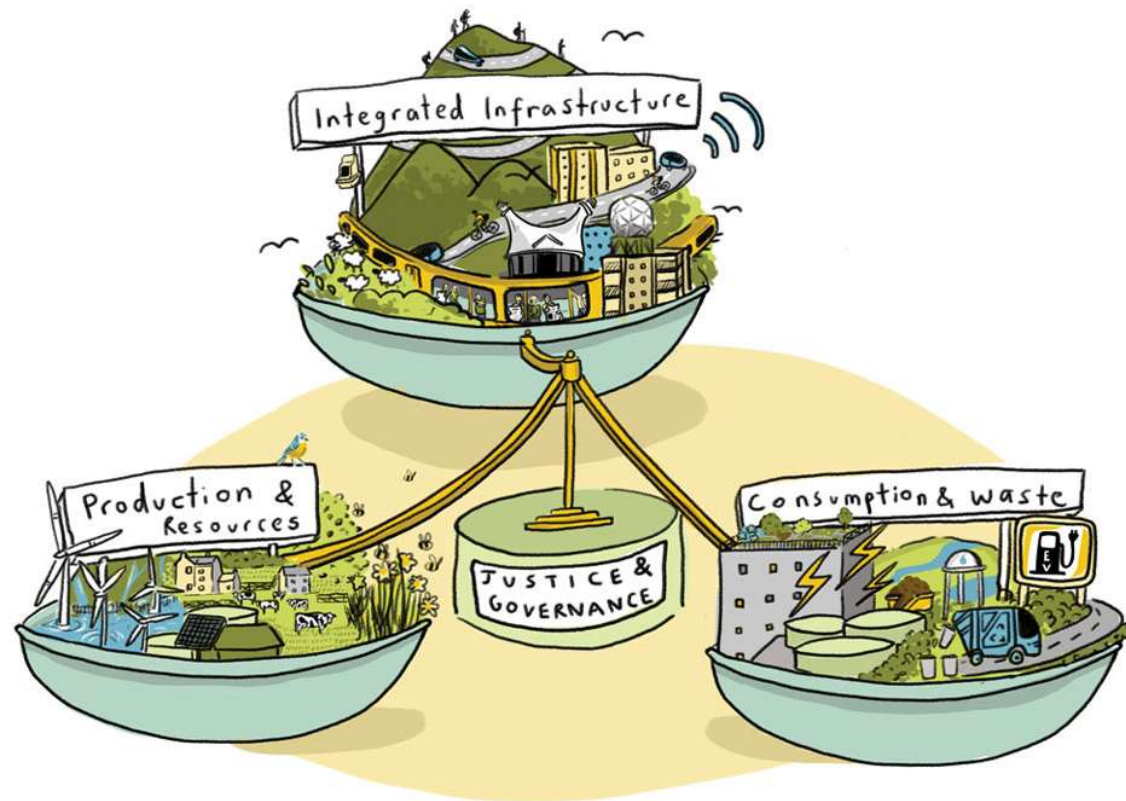


# CHALLENGES and THE WAY FORWARD

N|V|5

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## Challenges

- Engineering Profession is a big part of the challenge

## The Way Forward

- Leadership and an Integrated Infrastructure Planning Team
- Complexity of the Integrated Infrastructure Planning Process
- Identifying a methodology
- Case Study – Integration can also reduce Infrastructure Cost

## Socio-Economic and Environmental SDGs

1. Population – Demographic shift
2. Governance - Land Use Policy and Water Law
3. Geography – Political Boundaries, Site Constraints and Unique Context
4. Natural environment always take second place to the built environment
5. Global infrastructure response is largely reactionary
6. Funding
7. Engineering Profession

## CHALLENGES - ENGINEERS

- **Discipline based** – technical experts for each type of infrastructure; master planning, design and award of construction still largely in discipline based silos
- **Lacks true innovation** – solutions are based on previous projects and experience
- **Code compliance design** – does not allow for best sustainable integrated solution for individual projects within the local project context
- **Centralized solutions** (treat all wastewater in one facility) – decentralized solutions (natural based approach) need to be given a greater consideration
- **Complex solutions** and “big” projects creating an inherent bias toward bigger more expensive projects (profession is not rewarded for simpler solutions)
- **Low carbon solutions** – not part of vernacular for engineers
- **Project are implemented locally**
- **Engineers tend to bring solutions from developed places to undeveloped regions** (operations, maintenance and replacement parts)

