Department of Public Works

Staff Update on City Council Policy № 28:
Award Guidelines for Arterial and Collector Streets with Concrete or Asphalt

Council Presentation
April 27, 2021

Policy Amendments

Policy 28 Amended by Council on October 27, 2020:

*"If the project contains a majority subgrade with a **Plasticity Index (PI) greater than 30** or deemed as **moderately to highly expansive soil** by the design Geotechnical Engineer, the **asphalt pavement alternative** will be used by City Council when deciding to award a contract for arterial and collector roadways.*

*"If the **PI is less than 30** and the construction cost for concrete pavement is within $125,000 per lane mile ($17.75/square yard), which should represent the future anticipated maintenance cost, of the asphalt pavement alternative, the **concrete pavement alternative** will be used by City Council when deciding to award a contract for arterial and collector roadways. This policy will be updated annually."*

Background

Council Policy 28 Amended by Council on October 27, 2020:

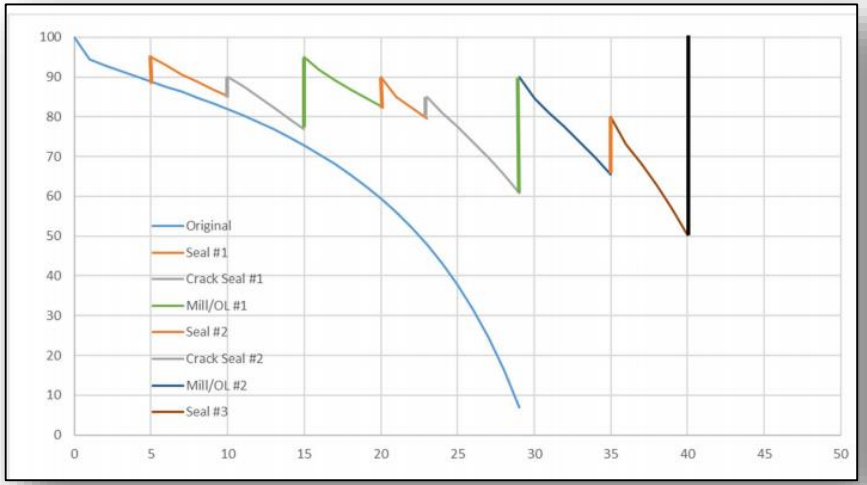
- Amended policy now considers an additional variable in the project application type decision matrix
  - Project site's **Plasticity Index (PI)**, a geotechnical soil characteristic, must be evaluated by laboratory prior to RFB release, contractor bidding, and Council award
- **Expansive soils (i.e. clay) – High PI (30+)**
  - Subgrade swells with increased rainfall, shrinks with decreased rainfall
- **Non-Expansive Soils – Low PI (≤ 30)**
  - More stable sub-grade, less movement over life

Analysis

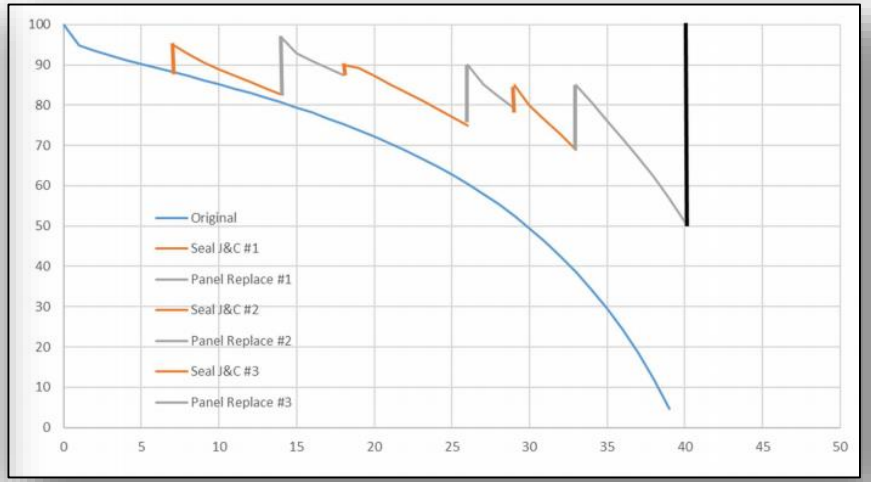
- Roadway Asset Services, LLC (RAS) performed Lifecyle Cost Analysis (LCCA)
- Analysis considered lifetime maintenance activities and their costs and applied discount and inflation rates to determine **Present Worth Value** (PWV)
- 40-year analysis timeline to establish baseline comparison
- **Lifecyle Cost Analysis Resulted in 4 Key Conclusions**:
  1. Project's subgrade's PI is > 30 (clay), Asphalt Pavement prevails
  2. If Concrete's lifetime maintenance cost is within $125,000 per lane mile of Asphalt's lifetime maintenance cost, Concrete Pavement prevails
  3. Residential streets always recommended Asphalt Pavement
  4. If adjacent section is concrete, Concrete Pavement recommended for continuity

