

Wind Power Development on Port of Corpus Christi Authority Property



Prepared for American Association of
Port Authorities

Harbors, Navigation and Environment
Committees Seminar

May 1, 2012

San Francisco, California

The Port
of the
Lone Star
State.™



PORT CORPUS CHRISTI



PCCA Power Portfolio Basics

- Not a large consumer compared to refineries and manufacturing. We have privatized several operations. Our largest remaining operating facility with the highest energy demand is the Bulk Terminal.
- Overall PCCA annual electrical use is about 8.1 Million Megawatts.
- PCCA recently entered into a 60 month contract with Reliant Energy at a rate of 5.246 cents per KWH.
- By PCCA policy 10% of power is provided from renewable sources. The premium for renewable is less than 1 %.

HARBOR WIND





Port of Corpus Christi
Inner Harbor

Harbor Wind - General Information

Location: Port of Corpus Christi, TX

Wind Resource: 3 years of onsite data collected @ 60 meters

Permitting: Local zoning approval (granted by the Port)
Area zoned for heavy industrial use
No wetland /jurisdictional constraint
FAA approvals

Environmental: Voluntary Avian & Bat studies
Pre and Post construction
Ongoing for 3 yrs

Project Size: 9MW (6 wind turbines)

Project Cost: Est. \$20M (6 units)





Timeline

June 2006

Initial contact with Port

March 2007

Cooperation Agreement signed

Meteorological tower installed

Multiple studies started

July 2008

Long term (30 year) Lease Agreement signed

June 2011

Construction starts

February 2012

Construction completed

Commercial operations begin





HEIGHT: 414 feet

DEPTH: 95 feet (length of concrete piles in foundation)

WEIGHT: 233.6 tons = wind turbine
88.0 tons = reinforcing steel in each foundation
+1073.4 tons = concrete in each foundation
1395.0 tons TOTAL

ROTATION: 19 revolutions per minute at full power

ENERGY PRODUCTION: 30,000,000 kilowatt-hours annually;
enough to power 2600 homes.



Harbor Wind





Annual Emissions Offset by Harbor Wind (6 Turbines)

19,200 tons of carbon dioxide (CO₂).

38.25 tons of sulfur dioxide (SO₂).

76.5 tons nitrogen oxide (NO_x).

22,500,000 gallons of water saved.

Equivalent to the water consumed in 175 households every year.



Harbor Wind





Site & Development Considerations

Developer and Port Perspectives

Public Perception/Protection

- Viewshed

Ground Easements/Leasing – Construction/O&M Access

•Proximity to USACE DMPA/Safety

- Center of tower offset from levee toe
- Underground high voltage lines parallel to levee and deep
- Temp access road likely not there in future (DMPA Ops)
- Cessation per DMPA operations (present and future)

•Wind Easements

- 10 X Diameter
- Height restrictions on adjacent structures

• The Avies ---- Avifauna and Aviation

- Commercial/Military/Weather Service
- Birds/Birds/Birds

• Revenue

- Royalties based on generation w/minimum throughput



The Texas “Port” Advantage

Developer Perspective

Favorable Coastal Wind Resource

- Strong Class 3
- High coincidence with peak demand

Zoning/Permitting Simple

- No height restrictions
- Only need “Landowner” approval
- Existing “smokestack” viewshed

One Landowner

- Adjacent to DMPA
- Limited commercial value

Energy Intensive Area

- Refineries
- Other Large Industrial Customers
- Transmission & Substations at Site
- Energy Development Culture

Reduced Transportation Costs

- From Ship to Site

Reduced Construction Costs

- Raw Material in Port (concrete, steel, aggregate)
- Fabrication (offshore substructures)
- Crane availability





Site & Development Considerations

Port Perspectives

Public Perception/Protection

- Viewshed

Ground Easements/Leasing – Construction/O&M Access

•Proximity to USACE DMPA/Safety

- Center of tower offset from levee toe
- Underground high voltage lines parallel to levee and deep
- Temp access road likely not there in future (DMPA Ops)
- Cessation per DMPA operations (present and future)

