

Municipal Engineering Foundation (Vic) Study Tour 2007 United States & United Kingdom



The Alamo San Antonio Texas



Daniel Kollmorgen, Mauro Covacci, Jane Waldock,
Robert Ward, Phillip Warner

Asset Management & Project Management for delivery of Capital Works Programs

Mauro Covacci



Sponsored by the Municipal Engineering Foundation Victoria and Wyndham City Council

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- City of San Mateo, San Francisco, California, U.S.A
- Daly City Council, San Francisco, California, U.S.A
- City of San Antonio, Texas, U.S.A
- City of Baltimore, Maryland, U.S.A
- Department of Public Works, Arlington County, Virginia, U.S.A
- Dorset County Council, Dorchester, England, U.K
- American Public Works Association (APWA)

Executive Summary

The Municipal Engineering Foundation Victoria study tour of U.S.A and U.K provided the opportunity for Victorian local government engineers to pursue topics of specific interest. The group of four participants in the 2007 tour had two main topics of interest:

1. Asset Management
2. Integrated Traffic Safety

The tour occurred between Wednesday 5 September and Monday 24 September 2007.

My objective as a participant on the study tour was to look at project management and asset management practices in planning and delivering annual capital works programs. In particular:

1. how management of assets achieves the life cycle that the assets are designed for and how the delivery of annual capital works programs will produce the desired outcomes for the community, by gaining value for money and optimum asset life; and
2. how the processes in project management are able to deliver capital work programs which include buildings, roads and open space development, for the preservation / renewal of assets, upgrade of assets and new asset creation.

Study Tour Visitations

Visits to host organisations during the tour included: whilst in San Francisco, California, USA, the City of San Mateo south east of San Francisco, Daly City Council south west of San Francisco. In San Antonio Texas, the City of San Antonio. The City of San Antonio also hosted the APWA Congress which was held in the Henry B. Gonzales Convention Centre. Following our stay in San Antonio, the tour party split into two groups. The asset group continued the tour through the USA and the traffic group went onto Europe.

Whilst in Washington DC, Maryland we were hosted by the City of Baltimore and Arlington County, Virginia. This completed our tour of the USA. From the USA, we continued onto the UK where our tour took us to Dorchester where our hosts were Dorset County Council which is situated 250km south west of London on the south coast of England. This visitation concluded our study tour.

APWA Congress

The 2007 American Public Works Association International Congress was held in the Henry B. Gonzales Convention Centre San Antonio, Texas, USA. The Congress was attended by over 7000 delegates from all 50 states of the USA, 13 Canadian Provinces and several international countries representing a wide range of professionals in public works.

The Congress provided a time table that allowed the opportunity for all to gain full benefit from the program provided. The program allowed flexibility to participate in all 4 Keynote general sessions, visit the exposition of over 500 exhibitors, 154 educational sessions and “workshops / on-site demos” on the last day of the Congress. During the Congress there were several opportunities to interact with fellow delegates from City of Robbinsdale, Minnesota, City of Palm Bay, Florida and City of Windham, Maine.

This was advantageous in obtaining an understanding of how project management and asset management was aligned in the delivery of capital works programs in those municipalities.

Key Observations

1. Asset management is very much in embryonic stages in terms of meeting the full life cycle of the asset. The majority of capital improvement is done at the renewal stage near the end of the asset life, whereas if prudent intervention is pursued, the asset life could be extended before renewal is required. During the visitations in particular the USA, it was noted that limited funding sources for the delivery of capital improvement programs had a big influence in the ability obtain the full potential in the life cycle of the asset.
2. Priority lists of projects form the basis of capital works programs. These lists are developed with no set criteria for their priority status within the program. There is little or no value given to the asset's condition. Priority lists produced for capital improvement programs, do not necessarily provide the best means of asset management, but in many cases this formed the basis for projects listed for capital improvement programs.
3. Ability to gain appropriate funding on an annual basis for the delivery of projects in renewal and asset creation is a common thread in trying to deliver the projects. Funding is sought from many sources, not too dissimilar to experiences in Australia. Funding for capital improvement programs is not project specific but more as an allocated budget for the total program.
4. The process of asset management in the USA is not as advanced as in Australia or New Zealand. The underlining thread is good project management and planning is integral in the delivery of capital works programs, particularly in the renewal of assets. This was evident in many of the authorities visited in particularly Dorset County Council, England, U.K.

Wyndham City Council, is one of the fastest growing municipalities in Australia. The capital works program is one of the largest in Victoria, with an annual capital works budget of \$60 million plus per annum from all sources and some 200 plus individual projects. The challenges for Wyndham are not only to deliver new assets but to preserve, upgrade and renew existing assets.

With this in mind, the Municipal Engineering Foundation (Vic) and my employer Wyndham City Council gave me the opportunity to participate in the 2007 study tour of the USA & United Kingdom.

The tour was arranged and coordinated by the MEF (Vic). The purpose is to give local government engineers the opportunity to gain experience on how engineering principles are delivered in a global environment, focussing on the APWA Congress which all tour participants attend with enthusiasm.

Over a period of 20 days between 5 September 2007 and 24 September 2007, the tour group visited local government and public utilities in San Francisco, San Antonio, Baltimore, Arlington and Dorset County. The tour group attended the APWA Congress in San Antonio from 8 to 12 September 2007.

The tour group was led by Robert Ward, trustee of the MEF (Vic), who remained with the tour group until the end of the APWA Congress. The group consisted of representatives from the City of Manningham, City of Whitehorse, City of Stonnington and Wyndham City Council. The MEF (Vic) tour group was joined at the APWA Congress by the Institute of Public Works Engineering Australia national tour party led by David Abbott, National President and Chris Champion CEO IPWEA.

Although the structures of government observed are very different to those in Australia, we discovered that during our visitations the issues and challenges in the delivery of capital works programs are similar. This report will give an appraisal of how these authorities deal with these challenges. References will be directed to relevant websites for a more comprehensive insight into the operations of these authorities dealing with the delivery of capital works programs.

I acknowledge the hospitality, generosity and professional manner in which all the public works professionals conducted themselves during our imposing visitations. For this, I am truly indebted to many hosts.

This report is based on my personal observations and views formed over the duration of the study tour.

Wyndham City Council is one of the fastest growing communities in Victoria with over 5% growth per annum and a current population of 126,000. This growth has its advantages and disadvantages. Wyndham's capital works program reflects this rapid growth. Specific challenges arise where attempts are made to meet the community needs in creating new infrastructure where newer communities are developing, such as Point Cook, Tarneit, Truganina and outer Wyndham Vale. The capital works program also needs to renew, upgrade and preserve an ageing infrastructure in the established areas of the municipality such as Werribee, Hoppers Crossing and Werribee South.

Wyndham is a very diverse community. In addition to the rapid growing urban sprawl, Wyndham has a large industrial precinct in Laverton North, rural communities in Little River and the outer parts of Tarneit & Truganina, and a large agricultural precinct in Werribee South. The challenges of providing a balanced capital works program are of the highest importance so that the needs of the community are met.

In order to achieve this, there is a need to have a good understanding of asset management to produce a sustainable capital works program. In addition to good asset management, once the capital works program has been produced for one year, five year and ten years capital works planning plays an integral part in the delivery of these programs. To ensure the financial sustainability of the assets and optimum life cycle of the assets that are created, preserved, renewed and upgraded, long term planning is vital.

It is because of my primary role at Wyndham as the Capital Works Coordinator that I sought to explore how all of the elements fitted together in formulating and delivering capital projects. The study tour of USA and United Kingdom provided me with this opportunity to explore what Wyndham could gain from any of the key findings during the tour.

