IDIQ processes that have historically provided high value to the City in terms of cost and in-field results for a large scope of work. The Committee recommends continued use of the IDIQ method.

The City puts forth a general scope of work, and various contractors provide bids which consist of a very extensive list of activities with a price for each activity based on the units used or output produced. The City then selects one contractor for award of the IDIQ contract which exclusively covers a particular scope of work, within a defined area, for a specified period of time.

Once the IDIQ contract has been awarded, the City then dispatches delivery orders of work to the contractor. The contractor performs the work and invoices the City based on the quantity of work or materials actually used to complete the work.

- There are positive aspects of the IDIQ: The City always has access to a qualified contractor to perform the work at a known price. There is less need for detailed project specification during planning which results in reduced upfront cost as well as minimization of in-house resources. Flexibility allows the City to re-prioritize, increase, or decrease the aggregate work. The City has the ability to engage in work of unknown scope without a constant rebidding or change order cycle. The large contractors that bid on the IDIQ projects can operate with minimal supervision required and they also tend to offload administrative burden from the Engineering Services Department.

- There are negative aspects of the IDIQ: The exclusivity of the contract impairs the City's ability to hire a substitute contractor to the extent that the relationship with the awarded contractor does not produce the expected results. There are also no change orders, so it is hard to tell if a workplan goes haywire. There is the risk for adverse selection of work which is a risk for the City as well as the contractor because the profitability or value varies greatly by line-item and the amount of each line-item varies greatly between delivery orders. The Texas Local Government Code requires the City to award contracts for construction of roads, streets, utilities and other civil works projects to the lowest responsible bidder, but the lowest bid may be difficult to determine when comparing bids with à la carte service pricing – this is a consequence of the indefinite nature of these types of projects

Method 2: Micro - Indefinite Delivery, Indefinite Quantity (abbreviated as "Micro-IDIQ") Contracting

The Committee recommends that City Staff create a simplified process for projects where breaking a large job into smaller executional units would produce cost savings or enhanced manageability. We define this contracting process as a micro-IDIQ with a limited award size, geographic scope, process scope, and the time scope. We think that the benefits of the micro-IDIQ to the City include:

- Multi-source provision of services so that the City maintains the skills, availability, and readiness of contractors which ultimately delivers higher value through the competitive bid process.
- The shorter timeframe makes it less likely that the contractor will fall behind and ultimately fail to produce the work.
- Smaller contract size should enable smaller contractors to bid the work because the bonding requirements or workload requirements fit within the capabilities of a small provider.
- Focused scope of work may allow specialized contractors to bid on discrete portions of the work. The larger contracts usually result in large contractors serving in the role as prime contractor with the actual work performed by subcontractors which are billed to the City with a substantial mark-up on their services.
- Smaller contract size reduces risk to the City which has the derivative effect of allowing contract simplified terms.
- The Texas Local Government Code allows the City to award contracts for construction of streets using the competitive sealed proposal method if the expenditure is $1.5 million or less. The effective result is that the City can consider other criteria in addition to the price, use a best value determination, and have more flexibility to include small or new contractors as meeting the "responsible bidder" criteria.

Certainly the increased number of contractors associated with the Micro-IDIQ and project coordination will likely require increased workload within the Engineering Services Department. This will require additional staffing.

Method 3: Traditional Project Bid Contracting

The City should continue to use the traditional project bid method. This method has typically been used on bond projects, where the project is well defined and large in scope.

This method typically consists of a well-defined, specific scope of work which is bid using a competitive bid process where the contractor agrees to complete the entire project, typically at a fixed price. For projects larger than $1.5 million, the project must be awarded to the lowest responsible bidder.

This method requires substantial upfront design resources and an exact knowledge of the initial conditions of the surface and subsurface. If the scope of the project changes, due to either voluntary

design changes or discovery of complications, then the amount paid to the contractor typically increases through a change order process.

Method 4: Award Work to Internal Street Operations Department

The City should continue to directly perform the work using the substantial resources and expertise within the street operations department. The City has successfully performed large-scale seal coat operations.

Using internal resources provides the City with a flexible and responsive alternative to outside contracting. It is prudent to have these capabilities within the City. However, the cost of these activities needs to be benchmarked to understand the relative value of internal versus contractor produced work and the efficiency of in-house teams.

The City historically has achieved great success in "reworking" streets to renew their life; however, the City does not currently have the capability to perform this activity due to loss of internal expertise as a result of staffing challenges and budget cuts. The Committee recommends that the City hire crews and acquire equipment to restore these capabilities within internal operations. (See Section 2.7)

2.3 Payment interval

Finding / Recommendation 2.3:

The Committee recommends that the City should pay contractors promptly. This should be achieved by resolving bottlenecks in the process and improved coordination between City departments. It will also require substantial input from the legal department to ensure compliance with numerous applicable laws. As a first step, the City should track path, time until payment, and status of each invoice starting with presentment for payment. The Committee further recommends that the City set a target of six months for Council review so that there is urgency and accountability for completion of this task.

The Committee believes that the City should pay contractors and/or vendors within 30 days of the completion of work or delivery of goods.

If the City is slow at paying contractors after the work is performed, the following occurs:

- Small contractors cannot afford to work directly for the City because of a working capital funding gap. This financing need is caused because the small contractors must pay their employees and vendors, before they receive payment from the City for completed work. Currently, these small contractors only perform City work by being sub-contractors to large contracting companies who advance funds to the small contractors and directly invoice the City. Due to this arrangement, the City effectively pays a mark-up on the small contractor work because the large contractor adds an amount to the invoice presented to the City which represents the large contractor profit, administrative markup, and financing markup.

- Large contractors who work directly for the City calculate the cost of financing their working capital funding gap and add it to their bid as a cost of the job.

The Committee believes that the City can lower the cost of hiring contractors by paying promptly, because small contractors can bid directly on City work and large contractors can afford to lower their bids by the amount of savings on financing costs.

With respect to street projects, the City conducts on-site inspections of the work performed proximate to the completion of the work in the field. We believe that these inspection can provide the City with an estimate of the percentage of completion as well as the assurance that the work was completed in good faith.

Solving this issue will require refinement of the invoicing process internal to the City as the invoice is processed among multiple departments. It will also require substantial legal review due to the high degree of regulation with respect to Texas State law, among other issues.

Even if the City cannot ultimately meet the 30 day payment objective, anything that can be done to shorten the interval will improve the situation for contractors and the City. If the invoice cannot be paid in full, if consistent with applicable rules and regulations, perhaps the City can pay the undisputed amount or provide for a large mobilization payment for bonded contractors where performance risk can be mitigated.

As a first step to understanding the magnitude of this problem, the Committee recommends that the City should track the path, time intervals, and status with respect to each individual invoice as it moves within and between departments, starting from the date of vendor presentment for payment. This data will indicate probable bottlenecks as well as provide a basis for reporting.

While we believe that the street operations and engineering department would benefit from these changes, the issue of payment interval exists external to these departments and is likely to affect most City operations.

2.4 Acquisition Planning

Finding / Recommendation 2.4:

We recommend that the City create an internal purchasing and contract administration role to ensure that acquisition planning results in the highest value to the City through the bidding process and throughout the completion of the work.

Acquisition planning is the combined role of strategic purchasing and contract administration.

The Committee believes that engineering and acquisition planning are distinct skill sets. Currently, it is typical that a project goes from engineering design specification directly to procurement without an evaluative step to thoroughly consider relative value between procurement methods or other considerations to improve procurement results, such as project aggregation or disaggregation.

As such, we strongly recommend that the City create an internal, acquisition planning role.

The acquisition planning role would include understanding the historical cost for services, understanding best estimate of current costs, comparing costs with similarly situated entities, coordinating with contractors to understand their cost structure to re-design City processes to make everyone more efficient, understanding contractor capacity and availability, farming small contractors into larger ones, de-bottlenecking the contracting process, assuring prompt payment of invoices, negotiating terms and pricing. We also believe that the acquisition planning role should have responsibility for contract administration to ensure that the business terms of the contract are respected by both the City and the contractor.