•Wind Easements

- 10 X Diameter
- Height restrictions on adjacent structures

• The Avies ---- Avifauna and Aviation

- Commercial/Military/Weather Service
- Birds/Birds/Birds

• Revenue

- Royalties based on generation w/minimum throughput

Comparison To Existing Inner Harbor Structures



Wind Turbine

Grain Elevator

Refinery Stacks



Site & Development Considerations

Public Perception/Protection

- Viewshed

Ground Easements/Leasing – Construction/O&M Access

•Proximity to USACE DMPA/Safety

- Center of tower offset from levee toe
- Underground high voltage lines parallel to levee and deep
- Temp access road likely not there in future (DMPA Ops)
- Cessation per DMPA operations (present and future)

•Wind Easements

- 10 X Diameter
- Height restrictions on adjacent structures

• The Avies ---- Avifauna and Aviation

- Commercial/Military/Weather Service
- Birds/Birds/Birds

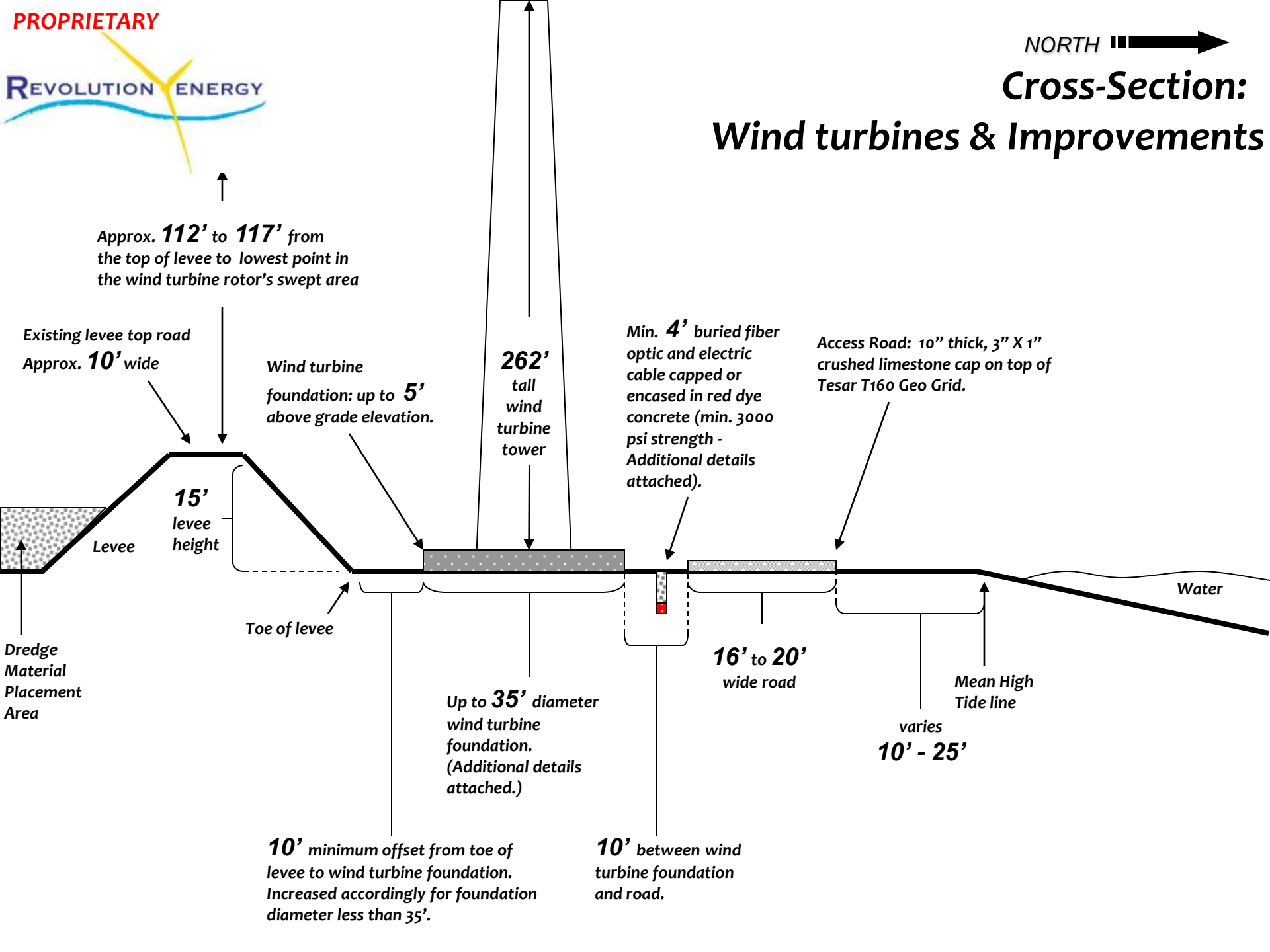
• Revenue

- Royalties based on generation w/minimum throughput



NORTH 
Cross-Section:

Wind turbines & Improvements





Site & Development Considerations

Public Perception/Protection

- Viewshed

Ground Easements/Leasing – Construction/O&M Access

•Proximity to USACE DMPA/Safety

- Center of tower offset from levee toe
- Underground high voltage lines parallel to levee and deep
- Temp access road likely not there in future (DMPA Ops)
- Cessation per DMPA operations (present and future)

•Wind Easements

- 10 X Diameter
- Height restrictions on adjacent structures

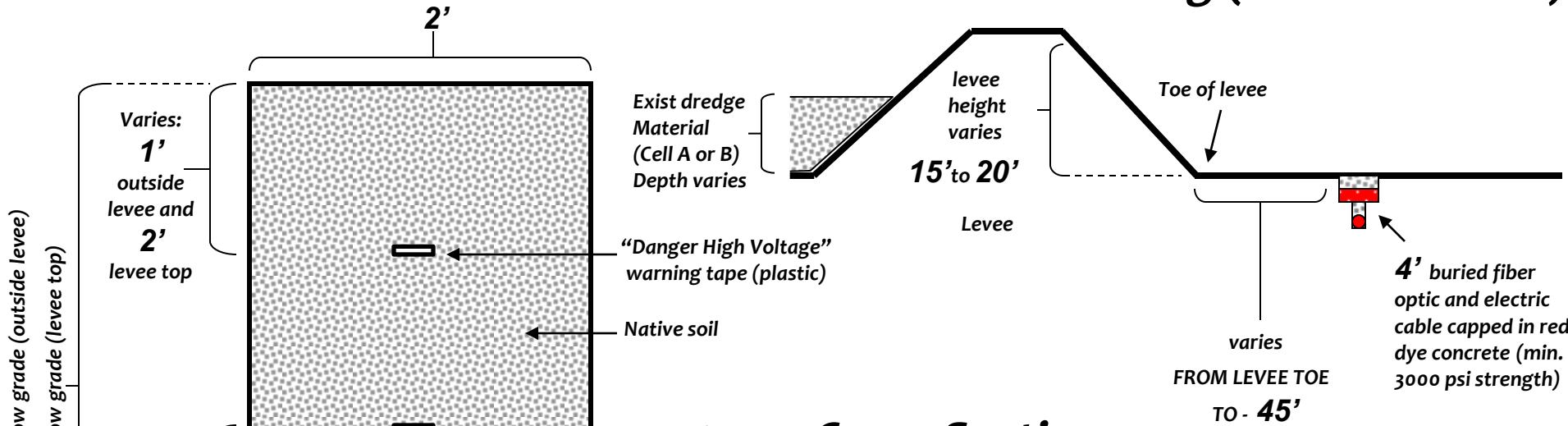
• The Avies ---- Avifauna and Aviation

- Commercial/Military/Weather Service
- Birds/Birds/Birds

• Revenue

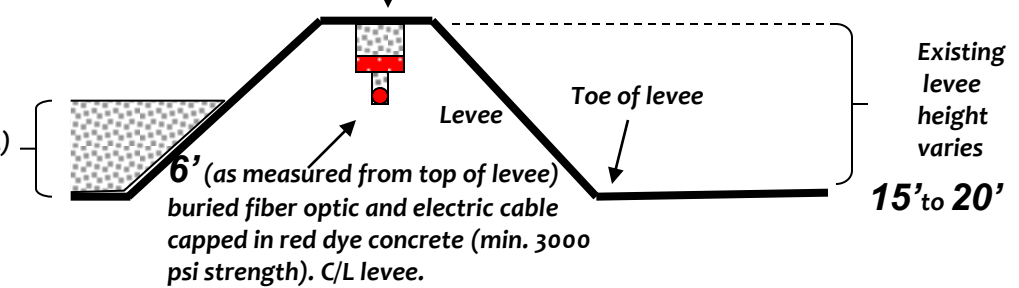
- Royalties based on generation w/minimum throughput

Cross-Section: Electric Cable Routing (Outside Levee)



Cross-Section: Electric Cable Routing (Levee Top)

Electric cable plowed to depth of 6', with a 4'8" deep by 2' wide trench dug on top of the buried cable. A min. 6" thick by 2' wide red dye concrete cap is place 4' below the existing levee top. All backfill procedures shall be professional design, and constructed and compacted in lifts to better insure levee's stability and integrity and prevent breaches or failures.





