

# Preparing for Larger Cruise Vessels

Gary Ledford

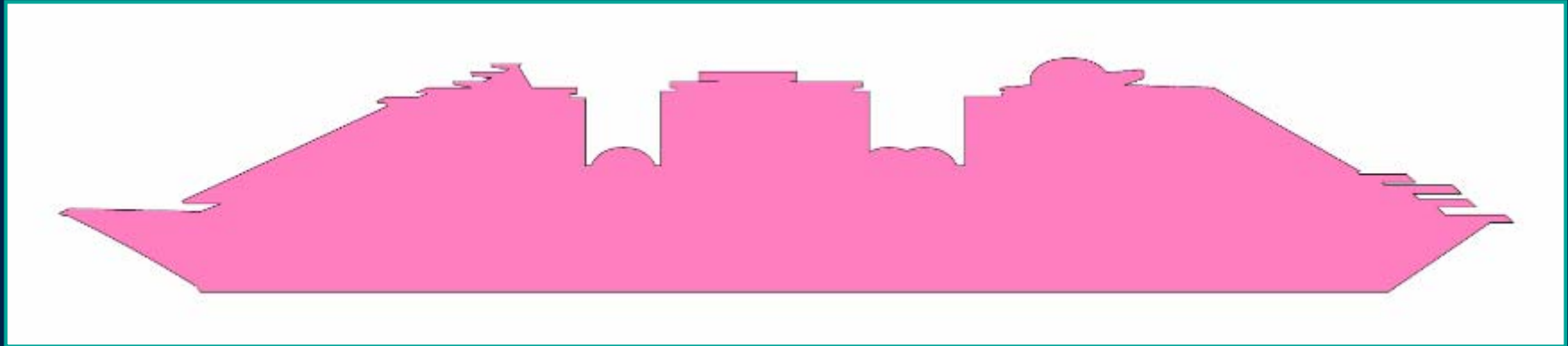
AAPA Facilities Engineering Seminar

November 17, 2009

## Bigger is Better... (for the cruise lines)

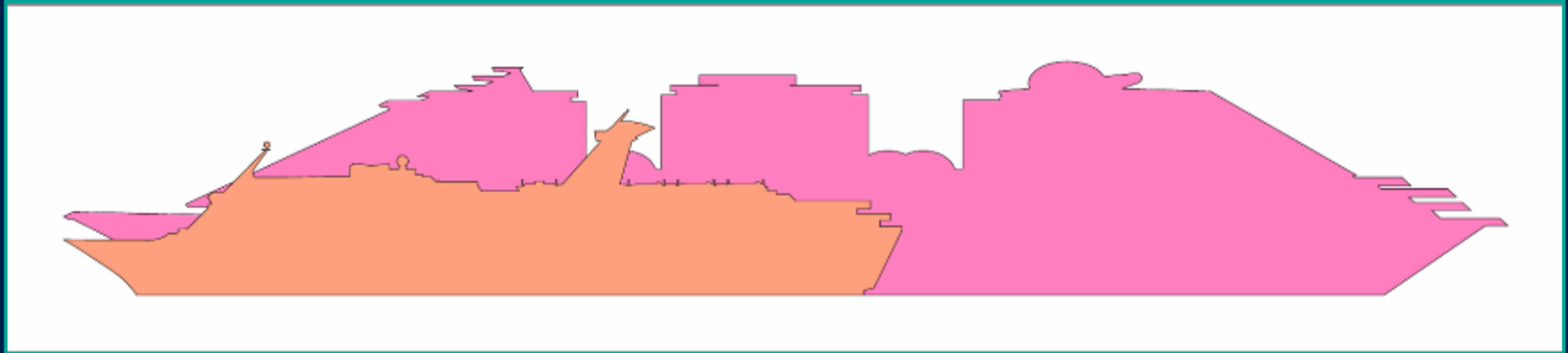
	Current Ships	New Ships
LOA (ft)	965	1116 - 1180
Beam (ft)	106	120 - 154
Draft (ft)	26	27 - 33
PAX (max)	2000 - 2600	3000 - 5000+

# When Pigs Will Fly...



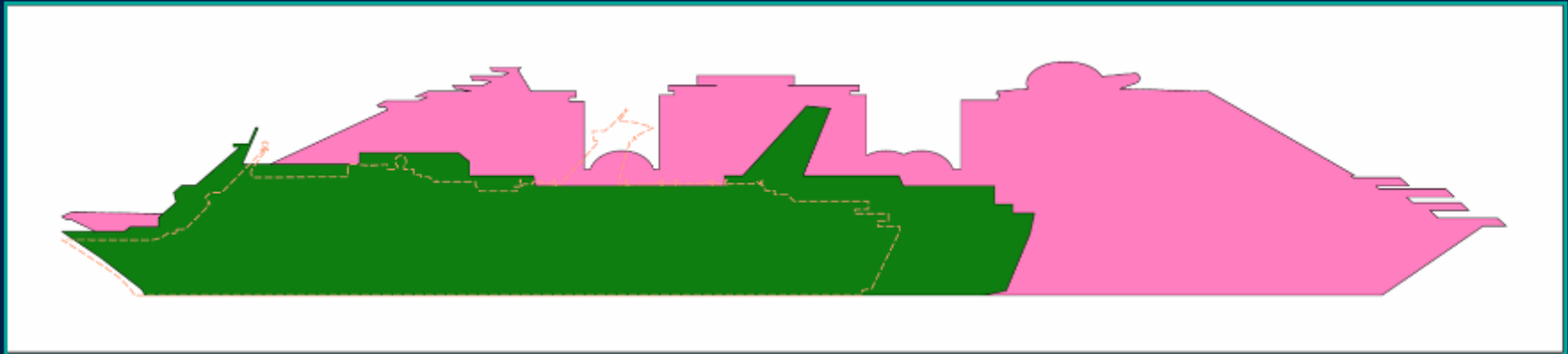
- America World City
- 250,000 GRT
- PAX 5600+
- Concept 1988
- 1268 feet LOA

# Celebration



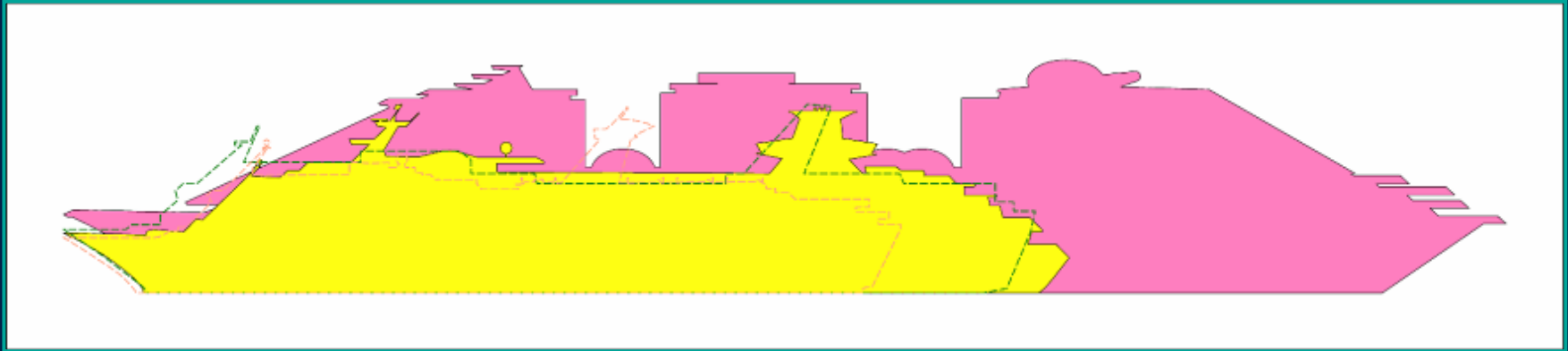
- GRT 47,262
- PAX 1896
- LOA 733'