The City engages numerous contractors which, in the aggregate, represent payments in the tens of millions of dollars in spending each year. Currently, the contracting process occurs within the Engineering Department which includes people who have professional ties with the entities who work on or a have a history of being on both sides of the table. In addition, these same people often serve as the authority within the City with respect to pursuit of contract claims or enforcement. We believe that there is the appearance of conflict of interest which could be avoided by implementing this recommendation.

While we believe that the street operations and engineering department would benefit from these changes, the issue of acquisition planning is likely to affect many City departments.

2.5 Improvement of Information Systems

Finding / Recommendation 2.5:

We recommend that the City design and implement process and system improvements to document cost, geo-spatial parameters, and performance measurements in order to achieve effective operational and asset management of the street inventory. In many instances, non-street City departments may have already made the investment and can be adopted with little incremental cost by the street-related departments.

The Committee recognizes that it will take substantial effort and investment to effect these improvements. The process will take many years.

The Committee believes that street operations would benefit substantially from implementation of best practices of the industry or copy successful implementations of electronic recordkeeping, materials management, or labor management systems which are in common use elsewhere. For example, street inspections and materials/labor tallies are recorded in the field on paper and submitted into the City system on a manual basis. We believe that these processes which have probably not changed for a generation are a substantial barrier for the City to understand its cost structure, implement efficiency improvements, or guarantee accountability.

We recommend that the City continue to engage experts to design and implement these process and system improvements. In other instances, non-street City departments may have already made the investment and can be adopted with little incremental cost by the street-related departments. Here are particular examples that seem ripe for improvement:

- Real-time tracking of street operation vehicles and people. This properly documents street repair activity, allows job costing, allows specific review of a repair location at a particular GIS coordinate, efficient routing to reduce mobilization loss, and time/hour employment responsibilities. Certainly this technology is in widespread use and may be partially or wholly implemented by the utilities department of the City.

- Street management has a large GIS component. Damage and repairs happen at a particular location. Costs should be understood at the block level. Work plans should be site specific, because various treatments/contractors relate to specific locations along a street. Third-party street cuts and repairs are location specific. Under street utility location for replacement or service impacts street surface. Dispatch for repair for citizen complaint is site specific. Pre-construction base and sub-grade testing happens at particular test holes which may need to be spatially understood if testing needs to be repeated or expanded. Work completion and acceptance has location, date, and responsibility parameters that should be tracked to evaluate performance over time. As such, the current GIS system need to evolve to support these needs. This expertise may already exist within the City, but has not been applied to streets yet.

- Portable devices for construction inspection and management. Portable tablets for inspection, with construction management software / apps installed can help City Staff or City representatives to document work and communicate in the field. For example in-field management of schedules, change order process support, creation of contemporaneous construction records, photographic documentation, materials tickets recording, documentation of baseline conditions, and electronic record creation and filing. These systems could also provide information to the inspectors such as real-time access to drawings, specifications, or contract document provisions.

- Group Communications for time-critical decision support. Whenever a job is halted in the field, enormous expense accrues that will either be borne by the contractor or the City. Resolution needs to be as quick as possible to minimize this unproductive deadweight loss. Communication systems can document the timeframe, process, information for decision making, and notifications or directions from the authoritative, responsible person.

- Data interchange with contractors or equipment. Contractor back offices probably produce a lot of information with respect to the work that was performed. Execution of a particular job probably has metrics or information such as materials tickets or materials testing results. Advanced machinery has the ability to report location, in-service data, or construction performance data. This data has the potential to improve accountability as well as reduce construction cost.

- The street department still circulates contracts for signature. The use of "DocuSign" or other acceptable technology would eliminate the time, expense, and hassle of paper shuffling and produce an electronic record which is a more consistent documentation of what occurred and eliminates the backend conversion of paper to electronic records.

Part of the challenge is defining standards. Part of the challenge is re-defining processes. Part of the challenge is systems. There is a need for a re-design of the system from the big picture all the way to the small picture. This is the same challenge that is faced by numerous entities that engage in road construction and asset management as part of their regular business practices. The first step is probably to review a number of public and private entities, as well as other internal City departments, to incorporate actual experience and actual solutions to eliminate the trial-and-error of theoretical discovery.

2.6 Incorporation of Technical Advances

Finding / Recommendation 2.6:

The Committee recommends that the City define a formal process in place for the intake, evaluation, trial, and acceptance of new technologies.

Technical innovation has transformed almost every industry within the last generation. The improvements have come in the form of chemistry/materials, information systems, and machinery, among other areas. Correspondingly, street management and construction have seen improvements in technology as well. These improvements lead to lower cost, reduced labor content in construction, or longer road lives.

There is no need for the City to risk being an early adopter in order to get the benefit of these advances. Certainly other governmental entities or private industry have probably conducted the research and development of these processes and technologies and have proven the performance in field trials or actual installations. If a process or technology has a proven track record in a similarly situated usage, then it should be evaluated by the City in order to save money or improve street lifespan.

There are numerous vendors of additives to streets during the reconstruction or seal coat process. Certainly there are many vendors willing to sell ineffective or cost-ineffective products, and the City should be on guard to protect its interests. However, the Committee believes that there are many products that have the ability to substantially improve the efficacy of existing processes in terms of street-life extension.

Many of these products seem especially effective at stabilizing streets in wet environments, which is a particular problem in Corpus Christi. The Committee recommends that the City undertake a formal process to consider and trial these innovations. It is probably as simple as verifying a successful implementation of these materials by a similarly situated municipal entity to initiate a small-scale trial locally. The Committee believes that the potential of these products will produce substantial cost savings in the long run.

Machinery has the potential to make labor more efficient and improve product quality. This incorporates issues of machine specialization, the right size for a particular job, onboard measurement/intelligence, and materials utilization efficiency, as examples.

2.7 Hidden Cost of Understaffing and Staff Turnover

Finding / Recommendation 2.7:

The Committee finds that budgetary savings that result from understaffing, unfilled vacancies, or under-compensation probably are outweighed by increased project costs, increased training costs, high-cost of contract labor, or lost value due to deferred maintenance. As such, we recommend appropriate staffing levels and market compensation for demonstrated performance. This is both a quantity and quality of workforce issue. We recommend that the City Council increase Street Operations crew staffing and equipment by three crews.

The City engages in multi-million dollar operations either directly or in an oversight capacity. As such, qualified individuals can have a multi-million dollar impact on the cost of maintenance, construction, or asset values. These individuals require fair-value, market based compensation in order to attract and retain talented leadership and workforce.

There is an enormous cost to the City when street projects are delayed. This cost is hidden from view until it becomes very real, usually in the form of budget over-run. It impacts the City in terms of increased cost of projects due to inflation which has occurred during the delay of bond projects for example. Another example is the increased damage to streets when preventative maintenance such as seal coats are not completed on schedule. Street related departments have experienced double-digit vacancy rates.

Within the street operations department, the loss of skilled equipment operators requires expensive retraining of remaining employees, mandatory outsourcing of street work to contractors, or irreplaceable loss of expertise. City Staff estimates that the budget for pavement operations has been essentially flat for 10 years which is equivalent to cutting the budget as compared with inflation and road-network growth.

Training is an investment that makes employees more valuable to the City. However that value is lost and the expense of training wasted, if the employee goes to another city or private contractor. This is especially true if the employee leaves the City shortly after training and before the City benefits from the value received through improved service. The City must address this issue by paying market priced compensation, including wages and benefits. It should also consider recapture of training costs if the employee leaves shortly after training.

While it is easy to underfund personnel positions to save on-budget dollars, there may be a real overall loss to the City as these increased costs of doing business vest over time in the form of higher project costs or cost of maintenance.

Street Operations believe that skin patches done in dry weather hold much longer than just pot hole filling. Execution of skin patches requires a level-up crew and equipment. Currently the department has two level-up crews and has requested additional crews in decision packages in the past that have not been approved. Staff believes that two more crews (12 full-time equivalents) and equipment would help the efficiency of existing operations and provide workforce to allow internal completion of TAR program work (the TAR program as explained in Section 3.1).