My objectives on the study tour were:

1. To explore how the various agencies dealt with growth in terms of capital works programs.
2. How asset management played a part in the establishment of the program and what processes, practices and systems were in place to assist in the delivery of the capital works programs, both short term and long term out to ten years.
3. How prudent project management plays a great part in delivery of capital improvement projects.

3.1 City of San Mateo, San Francisco, California, U.S.A

<http://www.ci.sanmateo.ca.us/index.html>

3.1.1 City of San Mateo

City of San Mateo is the second largest city in San Mateo County, California, USA., situated 40km south east of San Francisco. San Mateo has a population of over 90,000 covering an area of 20km², in a primarily built out area of urban development with little scope for Greenfield development. The community is diverse in its culture with strong influences of Spanish and Asian backgrounds.

3.1.2 Managing Infrastructure

San Mateo's Public Works Department has the responsibility for the maintenance, repair, cleaning and new installation of the 204 miles of City streets, 60 traffic signals, 10,000 street lights, 10 publicly owned parking lots and garages, 260 miles of sewers, 75 miles of storm drains, 20 miles of open creeks and drainage canals, 23 sanitary sewer pump stations, 11 storm drainage system pump stations, two dams, one flood control lagoon, three miles of levees, and a wastewater treatment plant.

As per most cases in the USA, the majority of infrastructure renewal, upgrade and preservation is under funded. San Mateo is no different. Funding comes from a variety of sources such as land taxes (rates), developer contribution for new projects and special district funding (special charge schemes) to fund projects. Projects are listed on a priority basis and funding is provided as a lump sum over a period of two financial years for capital improvement programs. The funding is not project specific. Long term planning provides a framework to fund capital improvement program over two financial years, with a five year capital improvement plan.

Asset management is very much in its infancy and provides a basic framework for the delivery of projects. The prime objective is to provide listings of works that require certain levels of intervention based on prevention more than renewal or upgrade of assets. This in some instances provides better value for money in the short term, especially in pavements where the lifespan is increased to only 20 years.



Bay Meadows major self contained housing project funded by developers.

As part of our visitation, the study tour group was taken on a tour of some of the major projects the City of San Mateo had currently under construction. These projects had lead times of 12 months minimum. The consultation process varied based on the scope and type of project. A general rule was little or no consultation for reconstruction of an existing asset, to over 12 months on a new project with environmental overlays and 6 months for upgrades or alterations.



New San Mateo Public Library



Drive through drop off point at New Library

The New San Mateo Public Library was a project that required extensive consultation in order to ensure that the community was to gain the full benefit. This project was not only funded by Council but included funding from donations and the private sector.



Book sorting scanned via conveyor belt from drop off point

3.1.3 Observations

- Asset management plays a limited role in planning short term and long term capital improvement programs.
- Revenue sources and financial risks could be improved by scoping a variety of funding sources in order to deliver projects that benefit the entire community.
- Lead times were tight and improvements made to scheduling would enable setting clear goals and realistic timeframes and effective time to develop teams for the delivery of projects. Project management processes suffered in terms of achieving the best outcomes.

3.2 Daly City Council, San Francisco, California, U.S.A

http://www.dalycity.org/about/city_profile.htm

3.2.1 Daly City Council

Daly City Council is situated 11km south east of San Francisco and is the largest city in San Mateo County, California, USA. It has a population of over 100,000 covering an area of just 13km². There are nine departments in Daly City with a work force of 550 employees. Daly City has a large ethnic culture in the municipality making up over 58% of the community. Development is concentrated and mainly middle to high density development. Daly City population density rates it 10th in terms of urban density in the USA.

3.2.2 Managing Infrastructure

Daly City faces even greater challenges in the upkeep of its infrastructure, primarily due to lack of funding. Daly City has currently identified some \$40million worth of capital improvement projects and has a budget of \$3million per annum. The majority of projects are funded by developer contributions. As far as funding road projects, these are funded through state funding sources via the fuel tax levy. The Daly City community through its various committees apply for a variety of grants at all levels of government to try and meet short comings in sustaining the infrastructure. A large proportion of the budget is spent on public safety.

Project management at Daly City is very much driven by strong planning influences, and funding availability. Project management requires a strong presence of committee involvement in order to obtain funding for projects from a variety of sources, both from the private and public sectors. A charge scheme is usually the only way that major projects can be implemented as funding from land taxes is insufficient to fund all projects. Project management in the delivery of the projects is mainly delivered by the Design unit of the Public Works Department.

Asset management plays a small role in developing capital improvement programs. There are lists of priority projects but they are not based on any asset management principles in terms of life cycle analysis or condition. The majority of projects included in the Capital Improvement program are assets that are at the end of their life. The majority of infrastructure is maintained purely for public safety as it has reached the end of its life and needs renewal.

3.2.3 Observations

- Asset management tools and processes are not used and capital improvement programs have limited linkages to any formal asset management strategy
- Appropriate and sufficient resources were in place to achieve proper project management in the delivery of projects
- Periodic and cyclic maintenance were limited and further enhancements to the process of analysis would ensure that the full design life of the asset is obtained

3.3 American Public Works Association International Congress San Antonio, Texas, U.S.A

<http://www.apwa.net>

3.3.1 APWA Congress

The 2007 APWA Congress was held at the Henry B. Gonzalez Convention Centre, San Antonio, Texas. 7000 plus delegates attended the Congress from all 50 states of America, 13 Canadian provinces and several other countries of the world, giving the Congress a true international flavour.

The Congress provided the opportunity for the tour party to attend any of the 154 different education sessions covering 15 themes, 4 general sessions with keynote speakers, an exhibition of over 500 trade exhibitors and new to the Congress, a workshop day on the last day of the Congress. The duration of the Congress was over 4 days, having started on Sunday 9 September 2007 and concluding on Wednesday 12 September 2007.

3.3.2 Sessions Attended

I attended several sessions of interest on topics that were relevant to my chosen topic as part of the study tour. The sessions mainly covered Project Management, Asset Management, Capital Works Delivery, Ageing Infrastructure and Contract Management.

Relevant sessions of focus of the chosen topic of the study tour were:

- *“Proven Concepts in Project Management”*
- *“Going High Tech to Manage and Deliver Contract Documents”*
- *“Improving Capital Project Delivery Efficiency”*
- *“Cost Loaded Project Schedules”*
- *“Improving Capital Project Delivery”*
- *“Aging Infrastructure” Litigation how to Prevent It*

On the last day of the Congress, I attended a workshop and on-site demo on *“Innovative Street Reconstruction Technologies”*. This workshop provided a technical session as well as a practical application to the theory that was presented.

3.3.3 Interaction at Congress

The opportunity for networking exceeded all expectations. We were able to interact in discussions with colleagues from all parts of the world, who had similar interests in the topic I pursued on the study tour. This interaction was invaluable in the sense of understanding that in global terms, the issues and challenges are similar if not the same. Personally this has created an on going network for me to develop.



3.4 City of San Antonio, Texas, U.S.A

<http://www.sanantonio.gov/?res=1024&ver=true>

3.4.1 City of San Antonio

The City of San Antonio is the second largest city in Texas with a population of 1.3 million covering an area of 652 km². San Antonio has a strong Latino influence in its culture as it was under Spanish control until the independence of Texas in 1836 at the battle of the Alamo. Modern day San Antonio is home to one of the largest military bases in the USA.