# Fantasy Class



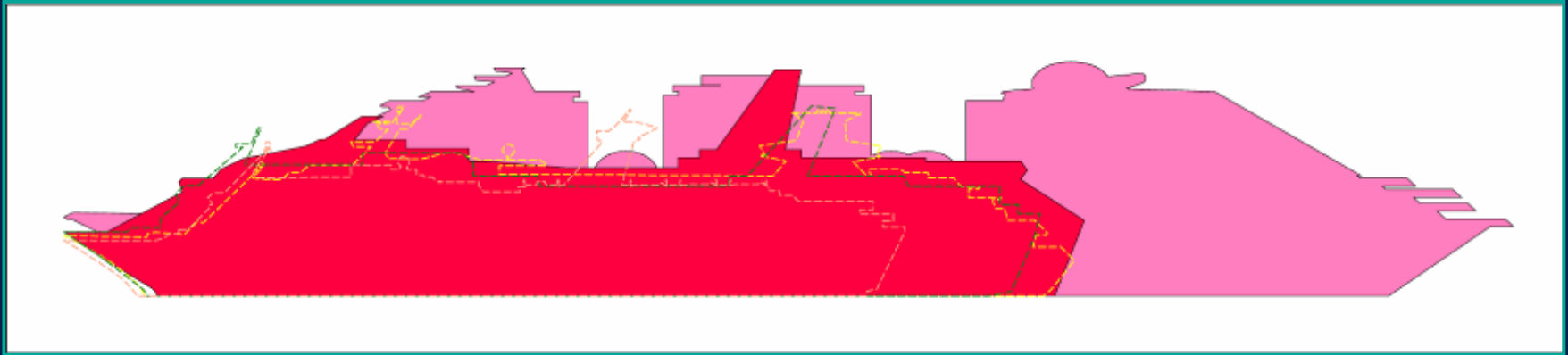
- GRT 70,367
- PAX 2600
- LOA 855'

# Sovereign Class



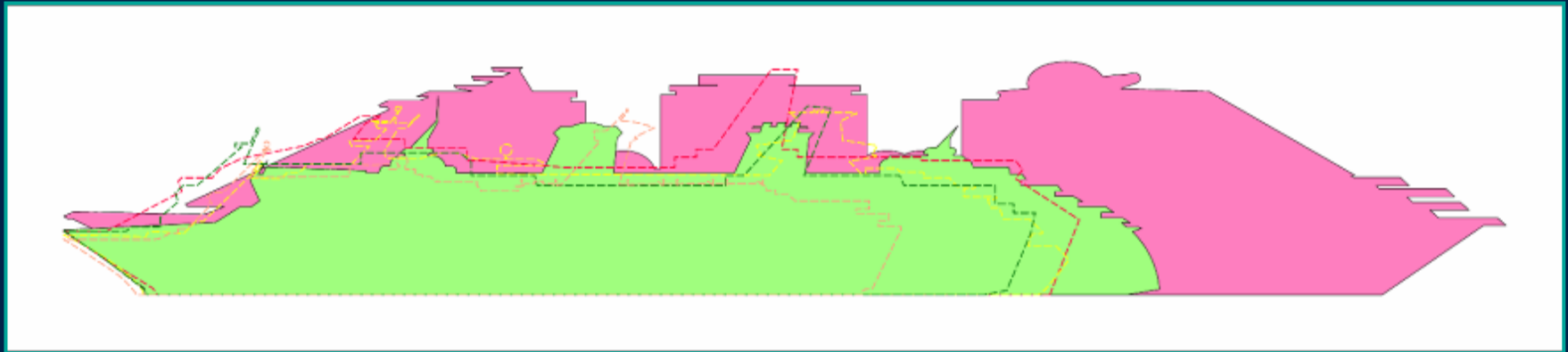
- GRT 73,192
- PAX 2880
- LOA 880'

# Destiny Class



- GRT 101,353
- PAX 3360
- LOA 893'

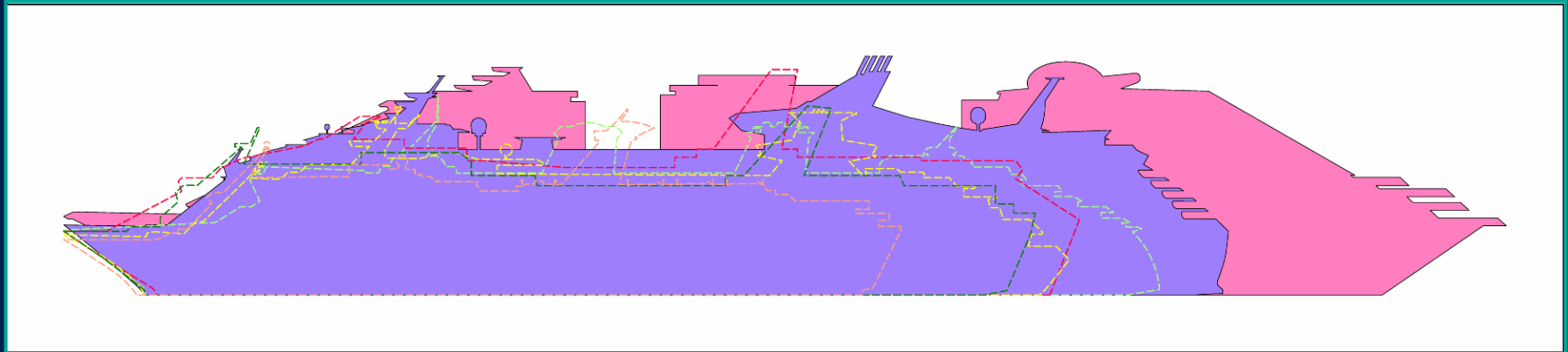
# Disney Class



- GRT 85,000
- PAX 2600
- LOA 964'