Site & Development Considerations

Public Perception/Protection

- Viewshed

Ground Easements/Leasing – Construction/O&M Access

•Proximity to USACE DMPA/Safety

- Center of tower offset from levee toe
- Underground high voltage lines parallel to levee and deep
- Temp access road likely not there in future (DMPA Ops)
- Cessation per DMPA operations (present and future)

•Wind Easements

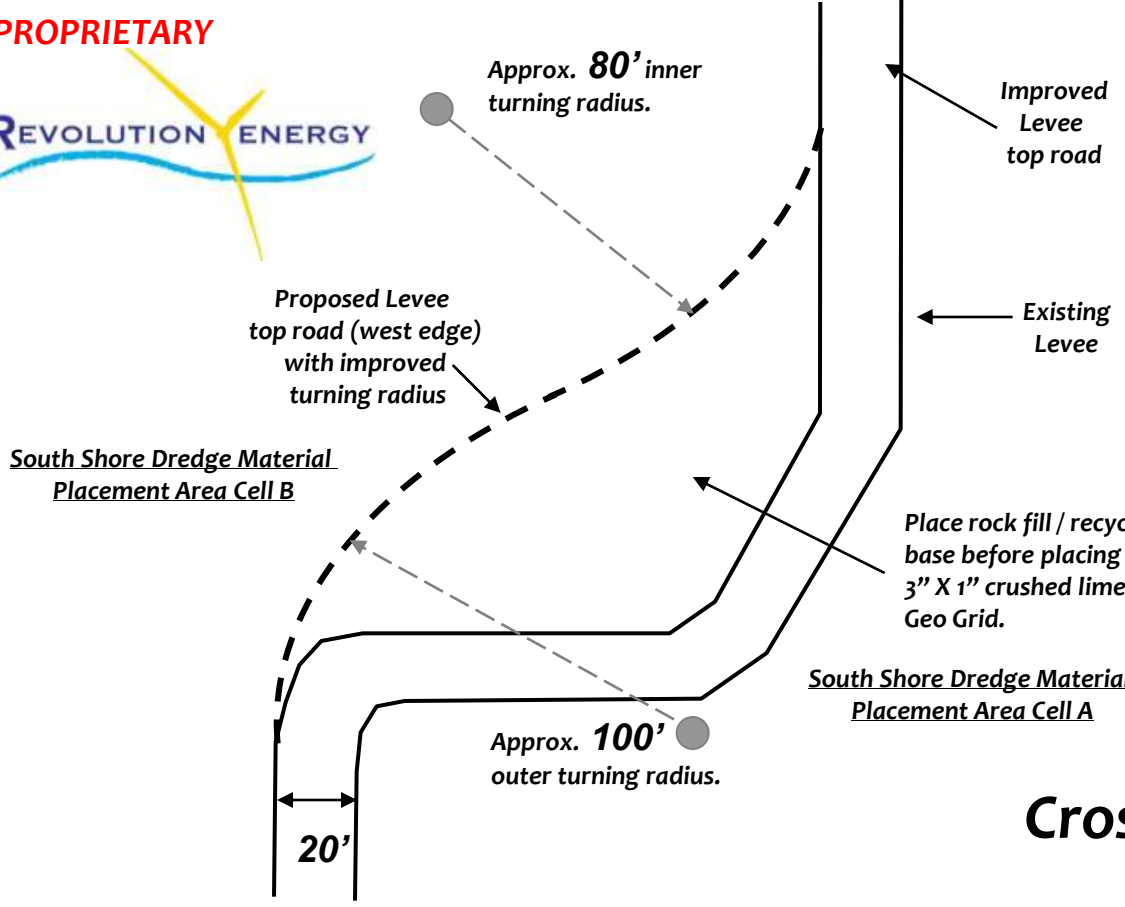
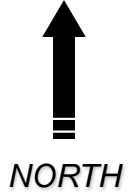
- 10 X Diameter
- Height restrictions on adjacent structures