Street Operations believe that a base-rework crew (8 full-time equivalents) and equipment would allow it to internally perform the street Rework process (the Rework process as explained in Section 3.2).

2.8 Engineering versus Construction Project Management Perspective

Finding / Recommendation 2.8:

The Committee recommends that the City expands the pool of qualified workforce by exploring the hiring of certified or experienced construction project managers to fill roles within relevant City departments which have heretofore unnecessarily required an engineering certification as a precondition for job consideration.

Engineering is a particular knowledge set which is validated by professional licensure. It is critical to many processes and projects and may be required by law, insurance, or best practices. Although some engineers may be excellent construction project managers, some are not.

Much of the professional engineering required by the City to support its projects is provided by outside engineering firms and individuals. Their work is validated by engineers internal to the City. Because the City primarily relies on outside engineering for proper design at project inception, the City is already in a position to refocus the department on construction project management.

However, it seems to the Committee that much of the workflow which is the responsibility of the Engineering department is better understood as a construction project management challenge. A successful construction management process actively manages and balances cost, quality, and timing. We think that the department would benefit from an increased emphasis on these aspects.

By specifying construction management expertise (as opposed to engineering) during the hiring process, the department may be able to get qualified and experienced people from a larger pool of applicants. Hence the possibility of increased quality and lower cost. Individual qualifications can be demonstrated with appropriate certifications or demonstrated practical experience.

Del Mar College can be a resource for training of existing Staff, as a source of interns, or recent graduates as well trained employee prospects.

2.9 Seal Coats

Finding / Recommendation 2.9:

The Committee recommends continuation of the SPMP seal coat program. However, data must be gathered in order to judge cost effectiveness and efficacy of the program.

The City undertakes seal coats in order to prevent the degradation of good streets that meet a particular physical standard. Seal coats are a widely-used treatment that involves the application of a mixture of water, asphalt emulsion, aggregate, and additives to an existing asphalt pavement surface. The treatment is designed to add additional wear surface to a road that is in good condition as well as to inhibit water intrusion. There are variations on this treatment including fog seal, slurry seal, chip seals, scrub seals and cape seals.

Currently this type of treatment is mostly, although not exclusively, funded through the Street Preventative Maintenance Program ("SPMP"). That program currently divides the funding between arterial/collector streets and residential streets. For 2016, the seal coat budget was $3.45 million, with the spending divided as 45% arterials/collectors, 55% local/residential.

It is also likely that the SPMP funding is insufficient to provide seal coats on all roadways for which the engineering assessment would indicate seal coat treatment.

Efficacy is strongly impacted by the initial condition of the road that receives the seal coat, the weather conditions during the time of application, proficiency of the application road crew, and choice of materials, among other factors.

Since the City had undertaken a large-scale seal coat program starting in spring 2014, there have been challenges effectuating seal coats related primarily to weather and contractor delays with the result that the work has been substantially behind schedule. However, the City's internal street operations crew has had success completing large-scale seal coat projects.

It is unclear to the Committee if the seal coat treatment actually preserves the life of the roads. We strongly believe that this is an open question which must be systematically evaluated by City Staff to determine cost effectiveness of this treatment within the next few years. We strongly encourage evaluation of street cohort groups through time to judge the value of seal coats using definitive data. It is important to design the data collection protocol now, so that the City can effectively monitor road performance.

The SPMP is too new to judge and Staff has learned from the new program in order to improve all aspects. However, the historical record of prior seal coat programs offer an incomplete, but un-inspiring picture.

Further, we believe that citizen satisfaction with seal coats on arterials and collectors has been low, because this category of treatment does not fix ride quality on roads that have a poor ride prior to sealing.

We believe that it is likely that technical improvements in commercially available industrial additives are likely to improve the performance of the seal coat treatment, and these should be evaluated.

2.10 Overlays

Finding / Recommendation 2.10:

The Committee recommends continuation of the SPMP overlay program with a reallocation to increase the relative spending on residential collector streets.

The City undertakes preventative maintenance on the streets in order to prevent the degradation of good streets. The overlay treatment consists primarily of milling off the surface portion of the road to a depth of between 1" to 2" with the replacement of the asphalt ride surface.

The City had undertaken a large-scale overlay program starting in spring 2014, with good results. The projects have generally been completed on time and within the expected budget. Currently the City does not conduct large-scale overlays with City crews, primarily because of the lack of expertise and experience within the City street operations group.

We believe that citizen satisfaction with overlays has been very high. The treatment gives the road an improved appearance and ride. However, because of the extensive nature of the street work associated with this treatment, the City has undertaken ADA upgrades, sidewalk, driveway, and curb/gutter renovation at the same time as the overlay process on the street surface. While the results have been very good, and the value very good, the cost for each road resurfaced has been high in terms of dollars spent per area of road overlaid.

It is also likely that the SPMP funding is insufficient to provide overlays on all roadways for which the engineering assessment would indicate overlay treatment. The SPMP overlay funds service arterials, collectors, and residential streets.

Currently this type of treatment is mostly, although not exclusively, funded through the Street Preventative Maintenance Program ("SPMP"). That program currently divides the funding between arterial/collector streets and residential streets. For 2016, the SPMP overlays had a $10.4M budget with the division of work being 47% arterials/collectors, 53% local/residential streets.

The Committee recommends that City Staff adjust the allocation of overlay spending to reflect: 40% arterials/non-residential-collectors, 25% residential-collectors, and 35% residential/local streets. In particular, the Committee believes that many citizens have the perception that residential collectors are residential streets. But because collectors have more traffic, higher traffic speeds, and longer travel distances we believe that better allocation of this scarce resource to residential collectors will result in a dramatically improved ride quality and corresponding citizen satisfaction.

The Committee recognizes that if funds are reallocated as we recommend, that there will be approximately $1.9 million less spent on overlays of true residential streets as compared with historical amounts. We believe that this is prudent because there will be substantial improvement in streets that

most citizens consider as residential. In addition, spending efficiency improves such that more street surface is renewed because collectors have a higher percentage of overlay spending in the street surface as compared with residential streets which have less surface area relative to required ADA, curb/gutter, and sidewalk spending.

2.11 Residential vs. arterials/collectors

Finding / Recommendation 2.11:

The Committee recommends prioritization of incremental spending on arterial/collector streets.

The Committee has been tasked with the reconstruction of Corpus Christi's residential streets, and we have presented recommendations thereto. Residential streets are important to keep in good repair as a matter of damage to property, public safety, civic pride, and in support of residential property values.

However, the City has an enormous need to reconstruct and improve arterial/collector roads too. The Committee believes that the condition of the arterial/collector roads has a larger impact on the citizens because most citizens, almost all commercial traffic, and many visitors spend more time and drive at higher speeds on the arterials/collectors. Therefore, while it is important to establish a credible residential street reconstruction program, incremental spending of available funds is better spent on arterial/collector streets.

2.12 Grandfathering of Street Design

Finding / Recommendation 2.12:

The Committee recommends initiation of legal review to explore the ability to apply current road construction standards to projects that would otherwise be grandfathered to build outdated designs for many years in the future.

The City gains most of its new residential roadway by acceptance of completed streets by private developers following construction of new subdivisions.

The City adopted improved specification for residential streets in 2013. We think that it was the general expectation that the improved standards would be implemented as new development tracts were built. It is the responsibility of the land developer to build streets according to City specifications when farm fields are turned into a neighborhood residential development within the City limits.

However, this is not the way the process currently works. As a result, many new subdivisions that have been completed since 2013 and will be completed in the future do not reflect the current design standards.

This unexpected result occurs because the City regulations are grandfathered for that development at the time the initial plat is filed and accepted by the City's Development Services Department. After that initial-plat, it may take as long as fourteen years to completely develop that neighborhood for the entire development span, yet the grandfathered rules apply.