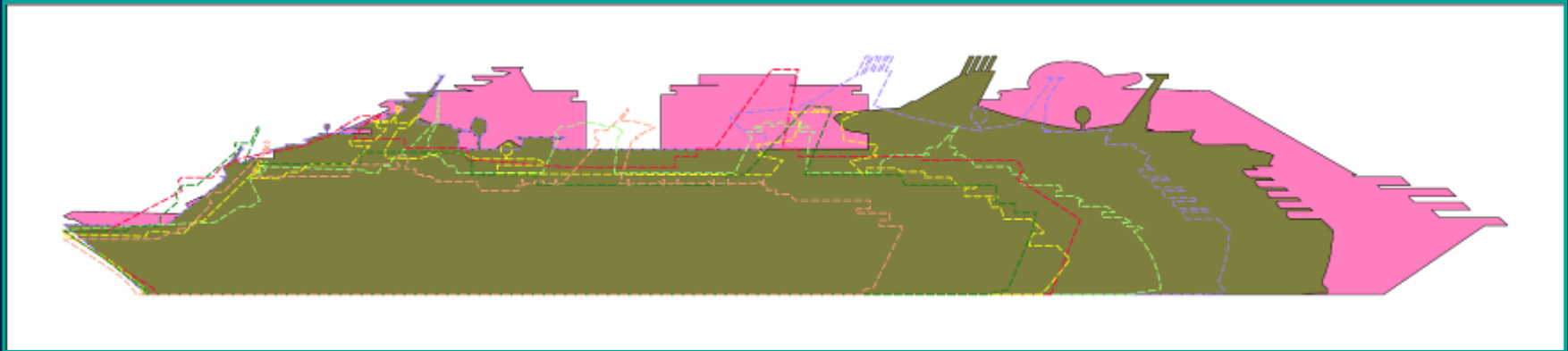


# Voyager Class



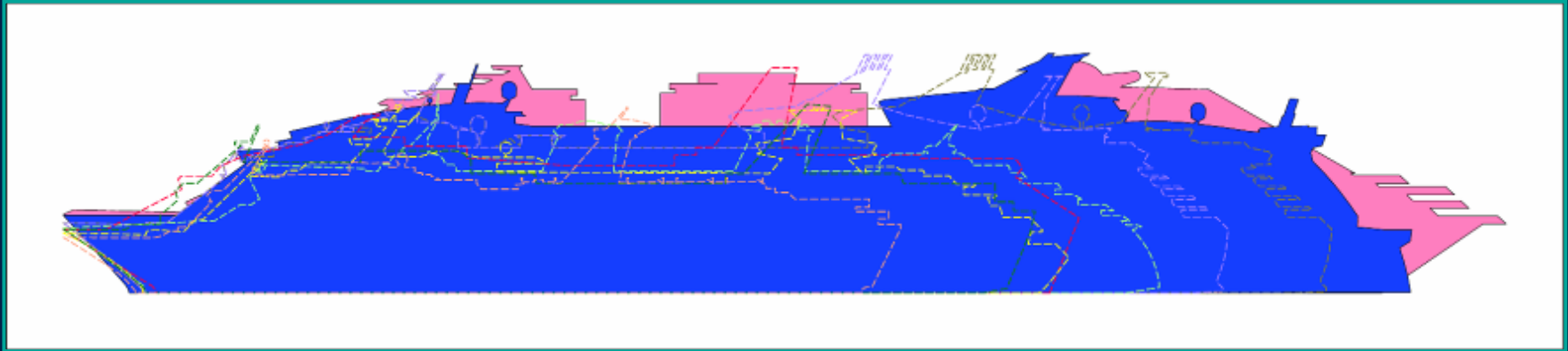
- GRT 137,300
- PAX 3860
- LOA 1021'

# Freedom Class



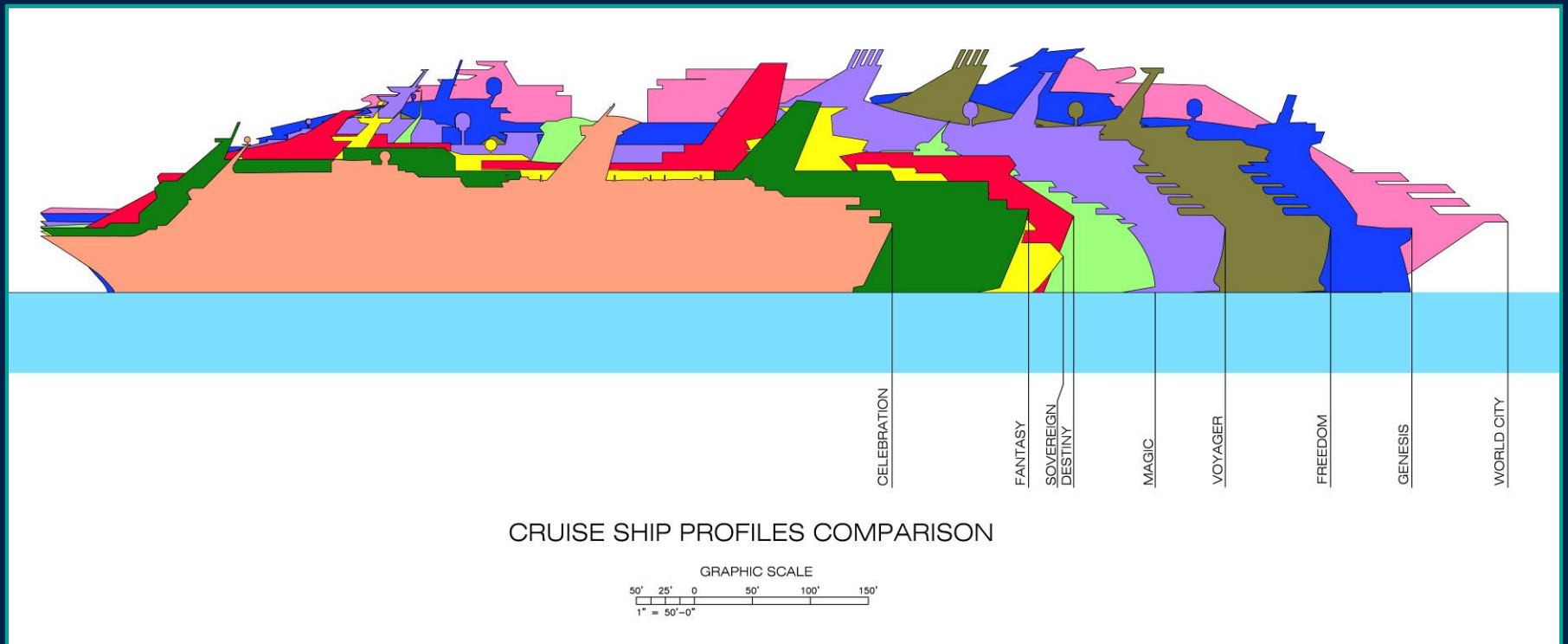
- GRT 158,000
- PAX 4370
- LOA 1112'

# Genesis Class



- GRT 225,300
- PAX 6300
- LOA 1187'