3.4.2 Managing Infrastructure

A capital improvement program in the City of San Antonio has three different funding sources:

- Community Development Block Grant (CDBG)-Funding from this source for infrastructure repairs is generally between \$10 million and \$12 million annually. Program is to preserve and develop urban communities and is funded through the U.S. Department of Housing and Urban Development (HUD). It is administered by the City's Department of Housing and Community Development.
- Metropolitan Planning Organization (MPO) projects are jointly funded by the Federal Government and the City of San Antonio and administered by the Texas Department of Transportation. Historically, the MPO receives recommendations for over \$100 million worth of projects with funding available for approximately \$23 million each year.
- General Obligation Bond projects are the result of special referendums in which citizens vote to decide whether bonds will be used for these construction projects.

These funding sources are an integral part of developing a capital improvement program for short term and long term capital works programs.

Project Management forms the basis for the delivery of capital improvement programs carried out by the Capital Programs Division of the Public Works Department who is responsible for the oversight of all projects from scoping through construction. The project teams, lead by a Project Manager, work with the design consultant firm and contractor to ensure projects meet the scope of the projects and are within budget. Project Management tasks include developing the project scope; holding public meetings while the projects are in design; reviewing the designs; monitoring the budget; providing information for other departments and the public; and, working through various issues with the consultant and the contractor.

Online billing system has been implemented to assist contract payments of which both the contractor and principal can access the system to gain up to date information regarding the contract. This allows rapid and constant tracking of the progress of the contract. All parties are pleased with the process as it allows prompt processing of claims and payments.

Asset management plays a role in the renewal of assets but is limited in preserving the asset for its designed life cycle. A five year infrastructure management program has been developed based on recommendations by staff. This is based on technical assessment of the asset on a scoring model that allows the asset to be rated accordingly in order of priority. This process allows a one to five year program to be produced and the ability to plan works accordingly. The majority of the program lists projects that require rehabilitation of assets rather than asset renewal. What the program doesn't do is look at the total life of the asset and if the asset can be extended or preserved by intervention at appropriate times during the asset's life cycle.

3.4.2 Observations

- Principles for project management were well applied in achieving good planning and accurate lead time to achieve implementation of projects on the ground
- There was a good understanding of the condition of the asset, based on a method of data collection and these were more to assess asset needs to provide a sound basis for the delivery of capital improvement programs. I found that this fundamentally did provide value for money and allowed the asset to meet its appropriate design life cycle.



Riverwalk Precinct



Rehabilitation of road using 30% lime stabilisation

3.5 City of Baltimore, Maryland, U.S.A

<http://www.ci.baltimore.md.us/>

3.5.1 City of Baltimore

The City of Baltimore is situated on the east coast of the USA, approximately 60km north east of Washington DC. With a population of 630,000 covering an area of 130km², it is a mainly built out residential and commercial precinct in the city proper. It boasts a harbour on the northern edge of the city.

3.5.2 Managing Infrastructure

The Baltimore City Council Public Works Department has 4 divisions and employs some 3500 employees, catering for over 400 municipal buildings including court houses, solid waste, water and waste water. The Department of Transport is responsible for roads and bridges. Funding for the maintenance of road infrastructure is a cut of the State fuel tax levy.

The funding is based on lane mile of road. A Capital Improvement Program for the sustainability of the infrastructure is developed based on a priority listing over 6 years. Funding for the capital improvement comes from a variety of sources:

Pay as you go (charge schemes) funds are used for:

- General Projects;
- Motor Vehicles;
- Waste Water;
- Water.

Grants are obtained from the Federal and State Governments to fund community development projects, libraries, senior citizens facilities, federal & local highways, waste water and water.

The Capital Improvement Program is developed based on the following criteria set by working closely with all the relevant agencies involved in capital project deliveries:

- Project is necessary to correct a dangerous and/or blighting condition;
- Project is necessary to protect public health and safety;
- Project is necessary to implement a priority housing or economic development project;
- Project directly supports priority City programs--Strategic Neighbourhood Action Plans (SNAP), Small Area Plans, Gateways, Main Street, Healthy Neighbourhoods Initiative, Economic Growth Strategy, Project 5000;
- City funding will leverage other fund sources;
- Funds will be spent in the budget year;
- Project fulfils a State or Federal mandate;
- Project fulfils an approved, prior commitment of City funds;
- Project promotes joint use of public facilities among City agencies or with; private entities to enhance neighbourhood programming and service delivery;
- Adequate project details and justification have been provided;
- Agency has fully utilized previous appropriations for approved purposes; and
- Project references the [Citywide Comprehensive Master Plan](#).

Project management delivers projects over each financial year, but the process allows for considerable lead time prior to the contract being let. Sometimes the lead time could be up to 3 years depending on the scope and magnitude of the project. A large level of liaison between consultants and designers occurs in developing and delivery of the projects. Both these services are out sourced as most of services in Baltimore council are also outsourced in terms of delivery. The majority of Council staff deals primarily with the planning and coordination of projects. There is a strong partnership between the private sector and public sector in the delivery of infrastructure projects and the alliance provides a balance in funding of projects to achieve the best outcomes for the Community.

Asset management is structured in the form of various programs that address a variety of needs in terms of preservation, renewal, upgrade and creation of assets. These programs are developed through commissions and bureaus who have control of their implementation, allowing the bids and funding to be gained for the delivery of the projects.

3.5.3 Observations

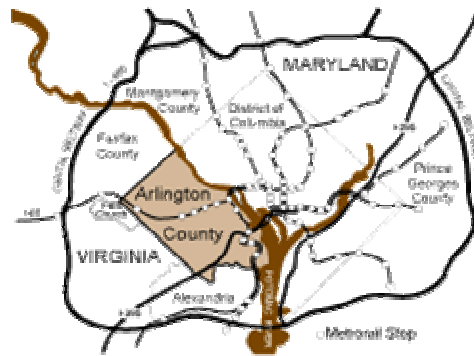
- The implementation of capital improvement programs relied on the ability to have a good programming. This allowed a good basis for obtaining the required funding from various sources for the delivery of the capital improvement program
- An established good relationship between multi agencies and tiers of government assisted in the delivery of projects
- Realistic lead times for the delivery of projects are in place, many projects are run over two to three year timelines to get the best outcomes in the delivery of the projects

3.6 Department of Public Works Arlington County, Virginia, U.S.A

<http://www.co.arlington.va.us/>

3.6.1 Arlington County

Arlington County is an urban County of about 42km², located directly across the Potomac River from Washington DC. Arlington County is in the State of Virginia and forms part of the nation's Capital area Washington DC. Arlington County has a population of 202,800, with a population density of 4,912 per km².



3.6.2 Managing Infrastructure

Arlington County funds its capital improvement program from several sources with General Obligation Bond financing the larger scale projects. The rest of the capital improvement program is funded by Pay-As-You-Go appropriation including local tax revenue, schools capital program, Federal & State highway grants. These funds are then distributed into various categories for implementation including: transportation, drainage, community conservation, safety facilities, government facilities, technology, regional, utilities, schools and parks. The area I will be discussing is transportation and drainage.

As part of the transport portfolio, Arlington County is responsible for the infrastructure of bridges, roads and waste. As far as bridges are concerned there is a county mandate that inspections are carried once every two years. There is a Federal Government requirement to provide a condition report of the asset annually. This determines the level of funding for the preservation task. Preservation funding is usually in the order of \$1.0-\$5.0 mil per annum for capital improvement. Any renewal or replacement of bridges is funded entirely by the Federal and/or State Governments.

As Arlington County is a fully built out region. The majority of projects are redevelopments and renewal. Funding for projects is based sales, fuel and state taxes being imposed up to 25%. Long term project planning over the next 6 years requires funding of over \$900 mil. Large projects including transit projects for public transport such as street cars, in the majority is funded by developers.