• The Avies ---- Avifauna and Aviation

- Commercial/Military/Weather Service
- Birds/Birds/Birds

• Revenue

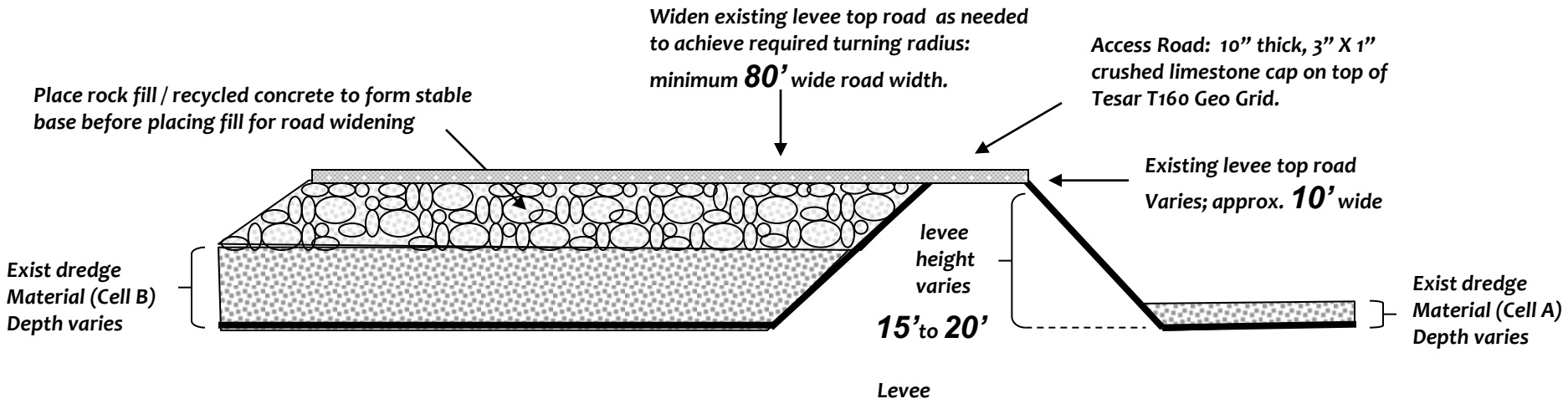
- Royalties based on generation w/minimum throughput



Improved Radius: Levee Top Road

Place rock fill / recycled concrete to form stable base before placing fill for road widening. 10" thick, 3" X 1" crushed limestone cap on top of Tesar T160 Geo Grid.

Cross-Section: Improved Radius Access Road (Levee Top)





Site & Development Considerations

Public Perception/Protection

- Viewshed

Ground Easements/Leasing – Construction/O&M Access

•Proximity to USACE DMPA/Safety

- Center of tower offset from levee toe
- Underground high voltage lines parallel to levee and deep
- Temp access road likely not there in future (DMPA Ops)
- Cessation per DMPA operations (present and future)