# When Pigs Will Fly...



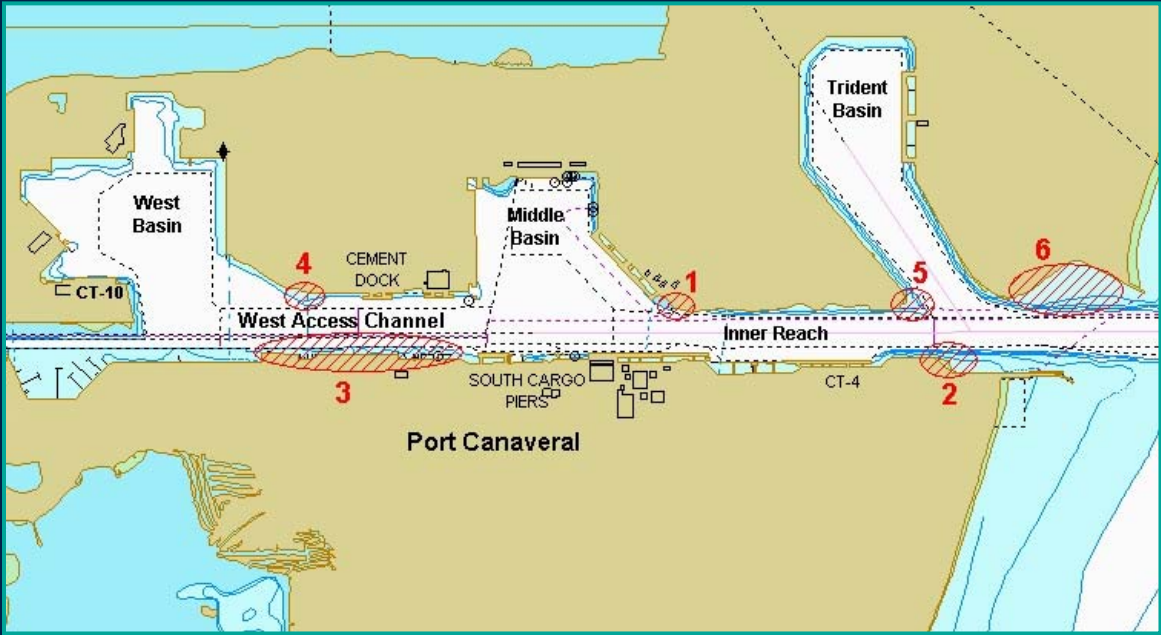
# Larger Ship Design Issues



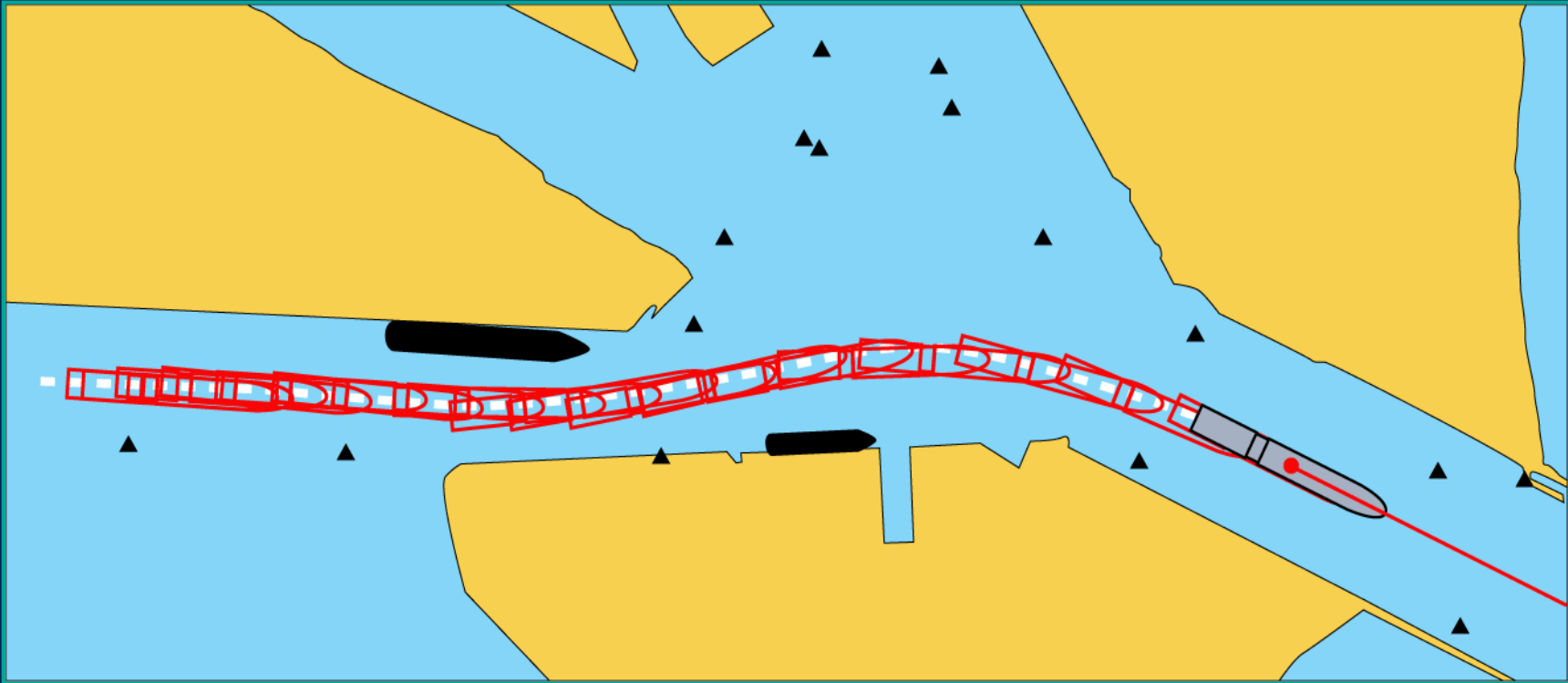
- Cruise Ships - large sail area
- Significant yaw angle (crab)
- Effective beam = 1.5 X actual beam