Asset management plays a role in the managing of infrastructure. There is a master plan with programs in place which attempt to achieve sustainability in infrastructure management. Findings based on the existing asset management process are that renewal is not currently sustainable. Rehabilitation of sewer assets is currently at 1% per annum. Arlington County stated that this should be increased to 1.5%. This is based on current information regarding the ageing infrastructure and depreciation values they have available. Failing this, the system is in danger of collapse. Using the same analogy storm water & water not quite there should be at 2% which is currently at 1.5%.

3.6.3 Observations

- Level of available funding has impact on the delivery of capital improvement programs.
- Project delivery is reliant on funding from the private sector to be achievable.
- Asset management of the infrastructure is the tool & process in providing a sound basis for good project and capital program initiatives.

3.7 Dorset County Council, Dorchester, U.K

<http://www.dorsetforyou.com/index.jsp>

3.7.1 Dorset County Council

Dorset County Council is situated some 250km south west of London on the south coast of England. Dorset County Council population is 701,000 and covers an area of 2653km². Dorset County is made up of primarily several larger towns. It is very much a tourist precinct for summer holiday makers. The towns for the most part are of coastal rural surrounds.

There are 3 tiers of council responsibilities in Dorset County:

- Parish Council Local - Signs, parking, general maintenance, etc.
- District Council – Planning, Strategic Planning, Local Waste
- County Council – Libraries, Schools, Waste Disposal

Dorset County along with most of England has enormous heritage overlay issues because England is so rich in history that any time any upgrade, renewal and creation of assets is planned, consideration must be given to any site of historical significance. This has a great impact on the level of renewal and upgrade of assets, in particular on the exterior of buildings and structures. The realignment of roads is also restricted as much of the country side is littered with historically significant sites.

3.7.2 Managing Infrastructure

Dorset County carried out a major review in its ability to deliver Capital Improvement Projects, with annual budgets of between £40 mil & £100 mil (Aud\$100mil & \$250 mil). The situation regarding project management didn't provide the desired outcomes. The review process commenced in 2002 and has taken 5 years to complete. The biggest issue was that no one took responsibility for the project management of projects. The review identified the need to establish a project delivery protocol. The protocol allows for key steps for the delivery of projects from the brief to completion of project. The process has a series of "gateways" to analyse the status of the project and unless all the items in that particular gateway is met, then the next stage of the project cannot proceed.

Dorset County Council's asset management plan features asset management principles, dealing with whole of life cycles of assets, incorporating preservation, renewal, upgrade and creation of assets. The plan also aligns the assets to the capital improvement program and looks at the project management process for the delivery of the capital improvement program as a whole package. The plan has a life of four years, but is reviewed annually to be continually updated with relevant data so that the document remains a live document.

3.7.3 Observations

- Dorset County has made a concerted effort to implement good project management process. It is considered a bench mark in the industry and other agencies throughout England are adopting the model.
- Good asset management plans have provided outcomes in terms of managing and delivery of capital improvement programs.
- Systems and tools are in place to deliver the objectives of good asset management / project management. The systems did seem to be onerous meeting these objectives



Old Weymouth School



New Weymouth School Wing



Project Group Weymouth Primary School

The Study Tour provided the opportunity to gain experience and knowledge from a variety of practitioners in the public work sector from other countries. This gave me the opportunity to look at comparisons between the way we manage infrastructure compared to the countries visited in the study tour.

Key finding 1: Asset Management

Asset management was best demonstrated in Dorset County Council, England, UK. The implementation of an asset management plan incorporating all the elements required in sustainable maintenance of assets is clearly evident throughout the plan. It demonstrated that with proper management, systems and processes, the optimum life of the asset can be obtained. Through timely interventions, an asset can outlive its design life considerably. The plan not only looked at the asset in terms of its life cycle management, but also integrated project management into the plan in order to deliver capital improvement programs.

Asset management in the USA was very much in its infancy. There are basic systems and processes in place to manage assets but primarily asset management in the USA is more about renewal. Not a great deal of emphasis is given to the preservation of assets. Timely interventions are not adhered to thus not optimising the potential extended life of the asset. This puts an enormous strain on budgeting for the renewal of assets in the capital improvement program.

Australia is in an envious position in terms of asset management where accounting standard AAS27 requires recording of asset depreciation. Local Government has imposed asset management plans to be implemented as a consequence of this standard. The Road Management Act in Victoria has also further driven this decision. Many plans already exist in Local Government in Australia or are continuously being upgraded or further developed.

Recommendation

Local government in Victoria could consider including project management in its asset management plans to deliver better outcomes in the delivery of its capital works programs along the Dorset County Council model.

Including project management in the asset management plans could be achieved by introducing a capital projects delivery protocol, similar to the Dorset County Council mode. This could improve the delivery of capital projects. The Dorset County model clearly defines the steps in project management (as per the flow chart in appendix 3 of this report) in providing good project management for the delivery of capital improvement programs. This model demonstrates the required steps in project management by identifying the vision, definition, decision and implementation of project delivery. The model allows clear “gateways” (hold points) to review the status of the project and ability to move onto the next phase of the project. By introducing this protocol, there would need to be good collaboration and team building within the project management unit. In introducing a protocol for better delivery of projects in the asset management plans, this would instil a rigor in project management that would deliver better outcomes for Wyndham City Council and other Council to benefit its communities.

Key Finding 2: Project Management

Dorset County Council has tackled project management by reviewing processes that had major deficiencies in delivering the desired outcomes in their capital improvement programs. This resulted in refining processes in the vision, definition, decision and implementation of projects by establishing clear and concise guidelines for the delivery of projects. More importantly, the review identified the flaws in the existing process. The new process heightened the accountability of project managers to take responsibility for projects.

The important element of the project management process is that each project is given the appropriate scoping and lead time to produce the desired outcomes. Planning projects is the most critical component of the process. This is clearly evident in the Dorset County Council model.

Project management in the USA was consistent in all the agencies visited and typically in the case of the City of San Mateo, it allowed sufficient lead time for the delivery of projects, in some cases a minimum of 2 to 3 years before delivery, as did most of the other agencies visited.

The difference between the Dorset County Council model and the USA models is the level of consultation on the projects. In Dorset, the users and community form part of the project group and attend regular project meetings throughout the project duration. In the USA, in particularly City of San Mateo, Daly City and Baltimore City Council, consultation with the community and users is only carried out in the initial stages of the project. This has limited success as the majority of decisions are made at the executive level of Council. The community and users of the assets seem to trust the Council to make the correct decisions on their behalf.

Recommendation

The Dorset County Council project management model has set the bench mark throughout England's public works sector. This model could also be considered as a basis for project management in Victorian Local Government agencies to assist in the delivery of capital works programs.

The Dorset County Council project management model breaks project management into specific "gateways" (hold points) where it clearly defines responsibilities and who is responsible for these responsibilities in order to progress the project. Protocol has segmented project management into four clear areas:

VISION DEFINITIONS DECISION IMPLEMENTATION

With sub requirements in each:

- | | |
|-----------------|-------------------------|
| Vision: | 1. Service Need |
| | 2. Project Concept |
| Definition: | 1. Technical Approach |
| | 2. Feasibility |
| Decision: | 1. Authorisation |
| | 2. Commit to Investment |
| Implementation: | 1. Final Agreed Brief |
| | 2. Scheme design |
| | 3. Project Approval |
| | 4. Project Delivery |

This protocol developed by Dorset County Council introduced in my Council and the wider community of local government, would ensure accountability and responsibility in the delivery of projects.