As a matter of process, the developers are typically given a two year window to complete development of the initial-plat. However, it is the expectation of virtually all developers that the lifespan of the development will be many years in the future. As such, it is common practice for the Planning Commission to renew the plats for two year intervals near each expiration date.

It seems to the Committee that at the time of any renewal, the time extension could be conditioned upon acceptance of certain new regulations. This is the policy question at hand to be considered.

There is certainly a balancing act necessary when considering forcing new regulation on a developer in the middle of a project. Some regulatory changes would impair the fundamental economics of the project and would be imprudent for the City to impose. An example of this would be the increased radius of a cul-de-sac circle, which was added to the development code to facilitate turning of heavy trucks including fire protection. If this were forced on a developer, the parcels adjacent to the cul-de-sac would need to be resized, setbacks adjusted, and the development plan necessarily reconfigured. We view this as an example of an unfair, imprudent, and unnecessary burden.

The Committee, in conjunction with the Staff of the Engineering Department and Development Services, believes that the prudent middle ground would be to condition plat renewal on non-geometric changed regulation. From the perspective of the Street Committee this would include the construction standards for street cross-section, curbs, gutters, sidewalks. We believe that the City Development Services Department will have a similar list of affected systems such as required water or wastewater pipe size, for example.

Allowing continued development using old street standards has a substantial cost to the City because of increased maintenance cost, problems with storm water runoff, or pre-mature failure requiring reconstruction earlier than expected according to current standards.

However, before any action is taken, there must be a thorough legal review. State law may preempt the ability of Corpus Christi to directly address the issue.

2.13 Improving Street Standards

Finding / Recommendation 2.13:

The Committee recommends that the City consider improved street standards or construction damage mitigation such as increased warranties, delayed acceptance, or delayed installation guaranteed by performance bonds.

During new neighborhood subdivision development, the streets are built prior to home construction. Substantial damage can occur as concrete truck loads or other heavy equipment associated with the

building of the subdivision by the developer transits the new streets. The City should evaluate strategies to reduce its exposure to increased cost related to this type of damage. These include:

- Lengthened warranty periods
- Delayed acceptance of the roads
- Delayed installation of road wear surface or sidewalks with developer performance guaranteed by performance bonds or cash
- Consider concrete streets for new road construction within residential subdivisions.

Improved street design standards may also be necessary. Streets engineering is an advanced and well understood science. However, as a general matter, the design standards for streets rely on a series of assumptions that are converted by formula into a profile for the street design. Thus when a street is designated as having a 30-year design life, it is often a short-hand estimate of Equivalent Single Axel Loads (often abbreviated as "ESAL").

If the assumptions which feed the formula are incorrect, or if road use changes, then the road will not achieve its design life in terms of years. Examples include:

- Incorrect assumptions with respect to the weight of garbage trucks, recycling trucks, delivery trucks, or busses which have tended to increase in weight or frequency as compared with historical periods.

- Usage may increase on a residential street if it inadvertently becomes a through-street due to issues of construction on neighboring streets or congestion on nearby arterials and collector streets.

- Street usage far beyond design life. The City currently contemplates using a street for 60 years even though the initial design life was 30 years.

Design-life extension can be simplified to be thought of as increased base and wear surface depth. Because road elevations get set on primary construction, it is much, much easier to increase these parameters on new construction as compared with redeveloping older streets to these new standards. Further, in most reasonable scenarios, additional base material has the effect of making maintenance and reconstruction cheaper in addition to expanding the useful life of the roadway.

More work has to be done, before a clear course of action is apparent.

2.14 Construction in the ETJ

Finding / Recommendation 2.14:

The Committee recommends that the City consider a strategy to address street construction in the ETJ to limit exposure to increased costs if those roads become City responsibility through annexation.

The City should also understand and catalog construction of residential streets in the ETJ. As the City grows, these streets will become the financial and operational responsibility of the City. If they are substandard because the City has no jurisdiction or if they are not properly inspected, then this will become a very expensive burden on the City as expansion occurs.

The County encourages construction that omits common features such as curb, gutter, sidewalks, or some storm water improvements so that it does not become responsible for maintenance of these expensive systems.

Because the City may have no or limited authority over new construction in the ETJ, the Committee recommends working closely with the County to address this issue.

2.15 Storm Water

Finding / Recommendation 2.15:

The Committee recommends that the City evaluate the stormwater problem outside of the purview of this Ad Hoc Committee.

Standing water due to ineffective stormwater drainage is a significant contributor to the degradation of City streets.

Unfortunately, stormwater is a complicated and expensive responsibility of the City. Effectively moving stormwater has a large impact on street health, safety, and the potential for property damage. The issue presents complex engineering challenges, land use issues, and an enormous funding problems.

The Street Committee believes that successful understanding and resolution of these issues is beyond the capabilities, timeframe, and resources of the Committee and, as such, we have no opinion on this matter other than making a small budgetary allowance within reconstruction scenarios.

Section 3 – Street Treatment Types

The need for street maintenance and reconstruction is large. However, the budget is necessarily small. As such, there will always be difficult choices that must be made to allocate scarce funding for maximum effect. Life extension of existing assets is the only way to cope with the physical and fiscal reality.

Ultimately, any street management program will be a combination of the following treatments:

3.1 Targeted Area Reclamation ("TAR")

Finding / Recommendation 3.1:

The Committee recommends that the City funds a program of residential street spending to achieve a Targeted Area Reclamation (a "TAR") with a defined budget amount and program cycle time. The TAR is a proactive, intensive maintenance cycle applied throughout the City to extend the functional life of streets until reconstruction can occur.

The Targeted Area Reclamation is an intensive maintenance program which is designed to pro-actively service streets throughout the City. The goal of the targeted area repairs is street life extension.

The TAR program repairs targeted areas to alleviate damaging conditions, dangerous conditions, low quality ride areas, or other specific areas that need remediation. Examples of problems that would be addressed can include but are not limited to jarring dips, recurring pot holes, and lane sag as examples. The TAR could also be used to achieve signage/striping designation of Metropolitan Planning Organization ("MPO") bike routes on residential streets, to the extent that these improvements are not directly funded by the MPO.

Remediation treatments can include but are not limited to area wear-layer treatments, micro-surfacing, area limited depth repair, area full depth repair, level-up treatments, structural pot hole repair, and signage/striping improvement, as examples. Improvements may also be made to curb, gutter, and flatwork as necessary. These treatments are currently used by the City on a smaller scale and more reactive basis. So there is substantial precedent that this type of process is both achievable and effective.

There will also be overlay-type improvements in the limited case where the streets require minimal ADA, curb, gutter, or flatwork. In these cases the overlay process is extremely cost effective, because almost all the money funds street surface renewal and little is required to be spent on ancillary facilities.

There are two key policy decisions that must be made with respect to the TAR process:

- The budget per unit of area. Policy makers would determine the annual amount of the program in their sole discretion. However, the Committee envision that the annual amount is approximately sized to be the financial equivalent of reconstruction of 10% of the surface area of the streets with a PCI < 55 within a defined area.

- The cycle time to service all areas. The promise to the citizens is that by completing a TAR cycle, each neighborhood within the City will have received proactive intensive maintenance within a defined number of years. It is this promise to the Citizens that is an important part of any policy. The Committee believes that the appropriate range of cycle span is five to seven years.

The first element of defining the TAR process is to determine Project Units which are geographic areas that segment Districts into areas for which an annual TAR workplan is produced. Project Units are logically defined, compact areas within City Council Districts that each have approximately the same square yardage of surface area of residential streets with a PCI less than 55. The number of Project Units within a district is equal to the number of years required to achieve intensive maintenance to the entire District area. For example, if the policy makers determine that the entire City should receive TAR maintenance over a five year cycle, then there would be five Project Units within each district. The Project Units will be designated by District number and year order related to a particular TAR cycle. As a hypothetical example on a five year cycle for District 1, there will be TAR 1-2017, TAR 1-2018, TAR 1-2019, TAR 1-2020, TAR 1-2021.