## Engineers are engaged too late in the process

- Identified Infrastructure Need – usually for a single infrastructure system
- General Project Definition
- How can we fund it
- Procurement Process – Engineer is engaged

The procurement does not ask the Engineer if there are other solutions and the project is seldom evaluated in the context of other infrastructure systems or regional needs, and never with any consideration for socio-economic or environmental considerations

## Complex Iterative Process to Integrate Infrastructure

- Preliminary planning data and sustainability considerations (social economic and environmental)
- Initial decisions related to required infrastructure
- Planning of infrastructure and more data
- Optimize planning of infrastructure - changes in assumptions and decisions

**LEADERSHIP:** Integrated planning that promotes sustainability principles and coordination between different infrastructure sectors,

- Avoid negative environmental and social impacts
- Address insufficient institutional capacity, lack of expertise and political and cultural challenges at the national level.

## ENVISION and other rating systems

1. Leadership
2. Quality of Life
3. Natural World
4. Resource Allocation
5. Climate and Resilience



### **COLLABORATION**

- LD1.1** Provide Effective Leadership and Commitment
- LD1.2** Foster Collaboration and Teamwork
- LD1.3** Provide For Stakeholder Involvement
- LD1.4** Pursue Byproduct Synergies

### **PLANNING**

- LD2.1** Establish A Sustainability Management Plan
- LD2.2** Plan For Sustainable Communities
- LD2.3** Plan For Long-Term Monitoring and Maintenance
- LD2.4** Plan For End-of-Life

### **ECONOMY**

- LD3.1** Stimulate Economic Prosperity and Development
- LD3.2** Develop Local Skills and Capabilities
- LD3.3** Conduct a Life-Cycle Economic Evaluation

**ENVISION**  
**11 of 64 Credits**  
**are for**  
**Leadership**

## LEED – Integrative Process Credits

### – Integrative thinking

Bringing the right people to the table at the onset and aligning goals can save project teams valuable time and resources.

Requirements in the Integrative Process (IP) section encourage and reward finding connections between different building systems and processes. The strategies built into LEED often accomplish more than just one thing, and with this opening dialogue, projects can capitalize on those synergies.

## Leadership – Integrated Team

- Facilitator or Project Manager (need to be someone who can challenge the technical experts)
- Technical Experts
- Stakeholders
- Finance

## Planning: Methodology for Strategic Planning Decisions for Integrated Infrastructure

- Holistic Strategies that consider socio-economics and the environment
- Innovation
- Integration

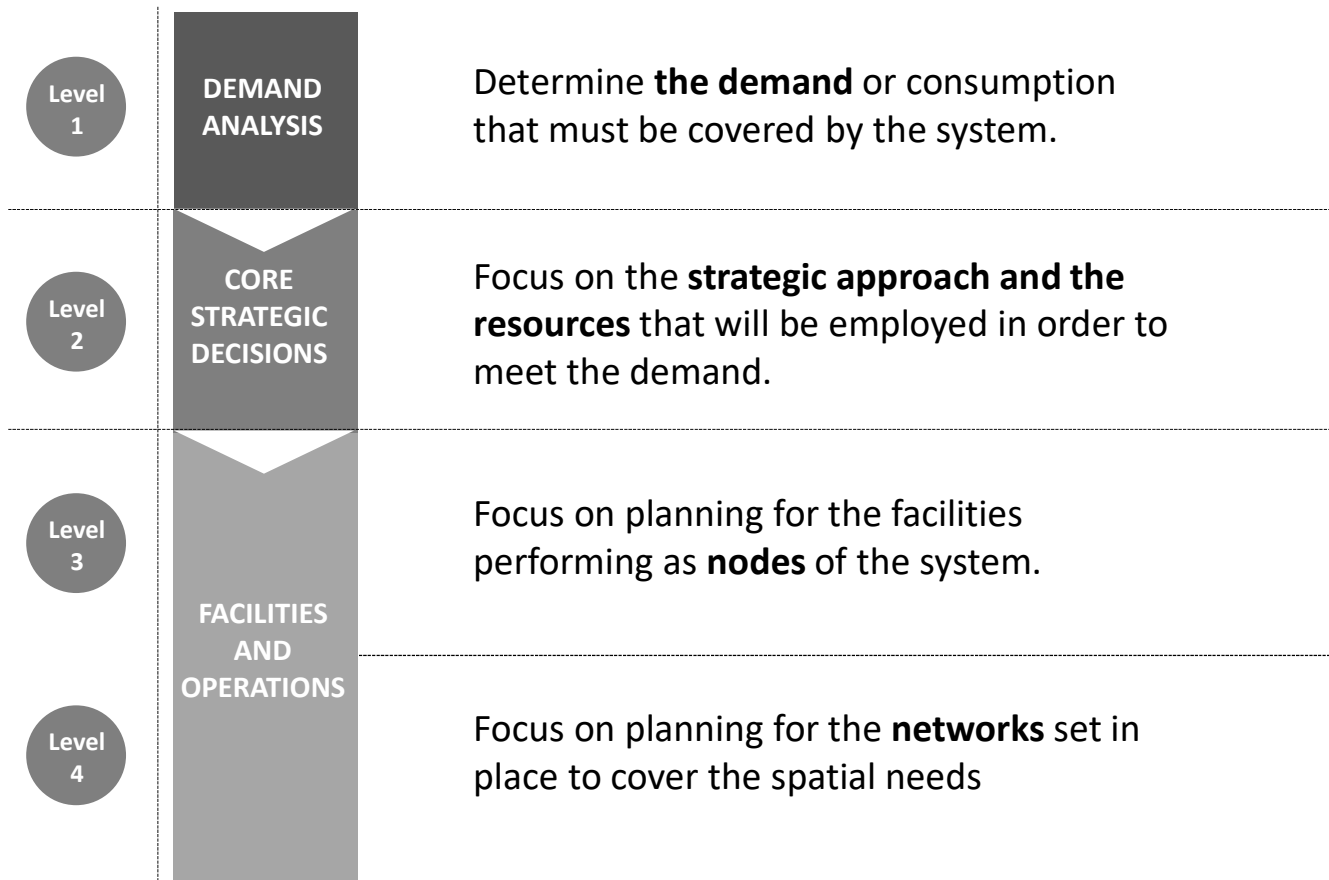
## Need to Identify a Methodology to advance the our ability to Integrate Infrastructure Systems