In my experience the difference in current practices between Victorian local government and Dorset County Council model in project management, is the superior accountability/responsibility in the Dorset County Council project management processes. It seems that in many instances throughout Victorian local government there is a shift in responsibility as the project goes from one phase to another e.g. planning to design to construction. Introducing a protocol similar to that of Dorset County Council model would improve accountability and responsibility. This may take up to five years to implement with all stakeholders getting involved to achieve the desired outcomes. My Council and local government in general would benefit as more emphasis is placed on capital project delivery as a core businesses of Council.

Key Finding 3: Capital Works Programming

Capital Improvement Programs vary in terms of planning from 1 year programs to long term planning of up to 6 years. The main driver in nearly all cases was the provision of funding and funding sources. The USA mainly relied on funding from either the private sector via developer contributions or other levels of government. These funding sources formed a large part of the capital improvement programs. The local land taxes are mainly used to fund local rehabilitation projects and not the larger type of projects such as schools, libraries and other major infrastructure. Asset management plays an important part in developing the lists of projects in the capital improvement programs, but doesn't address the long term planning for programs because asset management in the USA doesn't fully address the life cycle of assets.

Dorset County Council in England has incorporated the capital improvement program as part of their asset management plan. This model seems to deliver better capital improvement programs to manage the infrastructure to obtain the full life and beyond of the asset. Funding for the capital improvement programs is generally funded from the public purse. There are also projects that are funded by the private sector through developer contributions but not to the extent of the USA.

Recommendation

It would be advantages for Victorian local government to include capital improvement programs as part of the asset management plan in order to achieve the best results in managing its assets to gain optimum life cycles.

The first priority in establishing capital improvement programs / budgets must be asset renewal, followed by asset preservation and finally asset creation. This would ensure prudent asset management in obtaining optimum life from the asset before large amount of funding is required for renewal.

A process I would strongly recommend to ensure delivery of capital improvement programs is:

- *Strong asset base data that provides the necessary data to establish good short term and long term programming of capital projects with clear deliverables. This can be achieved by introducing an asset management system that is practical and user friendly for the stakeholders to utilise.*

- Project management principles need to be introduced to ensure project delivery timeframes and budgets are met. This is important and needs a large effort in implementing across local government in particular councils with large capital improvement programs. The Dorset County Council model could be introduced in a form that will suit our environment.*

This is a clear deliverable that can be achieved by introducing the concepts of the model in delivering projects. As municipalities progressively shift the focus of council budgets from recurrent to capital, more emphasis needs to be focussed on project management.
- The combination of good asset management and project management is the basis for the delivery of capital improvement programs. If asset management is able to provide sound outcomes, capital works programs can deliver programs that reflect the real need of projects. In order to achieve this, more emphasis needs to be given to asset management in programming capital works by ensuring accuracy, timing and realistic estimates. There is a need in programming projects that appropriate lead times are given to each individual project. In the USA, capital improvement budgets run over a minimum of two years. This is something that has merit and should be considered in Victoria over the next few years to deliver better projects, rather than trying to deliver projects in a single financial year.*

These can be implemented over the next five years to give local government and other agencies involved in the delivery of capital projects time to achieve better financial and project completion outcomes.

I was able to observe the processes used in the delivery of capital improvement programs in a number of Cities in different Countries and I observed how project management and asset management was used in the planning and delivery of capital improvement projects.

My study theme was inspired by my Council's endeavours to deliver large capital works programs on an annual basis as well as capital works programs of up to 10 years in the future. I wanted to explore how to improve the over management of capital works programs in the planning, budgeting, and implementation of programs in delivery better out comes through practices in asset and project management for the benefit of the community I work for.

The study tour gave me a greater understanding of how processes fundamentally drive the way capital works programs are delivered in conjunction with asset management and project management.

The study tour allowed me to observe the vast differences in agency and government structures from country to country in terms of their legislative responsibilities. The main observations in terms of capital works program delivery indicated the issues are very similar in all cases, including experiences in Victorian Local Government and Australia, albeit the different structures of government have varying impacts on how infrastructure is managed in a global sense.

What needs to happen in local government and in particularly with the delivery of capital improvement programs is introduction of proper project management protocol, accurate asset management data bases, deliverable projects in the capital works programs, minimum project delivery time frames of two years and programs to reflect these principles.

The experience gained on a personal level cannot be measured in quantitative terms. I was able to explore how:

- The various agencies visited met the challenges in producing sustainable capital improvement programs.
- The difficulties in obtaining funding for projects in the short term and long term programs they had in place.
- How asset management played a major part in the establishment of the capital improvement programs.
- Good and some not so good asset management processes and systems in place.
- How prudent project management is in the delivery of capital improvement programs as was the case in Dorset County Council.

The learning I have taken from my research will emerge in the future from the gains and changes that I am able to implement as part of my personal development. In addition, my personal development benefits should flow through to my employer and Local government in general by applying some of my findings in capital works program delivery.

- Appendix 1 City of San Mateo, San Francisco, California, USA
Information via web site and handouts
- Appendix 2 City of San Antonio, Texas, USA
San Antonio River Improvement Project via handouts
Five Year Infrastructure Management Program
- Appendix 3 Dorset County Council
Project Management flow chart via hand outs

Appendix 1 City of San Mateo Public Works Department Asset Management brochure and Capital Works Program of web site

Budget Needs

A budget needs report is created using San Mateo's Pavement Condition Index to project performance trends for streets with an annual maintenance cycle.

The pavement management program generates specific annual maintenance activities for each street segment based on a defined pavement condition threshold, functional classification, type of service, and budget constraint. This custom work schedule, which is a blend of various projects and the current and future work requirements for each pavement segment, is the final product in a street maintenance schedule that reflects the most cost-effective approach to maintain and improve the City's street infrastructure.

Budget Scenarios

The budget needs report provides the City with an estimate of funds needed to improve the City's Pavement Condition Index. Street segments are allocated for treatment with the greatest effectiveness rate based on a street budget management cycle.

As a result, the Pavement Management Program is a planning tool. This technique will ensure that the City is maximizing the benefit to existing pavement while improving the overall infrastructure with the current budget available.

Interesting Facts

- If the City of San Mateo reconstructed every City-maintained street, it would cost approximately \$550 Million.
- A typical portion of an asphalt road surface is made of 4% of aggregate level of stone on material.
- Asphalt can be 100% recycled, containing resources such as natural aggregates and petroleum products, saves for dollars more, and is an environmentally safe product.
- The average thickness of an asphalt road surface is only 12-20 inches.
- Preventive maintenance is the most cost-effective application to extend the life of our streets and increase road.
- A slurry seal application is seven times less costly than an asphalt overlay.
- A typical street will deteriorate 40% during the first 75% of its lifespan. And another 40% in quality in only the next 25% of its lifespan.
- Until all of the road system preventive maintenance needs are met, costs prohibit the reconstruction of any roadway.