The second element of the TAR process is to allocate funding to each Project Unit. The allocation is made by taking the total annual budget amount and dividing by the total square yardage of all Project Units expected to be completed for that particular year. The resulting amount is the allocated dollars per square yard. This factor is multiplied by the square yardage of a particular Project Unit to determine the total budget dollars available that year for a particular area.

The third element of the TAR is a detailed workplan for the streets within that year's TAR Project Units. The workplan is determined by a qualified street expert. The workplan identifies the specific problems and the proscriptive fix for each location. The amount and degree of work is limited by the budget allocated to the area under review.

TAR treatments would not be implemented on streets that had failed and are included in the Rebuild program.

While the spending between districts may be uneven due to the differing amount of residential roads in poor condition within each district, each area would receive funding proportional to the amount of poor condition streets in a particular area as compared with the City as a whole. We think that this achieves equity in street maintenance among citizens across the City.

The TAR process does improve the utility and safety of the streets. This method stretches the life out of streets to the fullest extent possible; however, it is not a substitute for replacement of failed streets or facilities. We do think that this approach benefits the City's water and wastewater utilities by allowing time for them to engage in an independent process to prioritize their spending to meet EPA requirements and assess under-street facilities health.

As compared with traditional reconstruction alternatives, the TAR is very effective at reclaiming problem areas of the surface of residential City streets per dollar spent. However it must be acknowledged that it achieves this by not improving curbs/gutters, under street utilities, or storm water drainage in material amounts.

The typical street serviced by the TAR will have sections that are unimproved. The damage repair in the areas that have received the intensive reclamation will appear to be new road surface. Visually the street will have a patchwork appearance, but the damage in the target area will be fixed.

The City may implement TAR treatments using both internal street operation resources as well as outside consultants. In addition to the large-scale contractors, we believe that there will be the opportunity for the City to strategically and effectively use small contractors to provide specific treatments or over small areas.

We believe that the first TAR cycle has the most value to address the most visible and ride impacting problems. The Committee recommends that the TAR program is reviewed in its entirety after the first cycle to judge its effectiveness and to assess the incremental value of a second cycle. We believe that the completion of the first TAR cycle will probably coincide with the completion of the Harbor Bridge and other major road projects such that availability of materials, contractors, or experienced workers may impact City priorities or cost structure of road repair.

3.2 Rebuilding Residential Streets

Finding / Recommendation 3.2:

The Committee recommends that the City funds a program of residential street spending known as Rebuild with a defined budget amount. Streets that are rebuilt will receive a new wear surface, base renewal, curb/gutter/ADA improvements, and under-street utilities as required.

Rebuild consists of a choice between two methods to address a failed street, either rework or reconstruct. The choice between these two processes for any particular street is determined by evaluating the street base, sub-soil, and existing materials quality in order to determine the possibility or degree of reuse of existing street materials. There is also evaluation of the under-street water, waste water, gas, and stormwater utilities for replacement or reconfiguration which may impact the decision between rebuilding methods.

During the rebuilding process curb, gutter, flatwork, and ADA required improvements are made.

Rework:

The rework process is a proven and cost effective method of rebuilding failed streets. For streets that are tested and have sufficient base and favorable sub-grade conditions, the City can rebuild the street using a rework process. That process mills the existing surface and base, stabilizes the mixture with additives, and re-uses about 80 percent of the materials in situ. A new wear surface is applied as the final step.

The street is functionally new at a cost less than full depth reconstruction.

The City used to complete the rework process with internal crews. The best example is Texan Trail between Reid and Staples that was reworked in August 2011 and remains in excellent condition.

Reconstruct:

Reconstruction is the required rebuilding process for failed streets where testing indicates that a rework is not possible or for streets that must be reconfigured. The existing material is removed. The sub-grade soil is mechanically and chemically stabilized. New base and wear surface is applied.

During the Reconstruction process, the under-street water, waste water, and gas utility facilities are evaluated and replaced if necessary to be funded by the respective utility departments. Stormwater will be considered subject to a budget limitations.

Section 4 – Prioritizing Street Rebuilding

4.0 Prioritization Recommendation

Finding / Recommendation 4.0:

The Committee recommends prioritizing street rebuilding according to a process that considers road condition, safety, maintenance history, proximity to schools, population density, utility coordination, transportation coordination, and road network connectivity.

In order to effect a rebuilding program, failed streets must be prioritized. This is a very difficult process to define but it is critically important so that it is implemented in an unbiased manner across the City and free from political considerations as much as possible. The process must be transparent, stable, organized, and well understood by all stakeholders. The results must be documented and available to the public.

The deliverable from the City to the citizens is a list of streets in order of expected reconstruction for each District. Each street accepted for reconstruction would have a defined work plan and associated budget. Roads not accepted for reconstruction would be eligible for service by the TAR process.

The Committee expects that the prioritization process will occur on a two year cycle which corresponds to recent Transmap data (or the equivalent) and the expected cycle of automated measurement of street health.

Prioritization Step 1 – Determination of Budget by District:

Each year, in conjunction with the budget cycle, the determination is made to divide the amount budgeted for street rebuilding between Districts. The calculation is designed to allocate budget according to relative need.

The City shall determine the total square yardage of residential streets with a PCI value of less than 55 for each District. Using the aforementioned total, the percentage of the annual budget for each District shall be the proportion of square yardage for the streets within a particular District as a ratio to the total square yardage among all Districts.

Prioritization Step 2 – Triage:

The candidate list of streets to be considered for Rebuilding shall consist of each residential street segments with a PCI of less than 20. The ranking process should be repeated for each District, because each District will have an independently prioritized list of streets designated for Rebuilding.

The triage is important because there are hundreds of streets that are in poor condition, and there is not enough budget or contracting capacity to address them all. By making an upfront determination of severity using a data-centric ranking, the City avoids spending time, labor, and expense to evaluate every situation in a detailed manner, but for which there are insufficient funds to address through

reconstruction. This process is also an important feedback mechanism for conditions that can be ameliorated through the TAR process.

The street candidate list shall then be scored according to the following matrix:

Element	Description
Ridability	The City will evaluate the use of the International Roughness Index, as provided by Transmap, as a proxy for degradation of road surface. Most people perceive road roughness as the indicator of road quality. The rougher the road, the higher the rank for a particular street.
Safety	The City will evaluate the accident reporting from the City's various public safety departments. The higher the incidence or severity of accidents, the higher the rank for a particular street.
Maintenance History	The City will evaluate the historical record of repairs to a particular road segment in order to determine the frequency of material problems. Repeated repairs within the same road segment can indicate the need for the rebuilding as a permanent solution to recurring problems. The higher the number of recurring problems per review period, the higher the rank for a particular street.
Proximity to schools	The City will evaluate the proximity of the road segment to schools. Schools generate substantial local traffic and need safe streets and supporting street infrastructure such as curbs, gutter, and sidewalks. The closer the street is to a school, the higher the rank of the street.
Population density	The City will evaluate the population density along the road segment if the data is available throughout the City or alternatively as a density of improved lots as a proxy for population if the data is otherwise unavailable. The higher population density, the higher the rank for a particular street.
Utility coordination	The City's utilities have under-street utilities for about 50% of the residential streets. The utility will report the street as a priority, neutral, or negative based on utility knowledge of the conditions and cost of replacement for facilities. A particular street will be ranked from priority as highest and negative as lowest.
Transportation coordination	The City has transportation priorities as determined by traffic engineering to increase safety or reduce traffic backups as examples. There are also planning organizations such as the

	MPO which have designated certain streets as being important to the transportation health of the City. The City will score each street as priority, neutral, or negative based on traffic priorities or planning organizations. A particular street will be ranked from priority as highest and negative as lowest.
Road network connectivity	Residential road segments at each end have either a dead-end, another residential street, a collector street, or an arterial street. The City will calculate a score for a particular street based on the importance of the connections at both ends. Streets will be ranked based on the intensity of their road network connection. Arterial connected streets will rank highest, residential road / dead end streets will rank the lowest.

The ranking for each category listed above shall have the same weight. Staff will determine the optimal scoring matrix consistent with Committee priorities.