### Zofnass Sustainable Planning Guidelines

1. Demand
2. Strategic Approach and Resources  
(to meet demand)
3. Specific Facilities
4. Operations



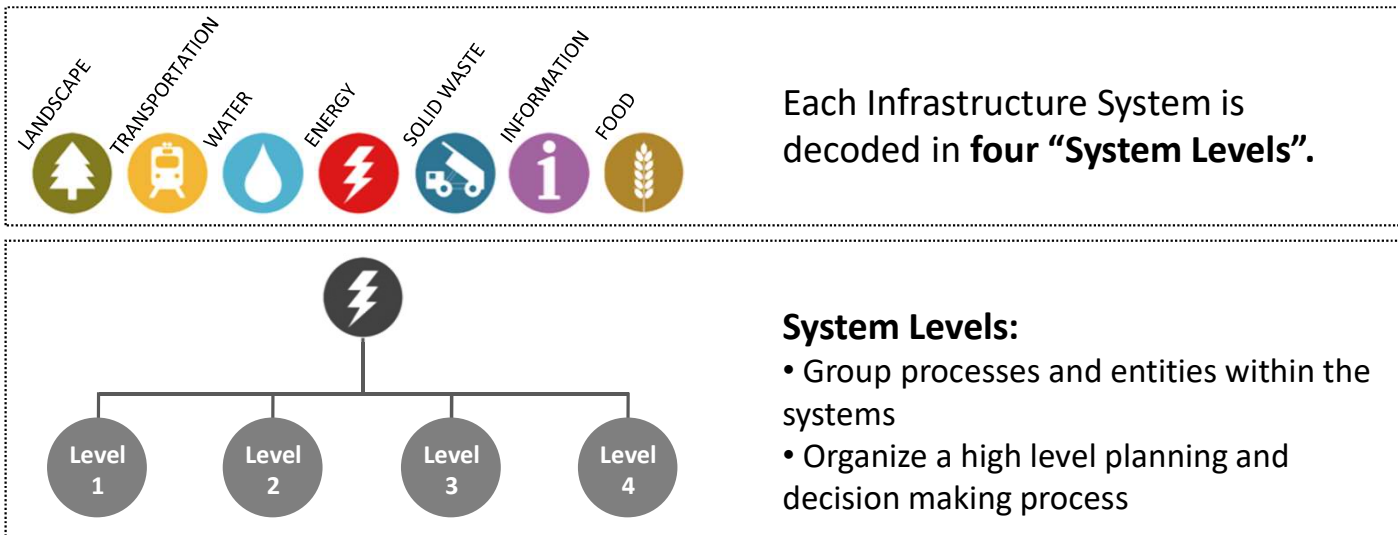
To ensure a sustainable infrastructure system **the four “system levels”**:





## Zofnass Sustainable Planning Guidelines

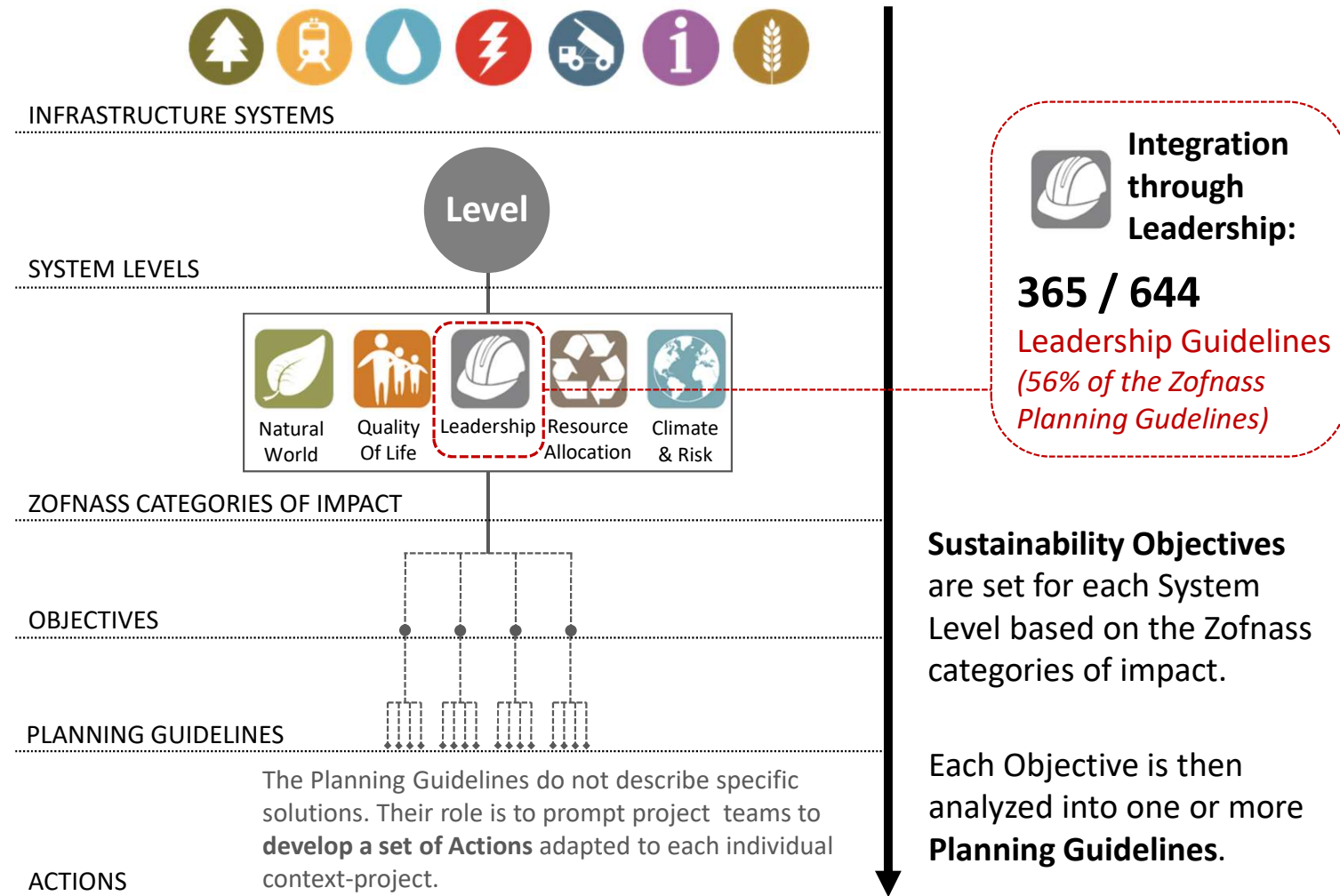
Each infrastructure is decoded in **four “system levels”**:



# Zofnass Sustainable Planning Guidelines



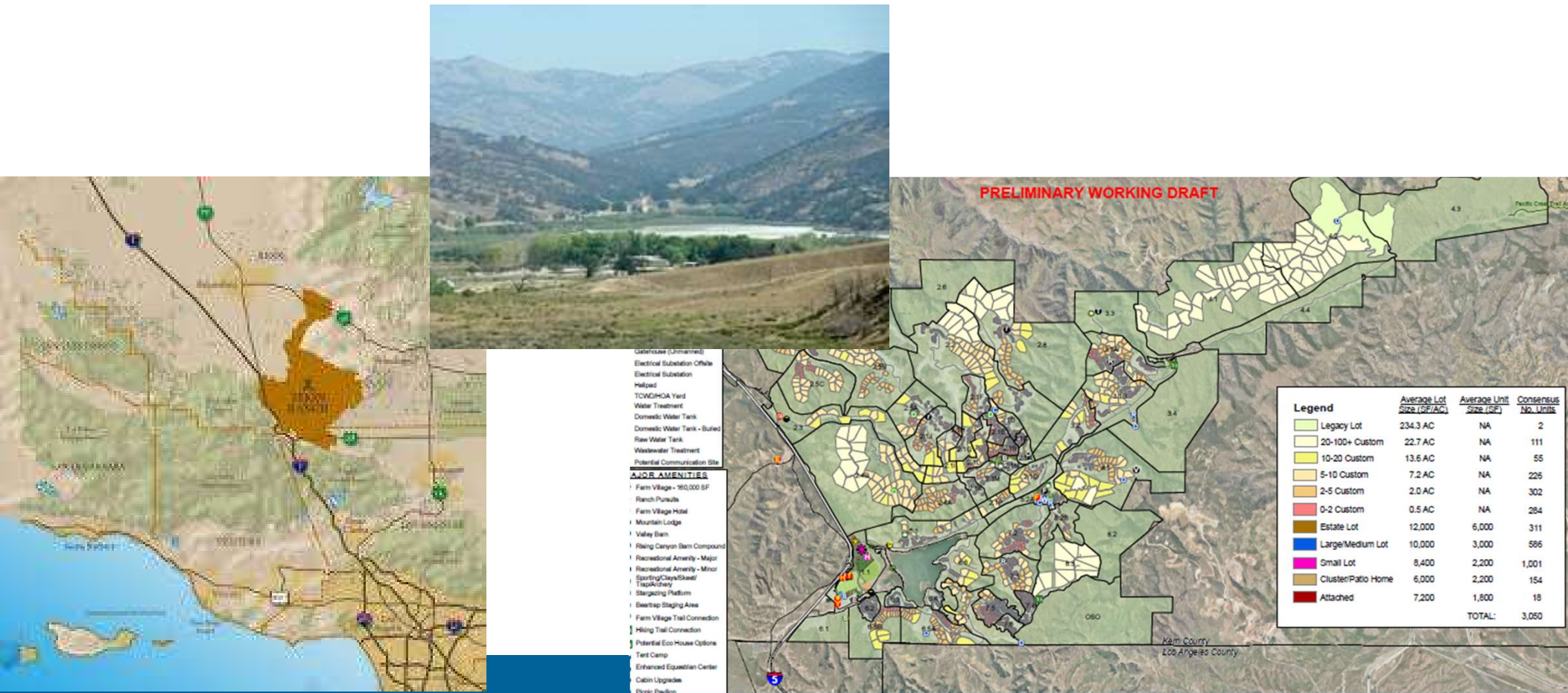
## Z Zofnass Sustainable Planning Guidelines





# NEW TOWN DEVELOPMENT CASE STUDY

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# INTEGRATION OF INFRASTRUCTURE SAVES \$\$\$



CONSTRUCTION ITEMS	AMOUNT
Rough Grading .....	\$ 139,442,670
Erosion Control & Fire Break .....	\$ 10,985,108
Environmental Mitigation .....	\$ 26,454,222
Bridge .....	\$ 12,511,675
Sanitary Sewer .....	\$ 78,172,429
Water Improvements .....	\$ 143,402,215
Reclaimed Water .....	\$ 48,987,582
Storm Drainage .....	\$ 19,090,547
Street Improvements / Intersections / Signalization	\$ 120,630,230
Dry Utilities .....	\$ 106,216,869
Landscaping & Irrigation .....	\$ 63,409,793
Fire Station / Sheriff Station .....	\$ 13,592,740
<b>Construction Costs .....</b>	<b>\$ 782,986,832</b>
Fees & Services (Pre-Construction) .....	\$ 105,294,681
Construction (Bonds, Survey, geotech)	\$ 59,005,791
<b>Total</b>	<b>\$ 947,287,304</b>

Cost Reduction of 5%  
**\$45 Million**