City of San Mateo

Pavement Management Program



A Guide to the Program



City of San Mateo
Public Works Department
300 West 20th Avenue
San Mateo, CA 94403
650-932-7300

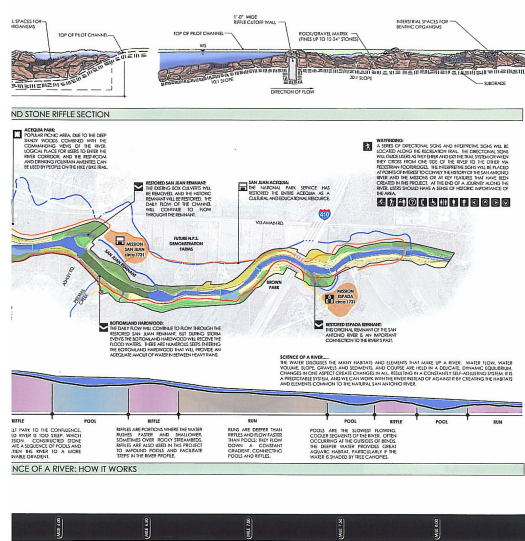
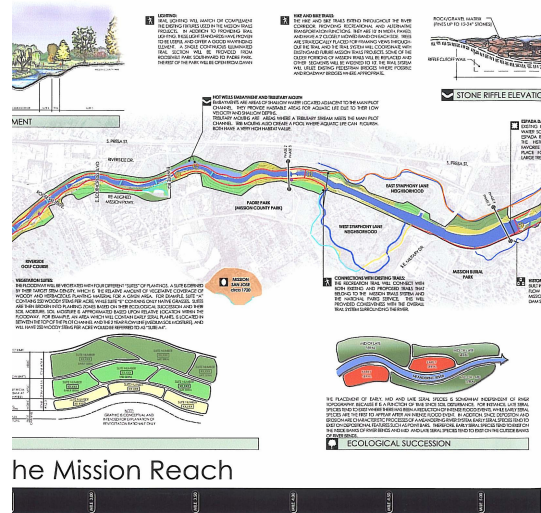
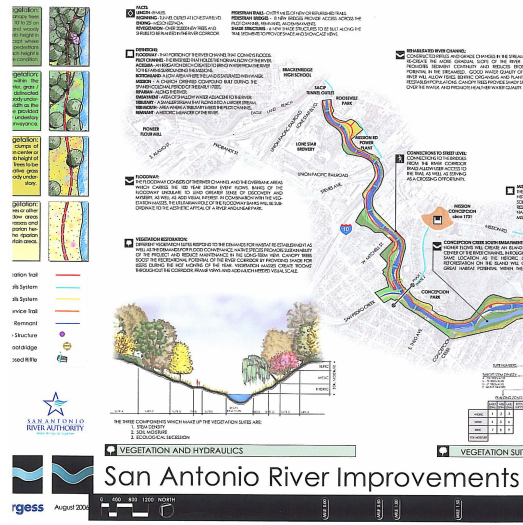
Pavement Management Program

PUBLIC WORKS						REVENUE			
DEPARTMENT SUMMARY	Actual 2004-05	Budget 2005-06 (As amended)	Revised Est. 2005-06	Adopted 2006-07	Projected 2007-08	FTE's	3,014	5,500	5,500
EXPENDITURES									
GENERAL FUND PROGRAMS									
TRANSPORTATION ENGINEERING	632,649	765,904	703,337	803,831	819,488	5.42	125,496	111,160	111,160
ENGINEERING SERVICES	662,982	796,662	799,811	777,372	818,807	12.64	149,037	60,000	60,000
STREET MAINTENANCE	743,715	790,833	849,036	864,164	890,000	6.31	160,000	320,000	320,000
TRAFFIC MAINTENANCE	1,301,434	1,404,940	1,330,849	1,478,997	1,500,376	5.02	175,500	175,500	175,500
STRM WTR POLLUTION CNTRL	356,591	711,268	571,364	411,021	422,161	2.83	40,000	40,000	40,000
MARINA LAGOON	338,001	570,529	443,713	316,615	318,859	0.30	0	169,000	169,000
	<u>4,025,372</u>	<u>5,040,281</u>	<u>4,698,959</u>	<u>4,650,991</u>	<u>4,776,196</u>	<u>33.63</u>			
SOLID WASTE FUND PROGRAMS									
STREET SWEEPING	517,883	462,223	286,659	498,807	515,041	3.47			
WASTE DISPOSAL	336,884	377,762	414,989	477,252	468,926	3.65			
	<u>854,767</u>	<u>839,985</u>	<u>701,648</u>	<u>976,059</u>	<u>983,966</u>	<u>7.12</u>			
SEWER ENTERPRISE FUND PROGRAMS									
WASTEWATER TREATMENT	5,901,064	6,310,577	6,147,310	7,996,182	8,423,382	29.99			
WASTEWATER SOURCE CNTRL	176,178	221,011	208,166	281,066	290,552	1.74			
DALE AVE LIFT STATION	284,673	302,474	245,031	350,715	388,869	0.80			
SEWER SYS ENGR SVCS	623,321	627,485	677,978	920,180	992,492	13.31			
SEWER MAINTENANCE	2,852,922	3,736,501	3,389,077	4,060,199	3,919,677	23.20			
	<u>9,938,167</u>	<u>11,198,048</u>	<u>10,667,561</u>	<u>13,617,261</u>	<u>14,015,072</u>	<u>68.13</u>			
FLEET & BUILDING MAINTENANCE									
BUILDING MAINTENANCE	1,124,140	1,404,621	1,244,093	1,494,279	1,541,855	9.59			
FLEET SERVICES	1,297,499	1,144,336	1,257,786	1,336,252	1,393,845	0.10			
	<u>2,421,639</u>	<u>2,548,957</u>	<u>2,501,879</u>	<u>2,834,532</u>	<u>2,935,700</u>	<u>9.69</u>			
CENTRAL PARKING IMPROVEMENT DISTRICT FUND PROGRAM									
PARKING OPERATIONS & MAINT	1,114,890	1,201,917	1,475,796	1,345,336	1,374,742	5.97			
	<u>1,114,890</u>	<u>1,201,917</u>	<u>1,475,796</u>	<u>1,345,336</u>	<u>1,374,742</u>	<u>5.97</u>			
Total	<u>\$18,334,854</u>	<u>\$20,919,127</u>	<u>\$20,044,983</u>	<u>\$23,424,180</u>	<u>\$24,085,670</u>				
By Category									
Salaries and Benefits	9,054,919	12,513,799	10,123,532	13,565,278	14,104,504				
Chargebacks to CD/PA/SDP	0	(2,115,193)	0	(2,080,174)	(2,152,411)				
Operating Expenses	8,786,896	9,876,519	9,455,602	11,060,049	11,566,723				
Capital Outlay	492,960	644,902	465,849	888,027	566,854				
Total	<u>\$18,334,854</u>	<u>\$20,919,127</u>	<u>\$20,044,983</u>	<u>\$23,424,180</u>	<u>\$24,085,670</u>				

Master
Part Time
Over Time
Sub-Total
CPID
Total

Capital Works Program

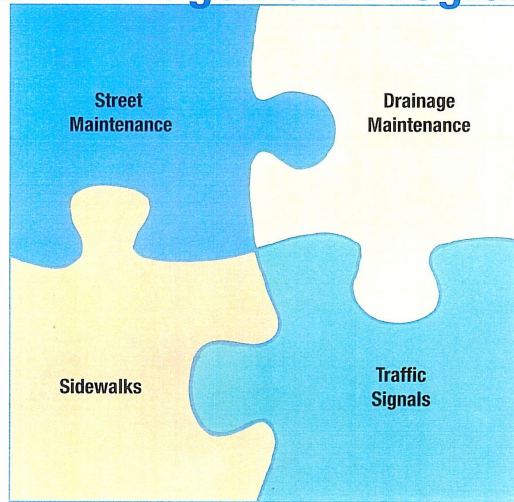
Appendix 2 City of San Antonio Public Works Department San Antonio River Improvement Project from hand out