Non-Expansive Soils

Concrete Pavement on Arterials



Asphalt Pavement on Arterials



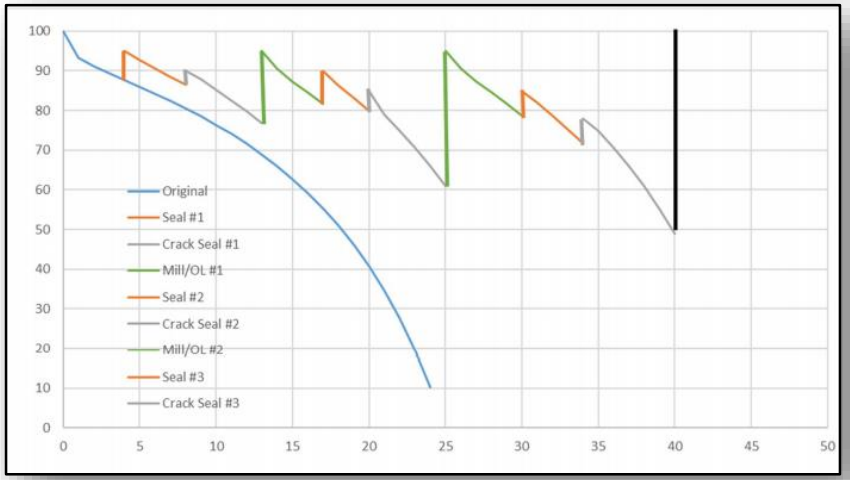
Application (Subgrade Soil)	Present Worth Value ($/lane mile)	Maintenance Difference
Concrete Arterial (Non-Expansive)	$472,190	
Asphalt Arterial (Non-Expansive)	$600,698	$128,509

Non-Expansive Soils

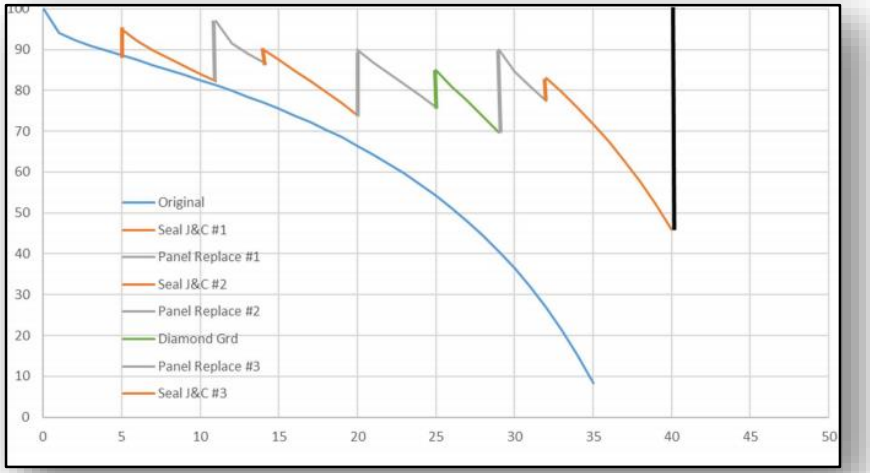
- **Soil Characteristics**
  - Sandy, allows for more drainage
  - No shrinkage or swell
- **Repairs (Outside of Normal Maintenance Cycles)**
  - Concrete Pavement: Cracks
    - Repairs involve crack and joint sealing
    - Estimated repair duration is 0.5 days
  - Asphalt Pavement: Pavement Failures
    - Repair of base and pavement with a mill & overlay
    - Estimated repair duration is 1 – 2 days