# Navigation Simulation

RTM STAR Center  
Dania, Florida

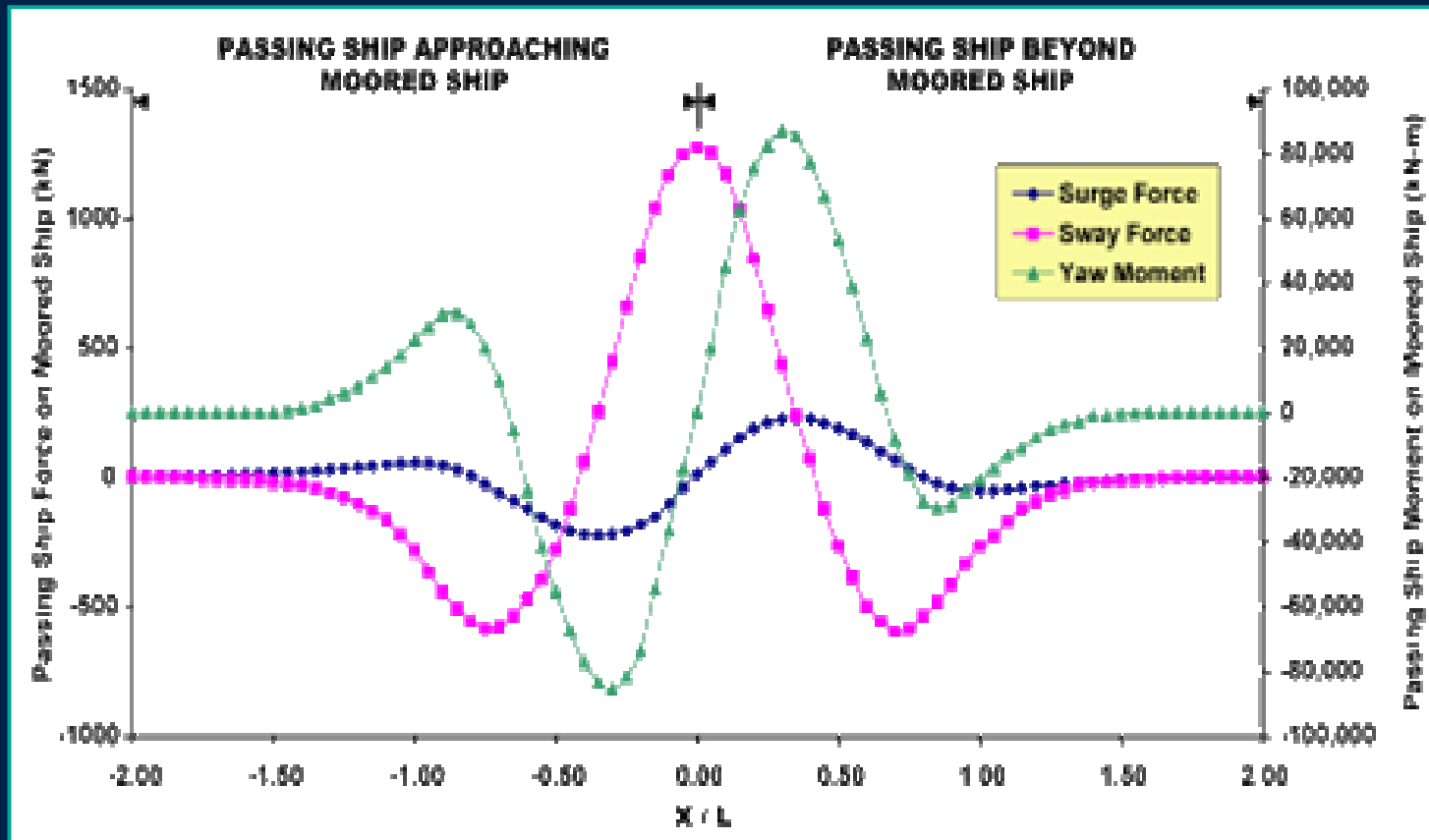


# Passing Ship Effects



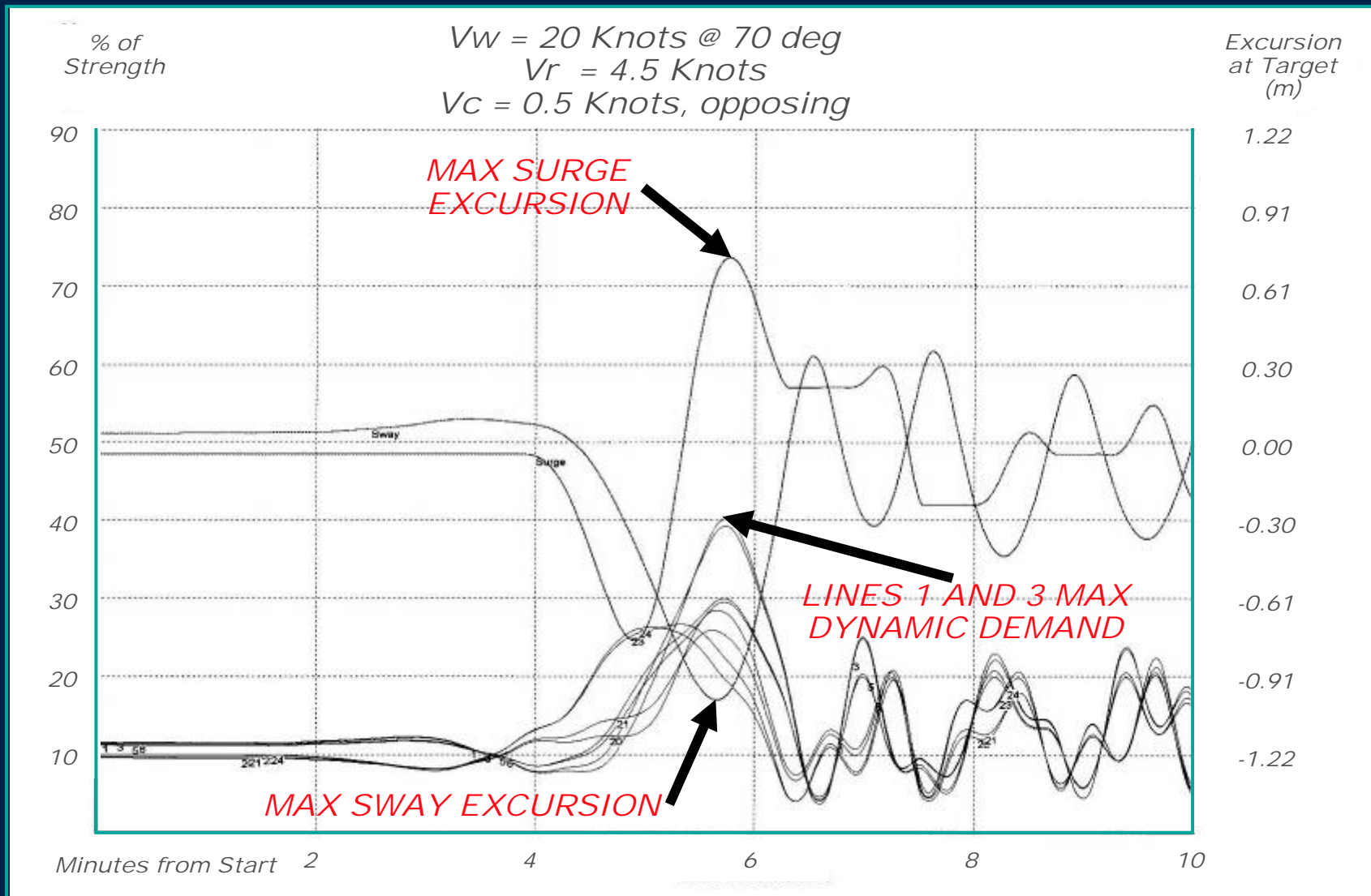
Run: Outbound  
Current - Ebb  
Wind - SE at 15 Knots (25.3 m/sec)

# Passing Ship Analysis





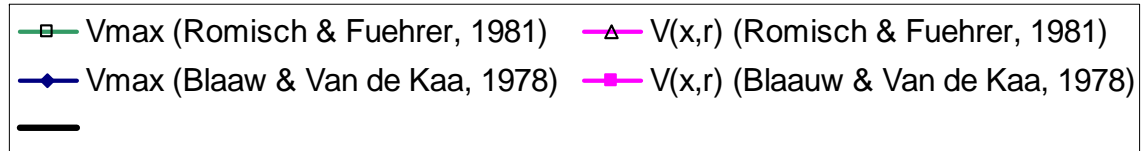
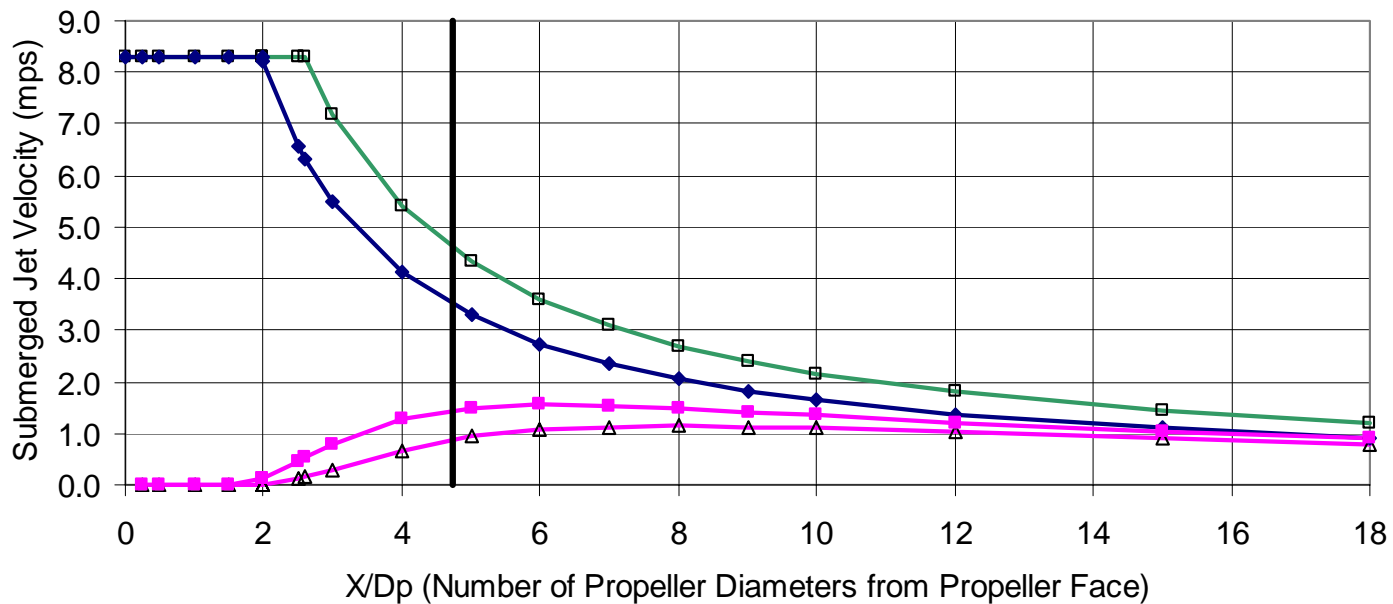
# Mooring Line Forces due to Passing Ship



# Propulsion Scour

## PREDICTED AZIPOD WASH VELOCITY DISTRIBUTION

$D_p = 5.6$  m, Power = 10 MW or 13,410 hp,  $n = 100$  rpm  
for Maneuvering Ship Speeds, Pod @ 45 degrees