The list shall be truncated at 140% of the estimated square yardage that can be serviced within a two year period using standard cost estimates for reconstruction, the expected annual budget, and the square yardage of the street segments. However, for discussion purposes, the Staff may generate a five year list.

We have chosen variables that attempt to fix the streets in worst condition but have the highest social impact. We have also tried to improve the efficiency of City spending by identifying roads where a fix can eliminate maintenance costs associated with recurring visits or avoid replacement of utility facilities that have remaining useful life.

Prioritization Step 3 – Information Gathering:

The third step is to gather information necessary to ensure quality of the list results as well as estimate cost of rebuilding for each street segment.

For each street segment on the list, a qualified person will visit the street to confirm the degree of street surface failure, evaluate expensive proximate problems such as insufficient stormwater drainage, quality of base or other materials, and condition of curbs/gutters/flatwork/ADA, among other variables. If the street condition is consistent with expected degree of failure, then the street segment will remain on the list for further evaluation.

The City should develop a workplan and standard-cost budget estimate for the street segment rebuilding:

- City and non-City utilities will be notified that street is being considered for replacement so that they advise the City if the street impacts their independent strategic priorities.

- Gather historical information regarding street construction, surface/sub-surface testing, maintenance history, third-party street work, etc.

- Estimate budget for replacement using standard cost methodologies for surface, curb/gutter, ADA, utilities net of any possibility of cost sharing or reimbursement from non-City entity.

- Estimate budget for any required stormwater facilities cost or other special situation costs.

- Estimate saving associated with efficient mobilization related to other City projects or between street segment candidates.

- Notify any potential sources of cost sharing such as other governmental entities or third-party utilities.

The workproduct for each street is a small decision package which is easy to create consisting of the net-cost budget, a short narrative, a few pictures, and an overhead street view.

Prioritization Step 4 – High Cost Exception Diversion:

The fourth step is the diversion to high-cost exception list. Certain streets that have failed and would otherwise have a high priority are disproportionately expensive to rebuild. The best example of a condition causing high cost is the need for improvement or addition of stormwater facilities.

Because the total funding for rebuilding is limited, there is the potential for a high-cost street to absorb a large fraction of the Rebuild budget to rebuild a single street. By moving the high-cost streets to a separate list for consideration of supplemental funding, the number of regular cost streets which can be rebuilt is maximized.

Here is the process for diversion of high-cost streets from the regular rebuilding list:

- If stormwater or other special situation costs are more than 20% of the estimated budget, then road is placed on a “High-Cost Exception List”

- High-Cost Exception List gets circulated to City Council or other relevant City departments

- The high-cost element is specifically funded or not
    - Dedicated stormwater funding source or allocated funds for purpose
    - Private or third-party funds
    - City Council direction for appropriation or for street program to absorb cost

- If high-cost element is funded, then street returns to normal ranking process

- If high-cost element is not funded, then street stays on high-cost exception list

Prioritization Step 5 – Finalization of Rebuild Annual Work Plan:

The Rebuild Annual Work Plan is established by assuming rebuilding of streets in rank order from the list for each District. The Rebuild Annual Work Plan is then communicated and authorized:

- Publish to public and provide City Council with preliminary findings with respect to streets, scoring and District list
- Public hearing hosted by City staff, can be central or by District
- Following public hearings, the City Council ratifies Rebuild Annual Work Plan

Once a road is accepted on an annual work plan, it will be completed in the expected year or become the first road for the next year rollover. If the City is ahead of schedule and under budget, then the street rebuilding can continue down the list in regular order of District rotation or savings added to subsequent year's plan. If work is over-budget, then amount is 'borrowed' from subsequent year's annual work plan.

Streets on ranking list but not in a work plan are referred to TAR list. With City Council approval, unplanned road reconstruction may be jumped into line within a District for good cause, to be determined by the City Council.

Results of the finalization and regular reporting of progress should be communicated to the public with respect to any particular street.

Other Considerations:

The Committee is recommending the use of PCI and the related roughness index as a major component to prioritize streets.

However, many on the committee have substantial reservations as to the usefulness of PCI in the lower value ranges (i.e. less than 40) as a measure of comparative street health. In making our recommendation, we are trusting the Staff representation to the Committee that the new values from Transmap highly correlate to actual street health.

If the Transmap values demonstrate the lack of correlation with street health that we observed in the prior City data, then other proxies or methods must be substituted in order for the City to achieve maximum benefit from this program.

Section 5 – Reconstruction Scenarios

The goal for the reconstruction program is to get the process underway at a level that credibly starts to address the problem of rebuilding residential streets. Unsurprisingly, if the City spends more money, it can rebuild more streets. If we successfully plan and execute a baseline plan, then there will be the opportunity to add funding on a one-time or recurring basis and accelerate the process.

With this in mind, the Committee presents funding scenarios of $10 million, $14 million, $15 million, $17 million and $20 million per year. Certainly intermediate funding levels will produce intermediate results.

Whatever level of funding is chosen, it will be prudent to reassess the plan in a five year timeframe. Within the next few years, the building of the Harbor Bridge and other TxDOT projects will present a challenge and opportunity for street operations. The challenge will be competition for experienced crews, materials, and contractor attention. The opportunity will be the potential for increased contractor capacity and new materials supplies to flow into the region. The key will be to reassess street programs at the end of the Harbor Bridge project, with the possibility of expanding City street replacement to take advantage of the wind-down of those projects.

Here is the spending by treatment for each scenario:

Program Size	$10 mm	$14 mm	$17 mm	$20 mm
TAR (Cycle length)	$0	$9 mm/yr (7 year cycle)	$12 mm/yr (5 year cycle)	$12 mm/yr (5 year cycle)
Rebuild	$10mm/yr	$5 mm/yr	$5 mm/yr	$8 mm/yr
Totals	$10 mm/yr	$14 mm/yr	$17 mm/yr	$20 mm/yr

$10 Million Scenario:

The $10 million scenario primarily spends the funding directly on rebuilding failed streets. Because the funding amount is small, it is unlikely that it would be worth the effort to establish a TAR program.

Program Table	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 29	Year 30
Annual TAR Milage Equivalent	-	-	-	-	-	-	-	-	-	-	-	-
Annual Milage Rebuild	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
Annual Milage Rebuild Equiv	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
Cumul Milage Streets Serviced	4.7	9.4	14.2	18.9	23.6	28.3	33.0	37.8	42.5	47.2	136.9	141.6
% Street Rebuilt Equivalent	1%	1%	2%	2%	3%	3%	4%	5%	5%	6%	17%	17%
Total Program Spend	10,000,000	10,200,000	10,404,000	10,612,080	10,824,322	11,040,808	11,261,624	11,486,857	11,716,594	11,950,926	17,410,242	17,758,447
Associated Util Spend	4,993,307	5,093,174	5,195,037	5,298,938	5,404,917	5,513,015	5,623,275	5,735,741	5,850,455	5,967,465	8,693,469	8,867,338
Storm Water	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
Total Cost to City	15,993,307	16,293,174	16,599,037	16,911,018	17,229,238	17,553,823	17,884,899	18,222,597	18,567,049	18,918,390	27,103,711	27,625,785

Rebuilding streets is expensive. By the end of year 5 only 3% of the streets would be rebuilt. By the end of year 30 only 17% of the streets would be rebuilt. Including an estimate of the associated utility spending, the total impact of the project is approximately $16 million per year.

$14 Million Scenario:

The $14 million scenario contains a TAR with a seven year service cycle and $5 million in rebuilding.