Proposed 2008 – 2012 Five Year Infrastructure Management Program

City Council

September 12
2007



City of San Antonio 5 Year Rolling Street Maintenance Program

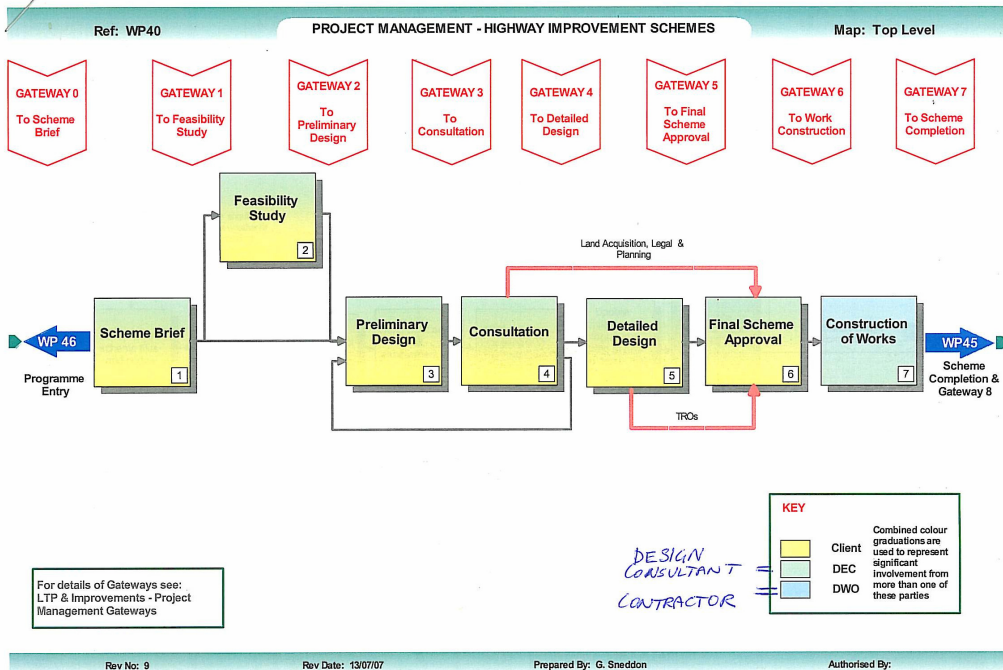
District	Year	Class	Street	From	To	Application Type	Estimated Cost
1	2007	Arterial	4th	Bonham	Ave B	Rehabilitation	\$99,820.00
1	2007	Local	Aganier	Basse	Hermine	Rehabilitation	\$43,497.00
1	2007	Arterial	Basse	McCullough	US 281	Rehabilitation	\$131,641.00
1	2007	Local	Belknap	Rosewood	Agarita	Rehabilitation	\$77,568.00
1	2007	Local	Buckeye	IH 10	Basse	Rehabilitation	\$81,457.00
1	2007	Local	Calaveras	Cincinnati	Culebra	Rehabilitation	\$50,380.00
1	2007	Arterial	Cincinnati	IH 10	Navidad	Rehabilitation	\$79,644.00
1	2007	Local	Gramercy	Blanco	RR Tracks	Rehabilitation	\$28,731.00
1	2007	Local	Jeffrey	Navidad	Sabinas	Rehabilitation	\$18,264.00
1	2007	Local	Kings Hwy	McCullough	Shook	Sealant	\$31,850.00
1	2007	Collector	Labor	Florida	Sadie	Rehabilitation	\$23,514.00
1	2007	Local	Laza	Rivas	Delgado	Rehabilitation	\$55,445.00
1	2007	Local	Lovera	Blanco	San Pedro	Rehabilitation	\$84,840.00
1	2007	Local	Lynwood	Blanco	Dead End	Rehabilitation	\$51,810.00
1	2007	Local	Magnolia	San Pedro	McCullough	Rehabilitation	\$69,273.00
1	2007	Local	Mistletoe	Main	McCullough	Rehabilitation	\$28,312.00
1	2007	Local	Monclova	San Jacinto	Brazos	Rehabilitation	\$19,136.00
1	2007	Local	Mt Sacred Heart	Blanco	Madonna	Rehabilitation	\$35,377.00
1	2007	Local	Neer	Dresden	Dead End	Rehabilitation	\$70,027.00
1	2007	Local	Pasadena	West	IH 10	Rehabilitation	\$81,588.00
1	2007	Local	Perez	Calaveras	Brazos	Rehabilitation	\$107,592.00
1	2007	Local	Sabinas	Ruiz	Delgado	Rehabilitation	\$28,001.00
1	2007	Local	San Angelo	Catalina	Dead End	Rehabilitation	\$109,158.00
1	2007	Arterial	San Pedro	Basse	Jackson Keller	Rehabilitation	\$483,808.00
1	2007	Arterial	San Pedro	Jackson Keller	Oblate	Rehabilitation	\$382,109.00
1	2007	Local	Santa Anna	West	IH 10	Rehabilitation	\$60,070.00
1	2007	Local	Santa Barbara	West	Buckeye	Rehabilitation	\$28,783.00
1	2007	Local	Santa Barbara	Buckeye	Neer	Rehabilitation	\$14,653.00
1	2007	Local	Santa Barbara	Neer	IH 10	Rehabilitation	\$3,663.00
1	2007	Arterial	St Marys	Quincy	Navarro	Rehabilitation	\$221,621.00
1	2007	Local	Texas	Williams	Dead End	Rehabilitation	\$5,574.00
1	2007	Local	Texas	Zarzamora	Alexander	Rehabilitation	\$41,298.00
1	2007	Arterial	West	Jackson Keller	Mardell	Rehabilitation	\$825,508.00
1&5	2007	Local	Calaveras	Lyons	Poplar	Rehabilitation	\$24,109.00
1&7	2007	Arterial	Cincinnati	Navidad	Zarzamora	Rehabilitation	\$51,408.00
2	2007	Local	Aransas	Pine	New Braunfels	Rehabilitation	\$99,102.00

Adopted by City Council
February 1, 2007

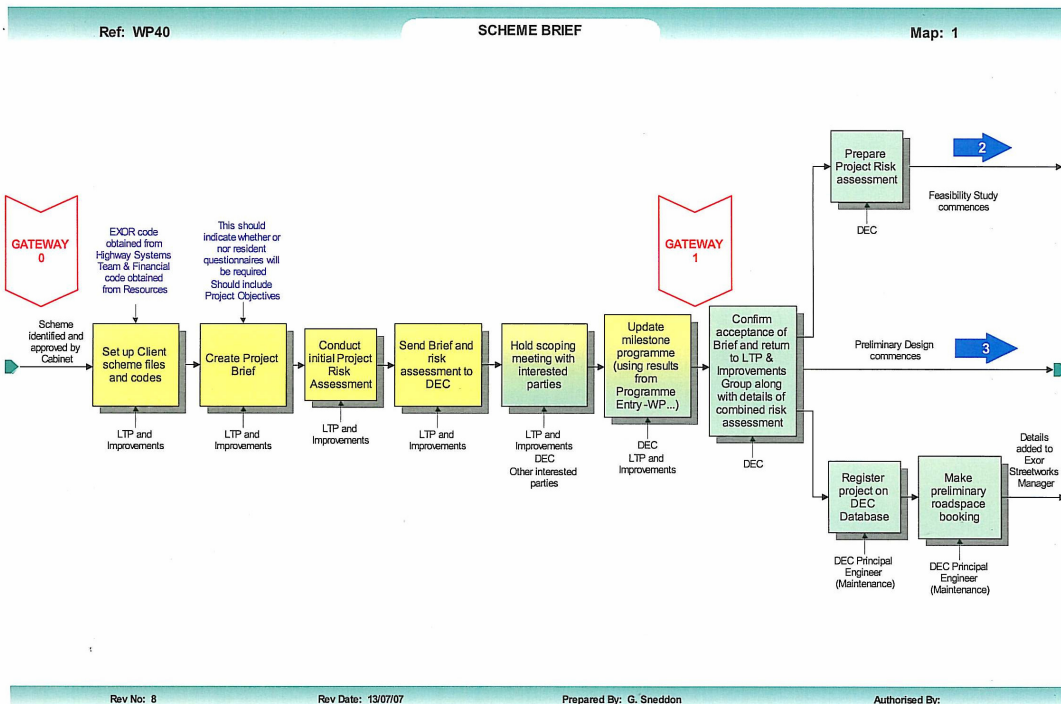
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Five Year Infrastructure Management Plan