•Wind Easements

- 10 X Diameter
- Height restrictions on adjacent structures

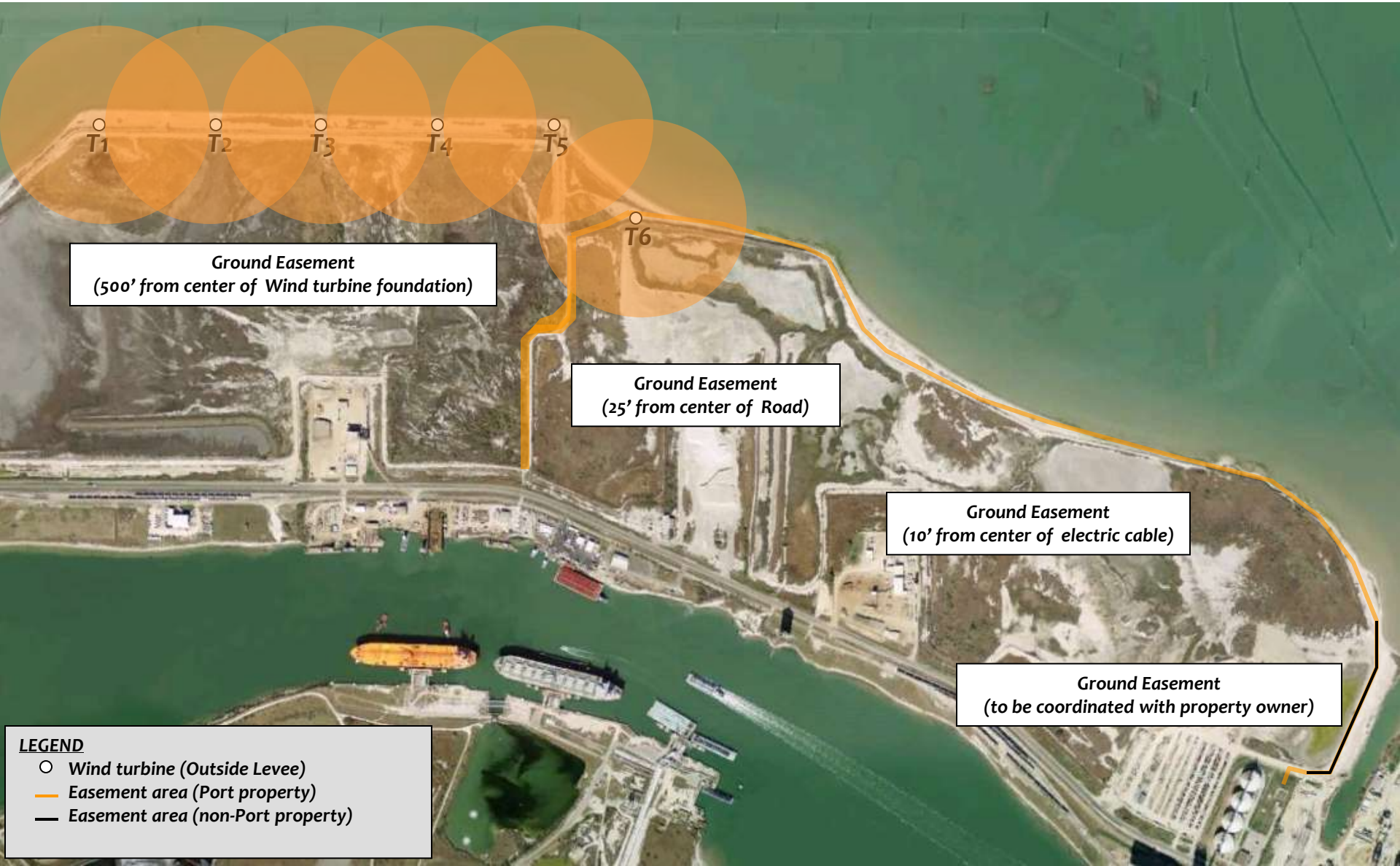
• The Avies ---- Avifauna and Aviation

- Commercial/Military/Weather Service
- Birds/Birds/Birds

• Revenue

- Royalties based on generation w/minimum throughput

Projected Reduced Premises



Ground Easement
(500' from center of Wind turbine foundation)

Ground Easement
(25' from center of Road)

Ground Easement
(10' from center of electric cable)

Ground Easement
(to be coordinated with property owner)

LEGEND
○ Wind turbine (Outside Levee)
— Easement area (Port property)
— Easement area (non-Port property)

Proposed Preliminary Retained Wind Easement Area



Wind Easement
(40' north from c/l of levee along south boundary)

Wind Easement
(10 X diameter of wind turbine generator blades equals radius of wind easement)



Site & Development Considerations

Public Perception/Protection

- Viewshed

Ground Easements/Leasing – Construction/O&M Access

•Proximity to USACE DMPA/Safety

- Center of tower offset from levee toe
- Underground high voltage lines parallel to levee and deep
- Temp access road likely not there in future (DMPA Ops)
- Cessation per DMPA operations (present and future)

•Wind Easements

- 10 X Diameter
- Height restrictions on adjacent structures

• The Avies ---- Avifauna and Aviation

- Commercial/Military/Weather Service
- Birds/Birds/Birds

• Revenue

- Royalties based on generation w/minimum throughput



DISCUSSION

The Port
of the
Lone Star
State.™



PORT CORPUS CHRISTI