Program Table	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 29	Year 30
Annual TAR Milage Equivalent	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2
Annual Milage Rebuild	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Annual Milage Rebuild Equiv	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
Cumul Milage Streets Serviced	11.5	23.1	34.6	46.2	57.7	69.3	80.8	92.4	103.9	115.5	334.9	346.5
% Street Rebuilt Equivalent	1%	3%	4%	6%	7%	9%	10%	11%	13%	14%	41%	43%
Total Program Spend	14,000,000	14,280,000	14,565,600	14,856,912	15,154,050	15,457,131	15,766,274	16,081,599	16,403,231	16,731,296	24,374,339	24,861,826
Associated Util Spend	2,496,654	2,546,587	2,597,519	2,649,469	2,702,458	2,756,507	2,811,638	2,867,870	2,925,228	2,983,732	4,346,735	4,433,669
Storm Water	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
Total Cost to City	17,496,654	17,826,587	18,163,119	18,506,381	18,856,509	19,213,639	19,577,911	19,949,470	20,328,459	20,715,028	29,721,073	30,295,495

The inclusion of the TAR stretches the street surface funding primarily by ignoring problems with curbs, gutters and ancillary facilities. By the end of year 5, an equivalent of 7% of the streets would be rebuilt. By the end of year 30, an equivalent of 43% of the streets would be rebuilt. Including an estimate of the associated utility spending, the total impact of the project is approximately $17.5 million per year.

As compared with the scenario that is weighted to rebuilding, utility expenditures are reduced. While the street budget increased by $4 million per year, the program total only increased by $1.5 million due to the offset.

$17 Million Scenario:

The $17 million scenario contains a TAR with a five year service cycle and $5 million in rebuilding.

Program Table	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 29	Year 30
Annual TAR Milage Equivalent	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6
Annual Milage Rebuild	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Annual Milage Rebuild Equiv	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9
Cumul Milage Streets Serviced	14.9	29.8	44.8	59.7	74.6	89.5	104.4	119.4	134.3	149.2	432.7	447.6
% Street Rebuilt Equivalent	2%	4%	6%	7%	9%	11%	13%	15%	17%	18%	53%	55%
Total Program Spend	17,000,000	17,340,000	17,686,800	18,040,536	18,401,347	18,769,374	19,144,761	19,527,656	19,918,209	20,316,574	29,597,412	30,189,360
Associated Util Spend	2,496,654	2,546,587	2,597,519	2,649,469	2,702,458	2,756,507	2,811,638	2,867,870	2,925,228	2,983,732	4,346,735	4,433,669
Storm Water	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
Total Cost to City	20,496,654	20,886,587	21,284,319	21,690,005	22,103,805	22,525,881	22,956,399	23,395,527	23,843,437	24,300,306	34,944,146	35,623,029

This scenario is probably the optimal level of spending. All neighborhoods get an intensive service within a reasonably short period and the rebuilding gets underway at a meaningful level. Corresponding utility spending is at a relatively low level.

By the end of year 5, an equivalent of 9% of the streets would be rebuilt. By the end of year 30, an equivalent of 55% of the streets would be rebuilt. Including an estimate of the associated utility spending, the total impact of the project is approximately $20.5 million per year.

$20 Million Scenario:

The $20 million scenario contains a TAR with a five year service cycle and $8 million in rebuilding.

Program Table	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 29	Year 30
Annual TAR Milage Equivalent	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6
Annual Milage Rebuild	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
Annual Milage Rebuild Equiv	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3
Cumul Milage Streets Serviced	16.3	32.7	49.0	65.3	81.7	98.0	114.3	130.7	147.0	163.4	473.7	490.1
% Street Rebuilt Equivalent	2%	4%	6%	8%	10%	12%	14%	16%	18%	20%	58%	60%
Total Program Spend	20,000,000	20,400,000	20,808,000	21,224,160	21,648,643	22,081,616	22,523,248	22,973,713	23,433,188	23,901,851	34,820,484	35,516,894
Associated Util Spend	3,994,646	4,074,539	4,156,030	4,239,150	4,323,933	4,410,412	4,498,620	4,588,593	4,680,364	4,773,972	6,954,775	7,093,871
Storm Water	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
Total Cost to City	24,994,646	25,474,539	25,964,030	26,463,310	26,972,576	27,492,028	28,021,869	28,562,306	29,113,552	29,675,823	42,775,259	43,610,765

By the end of year 5, an equivalent of 10% of the streets would be rebuilt. By the end of year 30, an equivalent of 60% of the streets would be rebuilt. Including an estimate of the associated utility spending, the total impact of the project is approximately $25 million per year.

Section 6 -- Financing

Although financing and determining sources of new funds for street improvements was not a primary task of the Committee, it is worth sharing Committee thoughts on program financing, as well as outlining numerous potential sources of funds under discussion for proposed new residential street programs.

6.1 Monitor Activity, Spending and Outcomes from New Residential Street Funding

Finding / Recommendation 6.1:

We recommend the City regularly report and publish a clear accounting of how and where individual program dollars are spent and to be transparent if program funds are increased, decreased or reallocated.

Both the Residential TAR Program and the Residential Street Rebuild (Rework & Reconstruction) Program described in this report are designed as new programs with new funding in order to assure independent tracking and reporting on the activity, spending and outcomes derived from these new dollars.

6.2 Static Funding

Finding / Recommendation 6.2:

We recommend that street program funding be increased annually at least at the general rate of inflation and proportionate network growth.

The Committee recognizes that static funding of programs over time may result in underfunding and/or understaffing program activity. A case in point is funding for City street operations has been flat for over a decade despite growth in the street network and the increased cost of inflation. It is important that program funding be increased annually at least at the general rate of inflation. As the City improves its ability to understand its standard cost structure, we expect the City will be in a better position to better determine growth demands and inflationary impact on actual program spending and then budget accordingly.

6.3 Sources of Funds

Finding / Recommendation 6.3:

We recommend that the Council direct the City Manager to explore all possible funding sources for residential street programs and prepare a recommendation for Council consideration.

RTA Funding of City Street Aspects. Our survey of other Texas cities showed a number of cities receive funding from their Transportation Authorities for both street maintenance and street reconstruction, expanding their traditional investment in bus stops and surrounding street elements, as well as for offsetting the wear and tear of city buses on the street network.

The Committee Chair had preliminary meetings with the RTA regarding their funding of street improvements. In general, these discussions centered on RTA funding of about $1.5 million per year.

Work still needs to be done to define the elements of street projects which support the RTA in their core mission of network transportation. We believe that bicycle mobility and American Disability Act accommodations are elements of street projects that are consistent with the RTA's core mission to serve economically disadvantaged and disabled citizens. Additionally, the journey to and from residential homes to a bus stop is an important part of end-to-end service and leverages RTA's substantial investment in bike and ADA accommodations.

The funding under consideration would be in addition to existing contributions to street programs by the RTA and not a reallocation of existing funding. It is expected that to the extent possible, we will work together to qualify this additional funding for direct or indirect Federal funding. Any actual arrangement between the RTA and the City must ultimately be determined and agreed to by the respective oversight authorities.

Budget Savings and/or Reallocation of Existing Dollars. As part of the City's zero based budgeting initiative, any reprioritization of existing dollars, as well as any identified budget savings, should be considered in developing new funding for proposed residential street programs.

Dedicated General Fund and Industrial District Revenue. The Council's Financial Budgetary Policies Resolution #029848 provides policy direction to the City Manager on the preparation of annual budgets. Included in this resolution are the defined General Fund and Industrial District Revenue contributions to residential street capital improvements. The resolution was discussed at length in the most recent Council Retreat where the Council talked about reviewing these specific policies regularly for appropriate future funding levels, as well as for inflation and growth impacts.

- For 3 years beginning in 2015, transfer $1m each year from the uncommitted fund balance of the General Fund to the Residential Street Capital Fund

- Beginning in 2016, transfer 5% of the Industrial District Revenue to the Residential Street Capital Funding

- In 2021, transfer 1/3 of one percent of the General Fund revenue less grants and industrial district revenue to the Residential Street Capital Funding

- In 2022, transfer 2/3 of one percent of the General Fund revenue less grants and industrial district revenue to the Residential Street Capital Funding

- In 2023, transfer one percent of the General Fund revenue less grants and industrial district revenue to the Residential Street Capital Funding

Repurpose Whataburger Field Debt Service Funds. The 1/8 cent dedicated sales tax known as Type A funds approved by voters in 2002 is coming back to voters this November. Type A funds are allowed to be used primarily for economic development, affordable housing and some special event facility debt. In our case, the $2.5 million in annual debt service for Whataburger Field is funded by a portion of our current Type A dollars. The Whataburger Field debt is paid off September 2017, freeing up approximately $2.5 million a year in 2018 for another purpose.