Expansive (Clay) Soils

Concrete Pavement on Arterials



Asphalt Pavement on Arterials

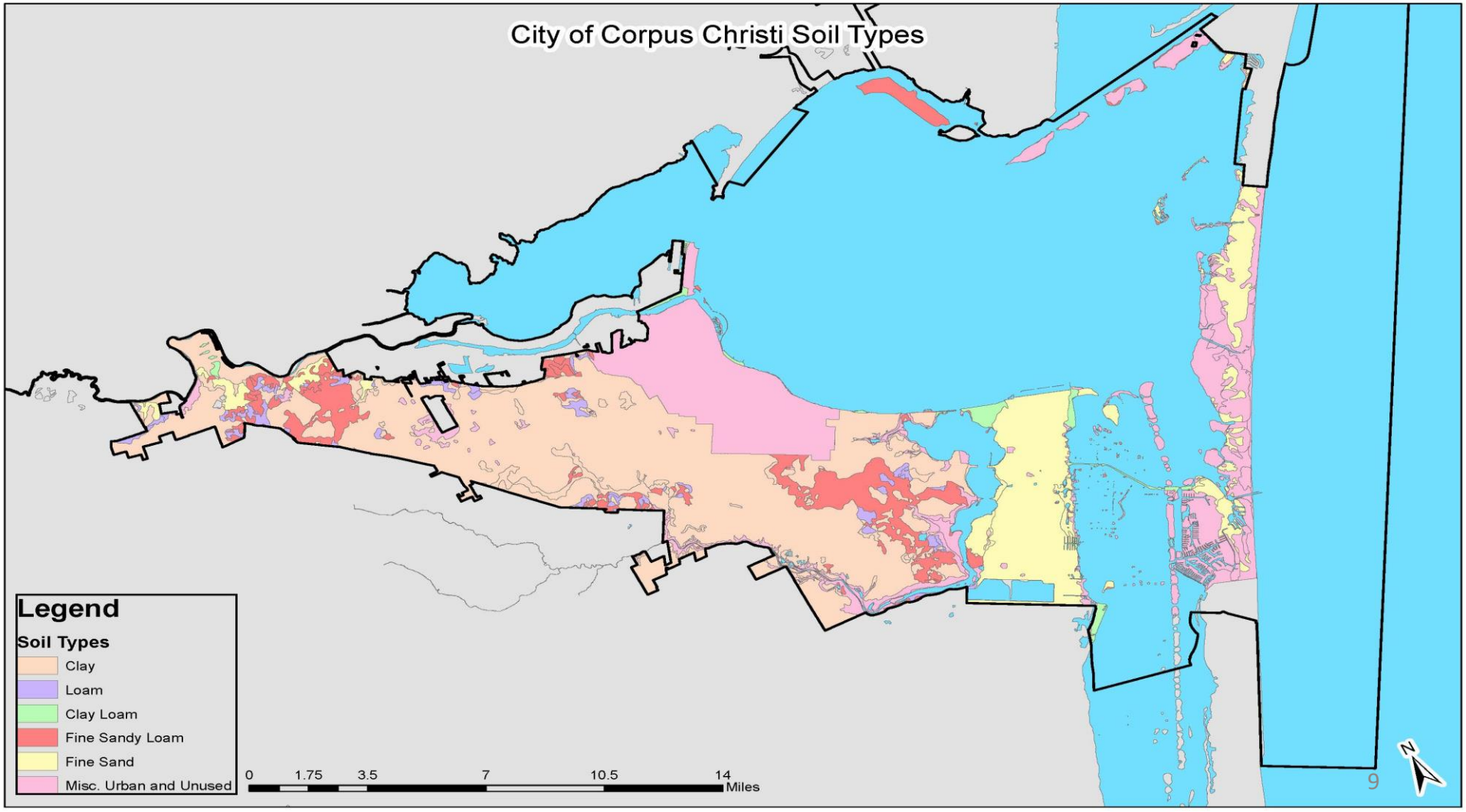


Application (Subgrade Soil)	Present Worth Value ($/lane mile)	Maintenance Difference
Concrete Arterial (Expansive)	$605,055	
Asphalt Arterial (Expansive)	$623,099	$18,046

Expansive (Clay) Soils

- **Soil Characteristics**
  - Moderate to high swell potential

- **Repairs (Outside of Normal Maint. Cycle)**
  - Concrete: Panel lift of several inches
    - Repairs involve panel replacements
    - Estimated repair duration is 7 days
  - Asphalt: Pavement Failures
    - Repair of street base and pavement with a mill & overlay
    - Estimated repair duration is 1 – 2 days


City of Corpus Christi Soil Types
Legend
Soil Types
Clay
Loam
Clay Loam
Fine Sandy Loam
Fine Sand
Misc. Urban and Unused
0
1.75
3.5
7
10.5
14
Miles
N

Additional Conclusions

Residential Streets

- Recapitalization costs not financially beneficial
- Lower traffic loads do not warrant concrete pavement structure
- Higher cost for utility cut repairs over life of asset
- Reconstruction difficult in residential areas
- **Asphalt Pavement** recommended

Pavement Continuity

- If project is adjacent to an existing concrete section, **Concrete Pavement** recommended

Final Recommendations

1. **Geotechnical Soil Conditions**
   - ✷ When Plasticity Index (PI) of subgrade is >30, **Asphalt Pavement** recommended

2. **Cost Differential Minimal to Existing Recommendation**
   - ✷ When the lifetime maintenance cost difference of concrete is below **$125,000/lane mile**, **Concrete Pavement** recommended

Final Recommendations

3. **Residential Streets**
   - ✷ Due to under ground utilities and light-moderate usage, **Asphalt Pavement** recommended

4. **Pavement Continuity**
   - ✷ If project is adjacent to an existing concrete pavement section, **Concrete Pavement** recommended

Questions?