# Shore Power



# Older Berths – Too Short



# Security Clear Zones



# Narrow Finger Piers

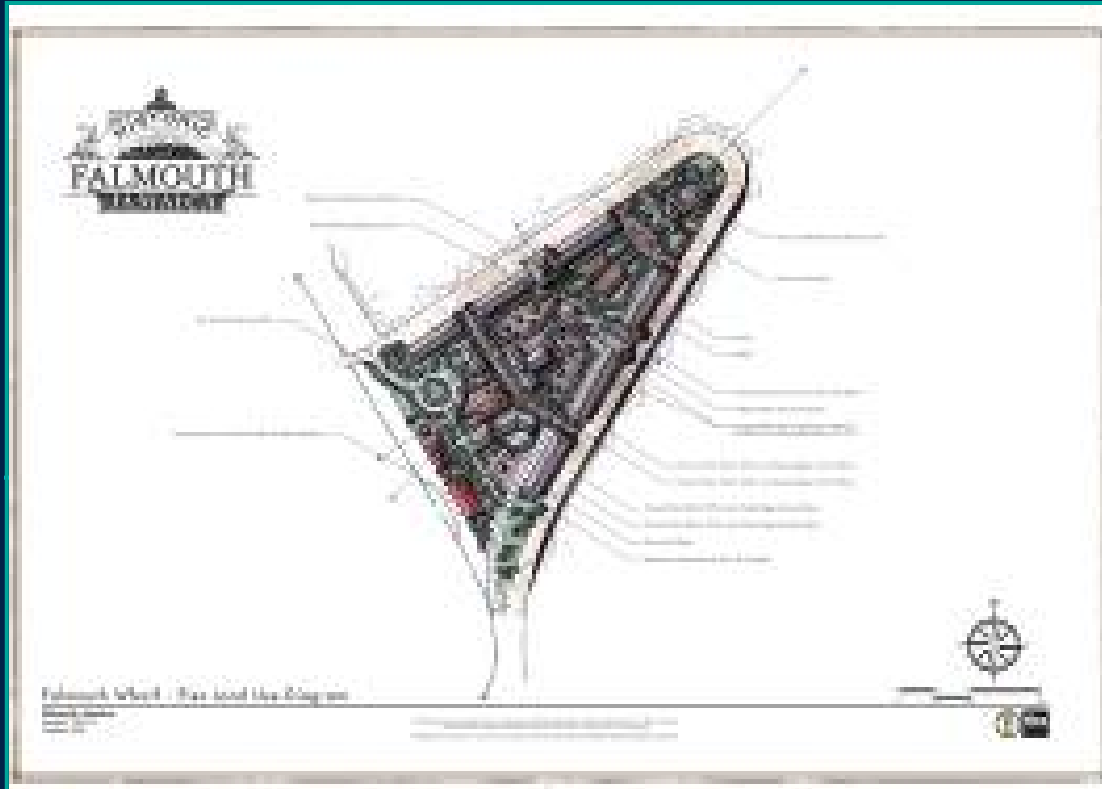


- Overhanging upper decks
- Larger ship thrusters against smaller vessels

# Mariner of the Seas at CT 10



# Falmouth Cruise Destination



- Designed to accommodate 1 Genesis Class ship at western berth and 1 Freedom Class ship at eastern berth
- First ship is scheduled to arrive November 2010

**Developer:** Royal Caribbean International

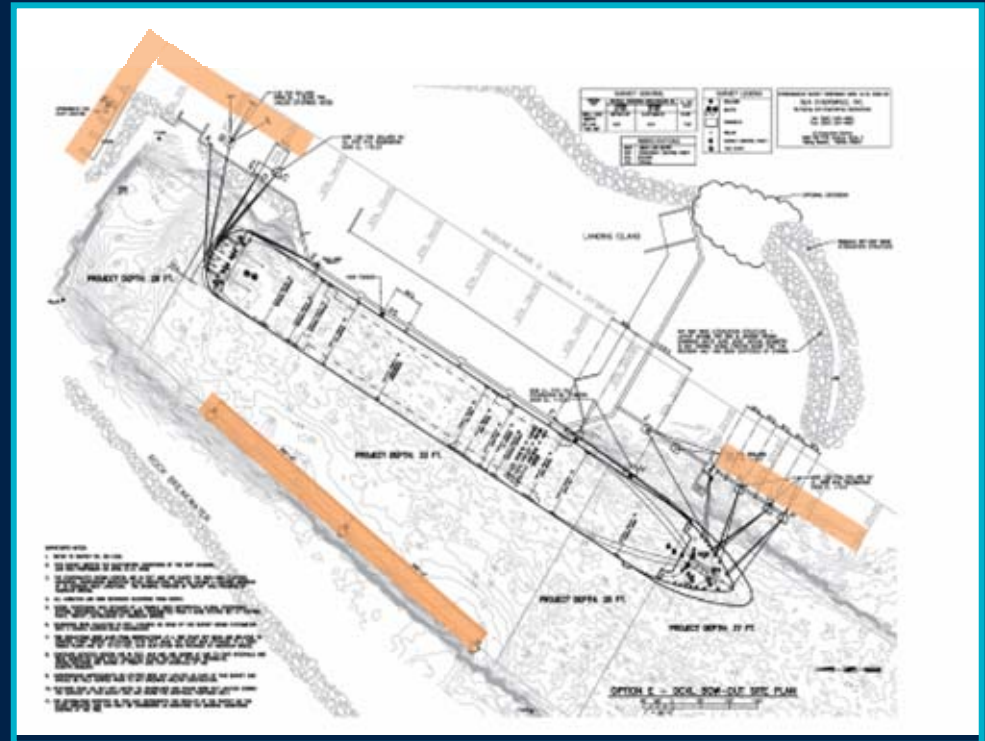
**Project:** Falmouth Cruise Port

**Location:** Falmouth, Jamaica



# Disney Cruise Line – Castaway Cay

- 500-ft expansion of existing berth to accommodate the new Disney XL
- Constructed Value: \$11 M



# Upland Planning



# Upland Issues

One Voyager vessel = Eight 747 Jumbo Jets



=



# Upland Issues

- Baggage Handling
- Passenger Queue – Security, Ticketing
- Ticketing Stations
- CBP – regulations vs. manning
- Gangways – vessel overhang
- Stores Delivery
- Traffic Patterns and Signage
- Crew Amenities