Council is currently considering November ballot language changing from a Type A program to either a Type B program which allows spending dollars on arterial reconstruction or to a General Revenue program which allows the dollars to be spent on any street reconstruction, including directly on residential streets. If Type B is chosen, some future arterial reconstruction bond programs could be replaced with residential reconstruction bond programs.

Both options allow continued funding of economic development and affordable housing initiatives. Council is also considering a different allocation of these dedicated sales tax dollars to increase the money available for street improvements from $2.5 million to approximately $3.5 million annually.

Charter Revision for Additional Dedicated Operations and Maintenance Property Tax Revenue. The current Charter Revision Committee is set to bring recommended charter changes to the City Council for potential consideration by voters in November. One measure under discussion would allow future City Councils to raise property tax rates under certain constraints for dedicated spending on street improvements.

Dedicated Spending from Revenue Growth. Tax revenue generated by new growth each year in the City should be isolated and reported, with some portion of that revenue increase considered for dedicated spending on residential street improvements.

Ad Valorem Tax Increase. Currently one additional cent on the property tax rate generates about an additional $1.7 million per year which the Council could appropriate for any municipal purpose, including street improvements.

Section 7 -- Communications

7.1 General Communications of Street Programs

Finding / Recommendation 7.1:

The Committee recommends that the City design a standardized communications program so that the public understands the plan for future work, the scope of current work, and an accounting of completed work.

For project based departments, the communication with the public should start with a promise. You give us "$X" dollars and we will give you "Y" streets. The elements of the promise are a proposed budget, a defined scope of work, and a specific timeframe. The promise must be made before work starts; progress must be documented on a periodic basis; and there must be a thorough accounting of the final result.

Here are committee recommendations in an effort to meet the promise standard:

- Electronically publish the engineering work plan and budget associated with each project / contract let.

- The budget year, the work plan year, and the final accounting should all line-up at the end of the fiscal year to the maximum extent possible. At the end of the fiscal year, work planned and actual work performed should be accounted for. Budget versus actual should be clearly disclosed.

- Carryover amounts related to pending or uncommitted-unfinished work should be clearly presented. This allows for consideration of adequate staffing if and when the deferred work is undertaken and so that the make-up of the work becomes a policy matter by leadership.

- Name the work plan in a logical way that indicates when the work is expected to get done. For example the '2016 Seal Coat Work Plan' would be streets expected to be seal coated in fiscal year 2016. Avoid terms like Year 2 Plan, as an example in order to avoid confusion.

- On a monthly (or other) periodic basis, publish the expected work plan and the actual work performed. Publish budget and timing variances as well as the updated resulting work plan.

- Publish the raw data without spending a lot of time massaging – this would include inspection reports, acceptance reports, invoices, contract awards, etc. -- let search algorithms (e.g. google) index and catalog the reporting.

- Publish before and after pictures of the work performed. It would help the average citizen understand the magnitude and scope of work being performed.

- Identify and disclose troubled projects so that there is confidence that issues are being address and not ignored. Everyone understands that problems will occur – the distinguishing character of good management is the ability to adapt and overcome. There is a tendency in large organizations to bury bad news; this inclination must be overcome and be replaced with sense of disclosure.

7.2 Communications of Street Program Complaints

Finding / Recommendation 7.2:

The Committee recommends that the City reinforce existing processes and procedures so that the Call Center can serve as the citizen point of contact for the City's professional response to specific citizen complaints or inquiry.

The Committee recognizes that citizens are the ultimate customer of City services including streets. There is a balance that must be maintained:

- Citizens must be provided with a complete, correct, and thoughtful reply to specific issues that an individual may raise. These situations include complaints about an individual street problem or complaints about contractor/street operations work, as examples among many.

- Direct and unfiltered contact between a complaining citizen and members of the Street Operations or Engineering Department requires a substantial investment of time and department resources. When this occurs, the core mission of the department suffers, the immediate work at hand is derailed, and there is an enormous emotional toll on the individual employees who may not be expert in customer communications.

The City's Call Center already has processes in place to take the complaint and get answers from the relevant departments. The Call Center is also staffed with professional communications experts who are trained to achieve appropriate communication goals. These staff members can also keep City Council or other co-inquiring management in the loop in a more organized manner.

By incorporating the Call Center into the path of complaints, the Committee believes that the feedback to the citizen will be improved, the deleterious impact on the department will be reduced, and City management can have a specific person accountable for professional response to the public.

Definitions

Acquisition Planning –Acquisition planning is the combined role of strategic purchasing and contract administration. Reference page 11, Section 2.4.

ADA – Americans with Disabilities Act, and for purposes of this document, all related rules and regulations related to facilities that require special design

Arterial -- An arterial road is a high-capacity urban road. The primary function of an arterial road is to deliver traffic from collector roads to freeways or expressways, and between urban centers.

Collector -- A collector road is a low-to-moderate-capacity road which serves to move traffic from residential streets to arterial roads.

ETJ – "Extra Territorial Jurisdiction". The ETJ is the unincorporated land within five miles of Corpus Christi's boundary that is not within the city limits or ETJ of another city. It is the territory where Corpus Christi alone is authorized to annex land. To a limited degree, the ETJ enables the City to extend regulations to adjacent land where development can affect quality of life within the city.

IDIQ – "Indefinite Delivery, Indefinite Quantity". A contracting method whereby competing contractors submits bids that consist of à la carte service pricing. Reference page 8, Section 2.2.

Overlay – A street renewal and maintenance process whereby the asphalt surface of the road is milled and replaced with a new wear surface. Reference page 18, Section 2.10.

PCI – "Pavement Condition Index". The PCI is a numerical index between 0 and 100 which is used to indicate the general condition of a pavement based on ride affecting and non-ride affecting conditions. It is a statistical measure of road health. Historically in Corpus Christi it has been based on visual inspection by qualified reviewers. However the process was recently automated by a company known as Transmap. Reference page 31, "Other Considerations".

Rebuild – Rebuild is a process to replace a failed street. For purposes of this report, it is either a Reconstruct or a Rework. The choice between methods is a function of street environment and condition of materials comprising the failed street. Reference page 25, Section 3.2.

Reconstruct – Reconstruct is a process to replace a failed street. It involves removal and replacement of the existing street materials. This method is selected if the conditions of the environment or the materials indicate that re-use would not be effective. It is also indicated where under-street utilities are replaced. Reference page 26.

Residential Collector – A Collector road that primarily services residential neighborhoods and may have residences along the road itself.

Rework -- Rework is a process to replace a failed street. It involves milling the existing materials, chemical stabilization, and reuse of a substantial fraction of existing street materials. New material is added as required. This method is selected if the conditions of the environment and the materials indicate that re-use would be effective. Reference page 25.

Seal Coat -- A sealcoat is a preventive maintenance surface treatment designed to preserve and extend the life of a street. In general, the process involves application of a thin layer of asphalt emulsion and gravel to the road surface. Reference page 17, Section 2.9.

"SPMP" – The Street Preventative Maintenance Program.

Street Preventative Maintenance Program – "SPMP". A program of preventive maintenance designed to preserve and extend the life of a street. The program is funded by a street fee on the water utility bill of most residences and commercial customers as well as by contribution from other sources. The program is entering its third year in 2016. It is applied to each category of streets. The processes are seal coats and overlays.

"TAR" -- Targeted Area Reclamation

Targeted Area Reclamation – "TAR". The Targeted Area Reclamation is an intensive maintenance program which is designed to pro-actively service streets throughout the City. The goal of the targeted area repairs is street life extension. The TAR program is designed to alleviate damaging conditions, dangerous conditions, low quality ride areas, or other specific areas that need remediation. Reference page 23, Section 3.1.