Appendix 3 Dorset County Council Project Management via Hand Out



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APPENDIX 1

Capital Projects Delivery Protocol – 23 November 2006 Revision

	VISION		DEFINITION		DECISION		IMPLEMENTATION			Project Approval	Project Delivery	
	Service Need	Project Concept	Technical Appraisal	Feasibility	Authorisation	Commit to Invest	Final Agreed Brief	Scheme Design				
Gateways												
Activity	<ul style="list-style-type: none"> Service Vision Service Priority Balancing of: <ul style="list-style-type: none"> Conciliation Sufficiency Sustainability Define Objectives (by the key stakeholders) Identify Outcomes Early views on key options/issues IT strategy/ issues Preferred site Preferred timescale 	<ul style="list-style-type: none"> Estate issues <ul style="list-style-type: none"> Property Database Highways issues Procurement options/issues Early views on key risks Preferred site Preferred timescale 	<ul style="list-style-type: none"> Produce Outline Brief Technical Appraisal including: <ul style="list-style-type: none"> Options Appraisal or Master Plan Early planning advice Highways/EA advice Land acquisition / disposal advice Consultees' views Design Appraisal Sustainability Project: Strategic Study finalised 	<ul style="list-style-type: none"> Full Feasibility Study to include: <ul style="list-style-type: none"> Stakeholder consultation Local aspirations Costings Funding Sources Procurement Timescales Route(s) Feasibility Reconciled Design Appraisal Project: Strategic Study finalised 	<ul style="list-style-type: none"> AMG approves and prioritises projects against Strategic Goals: <ul style="list-style-type: none"> Statutory Obligations Optimum Asset Management Corporate Aims and Priorities 	<ul style="list-style-type: none"> Cabinet approves project in principle (or rejects) and: <ul style="list-style-type: none"> Ranks all approved projects including defined Reserve Projects 	<ul style="list-style-type: none"> Ensure Deliverability against: <ul style="list-style-type: none"> Final Agreed Brief Budget Procurement 	<ul style="list-style-type: none"> Scheme Design developed in line with: <ul style="list-style-type: none"> Final Agreed Brief Budget Procurement Integrated Design Team Collaboration with constructor Deliverability Check Cost v Budget Time v Need Quality issues 	<ul style="list-style-type: none"> Achieve a balance between the required flexibility in capital programme development and political accountability Cost control Supply Chain management & integration Reporting Post Implementation review 	6	7	
Gatekeeper	O&PD Committee followed by PMG	PMG	PMG may refer to BCG for detailed investigation	PMG to sign off form AMG 1	AMG	Cabinet	Cabinet	Service Directorate	Service Directorate	Cabinet		
Documents	Form PMG-A Statement of Service Need to be completed by Service Directorate Representative	Form PMG-B Project Concept Statement to be completed by Service Directorate Representative and Project Manager	Form PMG-C and Master Plan to be prepared (if applicable) by Service Directorate and Project Manager	Form AMG 1 to bid for capital funding	Summary of Feasibility (including a deliverability statement) via form AMG1	Cabinet Reports: Capital Projects / Asset Management / Capital Programme Monitoring	Cabinet Reports: Capital Projects / Asset Management / Capital Programme Monitoring	Design Documents must be signed off by Service Directorate	Design Documents must be signed off by Service Directorate	Cabinet Reports: Capital Projects / Asset Management / Capital Programme Monitoring	Reports by BCG	
Planning	Preliminary planning issues	Check viability of options	Check viability of options	Stage 1 Planning Consultation				Stage 2 - Document Check	Stage 3 - Application			
Legal	Title and Covenant checks via Form PMG-C	Cost benefit analysis of options - using preliminary data only (incl. whole life cost)	Cost benefit analysis of options - using preliminary data only (incl. whole life cost)	Feasibility Estimates (Z/m ²) - using outline areas	Feasibility Estimates (Z/m ²) - using outline areas	Feasibility estimates for preferred solution	Feasibility estimates for preferred solution	Instruction to acquire interest in land via Form PMG1	Elemental Cost Plan, with appropriate quantities produced at end of Stage D	Pre Tender Estimate (where appropriate)	Note: Target certainty for cost data and cost plans varies for each stage according to procurement route	
Communications	Consult service Client Director, Develop Stakeholder & Communications frameworks	Consult service user(s) and stakeholders Consult Stakeholder undertakers and agencies	Consult service user(s) and stakeholders Consult Stakeholder undertakers and agencies	Consult stakeholders and end users with Planning where appropriate	Advise stakeholders	Advise stakeholders	Advise stakeholders	Neighbour liaison	Neighbour liaison	Neighbour Liaison (continued)	Neighbour Liaison (continued)	
Democratic	O&PD Committee	Local Members	Local Members	Local Members	Cabinet	Cabinet	Cabinet	Stage C	Stage D	Cabinet	Cabinet	
RIBA stages	Pre-Inception	Stage A	Stage A/B	Stage B	Stage B	Stage B	Stage B	Stage C	Stage D	Stages E-M	Stages E-M	
Project Manager	Facilitate	Support	Support	Support	Report	Report	Report	Lead	Lead	Lead	Lead	
<p>At Every Gateway</p> <ul style="list-style-type: none"> LEGAL AND ESTATES ISSUES RESOURCE IMPLICATIONS: Financial: Cost Plan v Budget (TP) quarter and accuracy of estimate), Charges, Fees; REGULATORY: PLANNING & BUILDING REGS ENVIRONMENTAL ISSUES SUSTAINABILITY CONSIDERATIONS 												
<p>STOP THINK</p> <ul style="list-style-type: none"> LEGAL AND ESTATES ISSUES RESOURCE IMPLICATIONS: Financial: Cost Plan v Budget (TP) quarter and accuracy of estimate), Charges, Fees; REGULATORY: PLANNING & BUILDING REGS ENVIRONMENTAL ISSUES SUSTAINABILITY CONSIDERATIONS 												
<p>Stages in initial Protocol</p> <ul style="list-style-type: none"> Client Needs Appraisal Solutions Strategic and Democratic Final Client Brief Project Delivery 												

PROJECT CLOSURE Full buildings/site information is passed to the Corporate Property Database Group

PROJECT SCORE FROZEN AT GATE 5 - Any significant variations in scope (e.g. Brief after Gate 5 must be referred to PMG who may require that the project returns to an earlier gateway or may sign off the variations for full cabinet approval

1. City of San Mateo – Pavement Management Program, Capital Works Program
2. Stephen Scott – San Mateo Rail Corridor Transit Oriented Development Plan
<http://www.ci.sanmateo.ca.us/index.html>
3. APWA Congress – Various Papers
<http://www.apwa.net>
4. City of San Antonio - 2008-2012 Five Year Infrastructure Management Plan
5. City of San Antonio - 2007-2012 \$550 million Bond Program
<http://www.sanantonio.gov/?res=1024&ver=true>
6. Arlington County Virginia – Fiscal Years 2003-2008 Capital Improvement Program Summary
<http://www.co.arlington.va.us/>
7. Dorset County Council - Asset Management Plan 2007-2010
<http://www.dorsetforyou.com/index.jsp>
8. Dorset County Council, G.Sneddon – Capital Projects Delivery Protocol
<http://www.dorsetforyou.com/index.jsp>