# To Use Conveyors or Not To Use Conveyors?



# Conveyors



# Conveyors



# Alternative – Luggage Tables





# Luggage Tables



# Passenger Queue



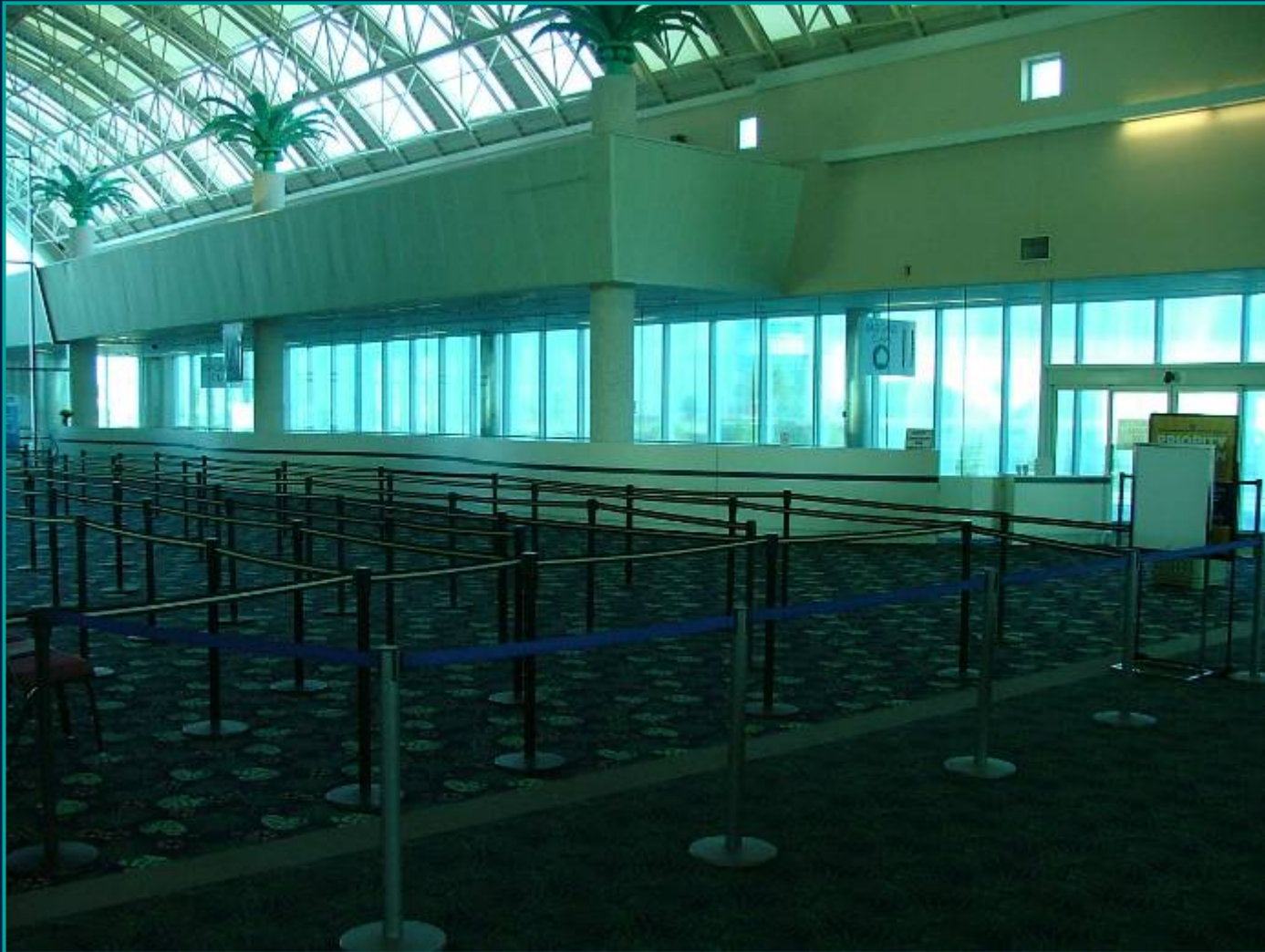
# Passenger Queue – Security Ticketing



# Ticketing



# Ticketing



# Ticketing – more is better



# Homeport Gangways



# Homeport Gangways





# Homeport Gangways



# P.O.C. Portable Gangways



# Homeport Gangway Interface



- Move away from traditional shell doors

# Homeport Gangway Interface



- Move towards using lifeboat deck gates

# Homeport Traffic Flow



- Mixing Trucks with POV's
- Parking - Percent Drive To Market

# Approach Signage



- Adaptable
- Clear and Concise
- Ship Names



# Interior Signage



# Stores Loading

- Voyager Class requires about 25 to 50 trucks
- Truck security screening
- Truck staging and traffic circulation





# P.O.C. Traffic Patterns



# Crew Amenities



# Passengers

- Cruise passengers - cargo that complains
- Keep the Cargo Happy!



# Port Canaveral



# Port Canaveral CT 8 Expansion



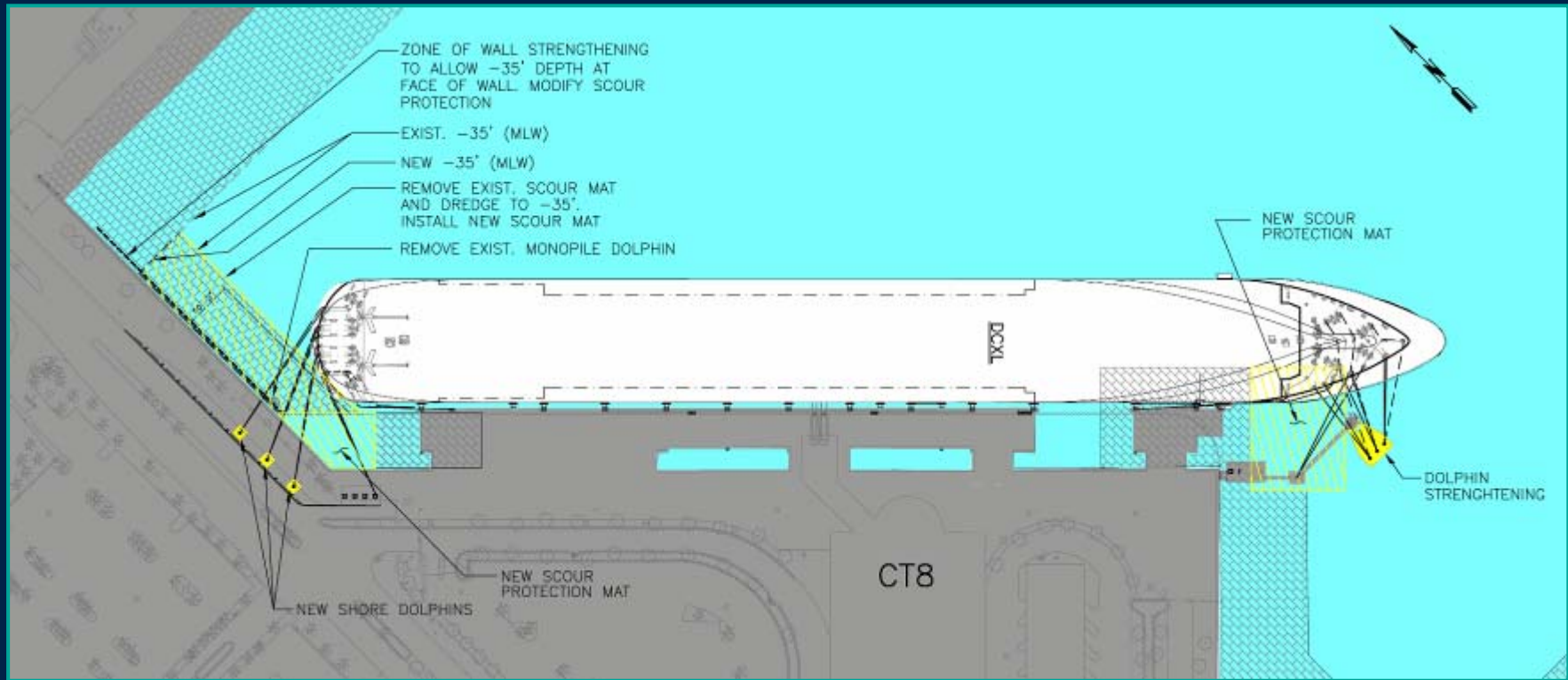
Cruise Terminal 8

- Expansion of east mooring dolphin—adding three additional 125-ton bollards
- Pier extension and new land bridge
- Three stern shore mooring dolphins
- New west bulkhead wall
- New scour protection mats at the stern thrusters and main propulsion
- Construction Cost: \$6 Million

CT 8



# CT 8



- DCXL - about 3 feet longer than Freedom Class

# CT 8





CT 8



CT 8



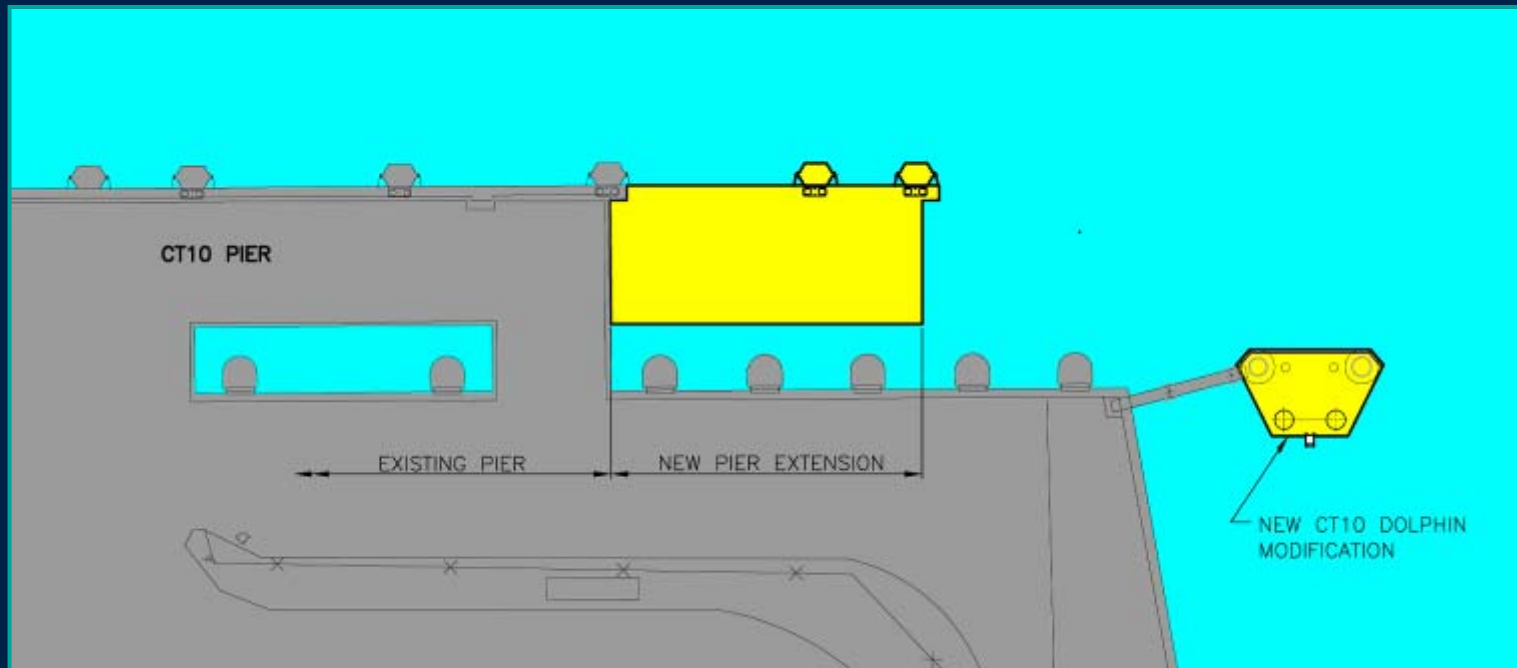
# Port Canaveral CT 10 Expansion



Cruise Terminal 10

- Pier extension to access the stern provisioning doors on Carnival Dream
- East mooring dolphin expansion to accommodate Royal Caribbean's Freedom Class bow lines
- Construction Cost: \$2 Million

# CT 10



- 90' long pier extension
- East mooring dolphin expansion — added two 125-ton bollards

# CT 10



# CT 10



# CT 10



# CT 10

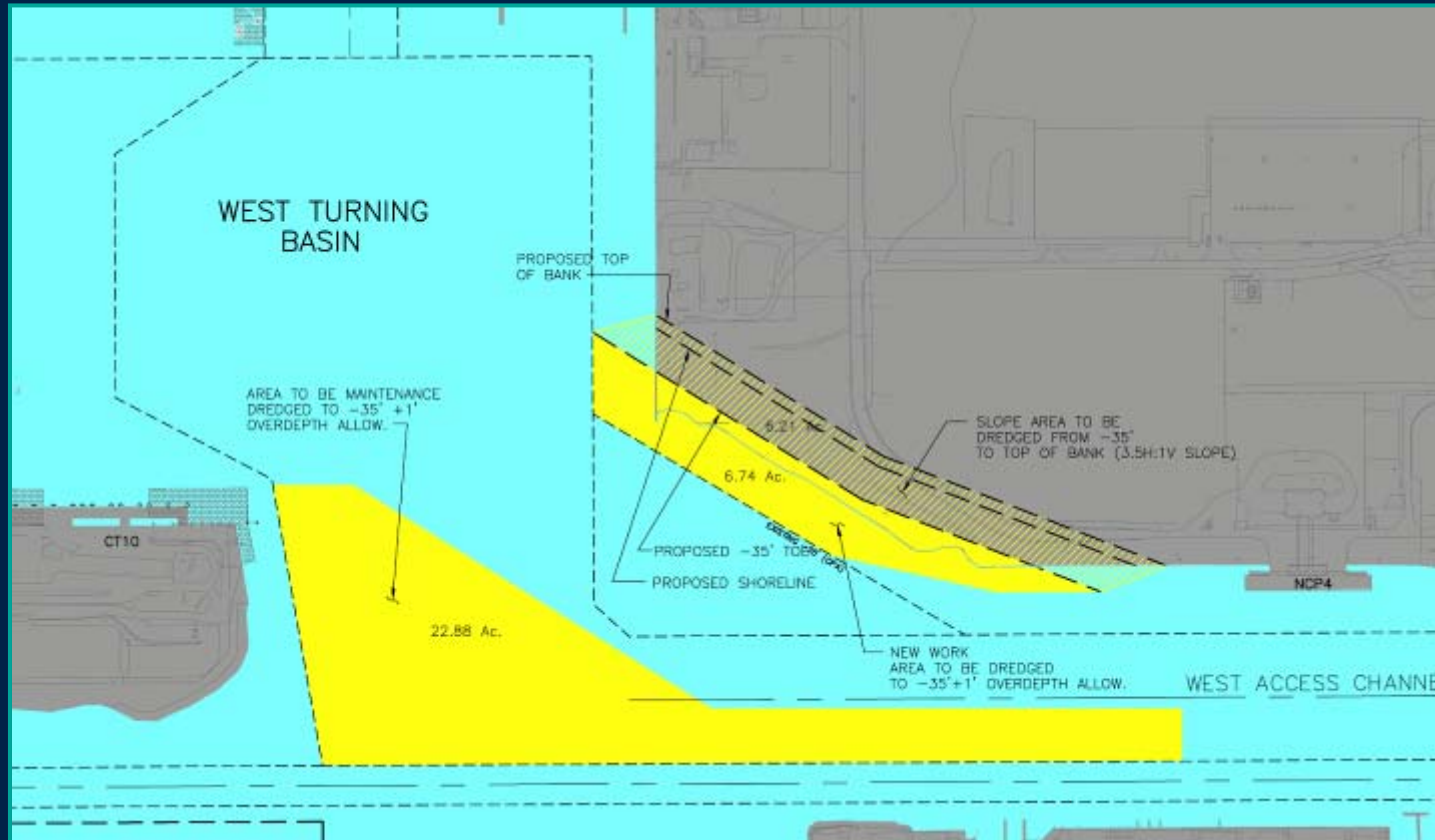




# CT 10



# Interim Corner Cut-Off (ICCO)



- Sands to -13': 227,000 CY, recovered into upland dike
- Clay to -35': 235,000 CY, off-shore disposal
- Construction Cost: \$6.9 Million

# ICCO



# ICCO



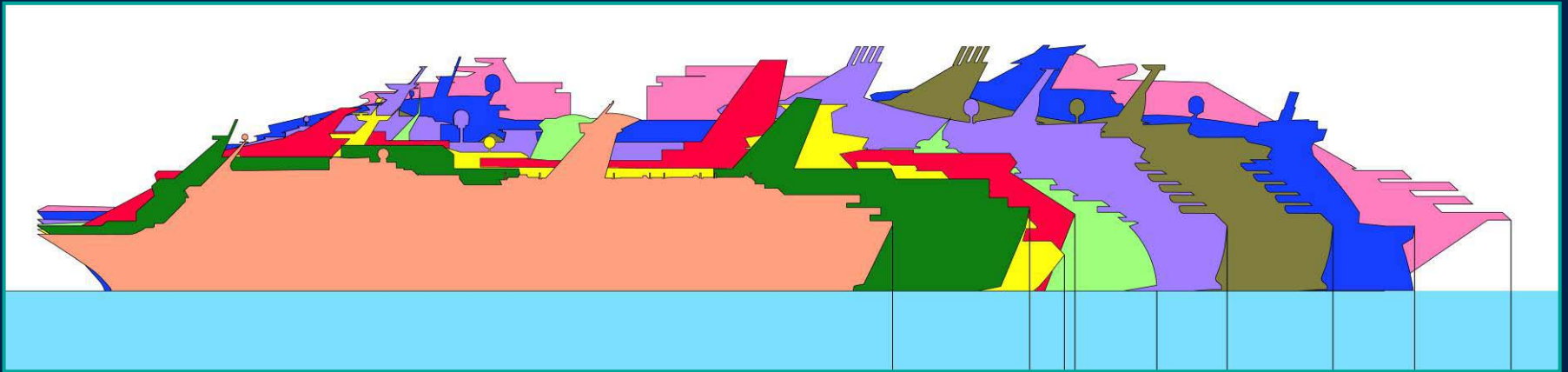
# Dredging Surprise



# Overhead Surprise



# Preparing for Larger Cruise Vessels



- Voyager and Freedom Classes will someday be “average” size vessels
- New Panamax size will make it easier for large cruise ships to re-position
- Integrate landside and waterside planning

Thank you