Passenger Terminal World Expo 2011
Copenhagen, Denmark

How to Plan for PRT in Airports

Key Concepts and Practical Parameters

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Overview

- **PRT Definition**
- **Planning Parameters for Airport Projects**
  - Speed
  - Capacity
  - Geometrics
  - Costs
- **New Airport Paradigms Enabled by PRT**

PRT Definition

- **Driverless Vehicles on a Guideway**
- **One to Six Seated Passengers plus Luggage**
- **Direct Origin to Destination Service**
  - No Need to Transfer or Stop
- **Service On-Demand (NOT Scheduled)**
- **Very Short Headways (Seconds)**

Planning Parameters for Airports

➢ Speed

- Speed Impacts Capacity - Choose Wisely
- Airport Distances are Short & PRT Trips are Non-Stop
  - Lower speeds can provide high levels of service
  - Consider desirable trip time then select speed
- Typical Airport Speeds
  - 40 kph (25 mph)
  - 20 kph (12 mph)

Source: PRT Consulting, Inc.

Planning Parameters for Airports

➢ Guideway Capacity

- Depends On:
  - Vehicle Occupancy
  - Minimum Headway
    - Speed
    - Available/desirable deceleration rate (0.25G – 0.5G)
    - Safety requirements (e.g. brick wall criterion)
    - Vehicle length

Source: PRT Consulting, Inc.

Minimum Headways (Seconds)

	40 kph	20 kph
0.5G	1.5	1.3
0.25G	2.7	2.0

- **Recommend**
  - 3 Seconds for 40 kph (25 mph)
  - 2 Seconds for 20 kph (12 mph)
  - Meets “brick wall” Criterion

Source: Advanced Transit Association

Source: PRT Consulting, Inc.

Theoretical Maximum Capacity

Headway	Occupancy = 1	Occupancy = 4
3 seconds	1,200	4,800
2 seconds	1,800	7,200

- **Passengers per hour per direction**
- **Practical capacity = 80 – 95% of maximum**
  - Depends on duration and control system
- **More than one guideway may be needed to meet demand**
  - May still cost less than alternatives

Source: PRT Consulting, Inc.

Capacity (cont.)

- **Station Bay Capacity**
  - **Depends on:**
    - Vehicle Dwell Time
      - Time from one vehicle to the next
      - Depends on:
        - Boarding and alighting times
        - Station geometrics
          - » Amount of maneuvering required
      - Dwell time varies from 15 to 40 seconds

The proposed San Jose Airport PRT network.

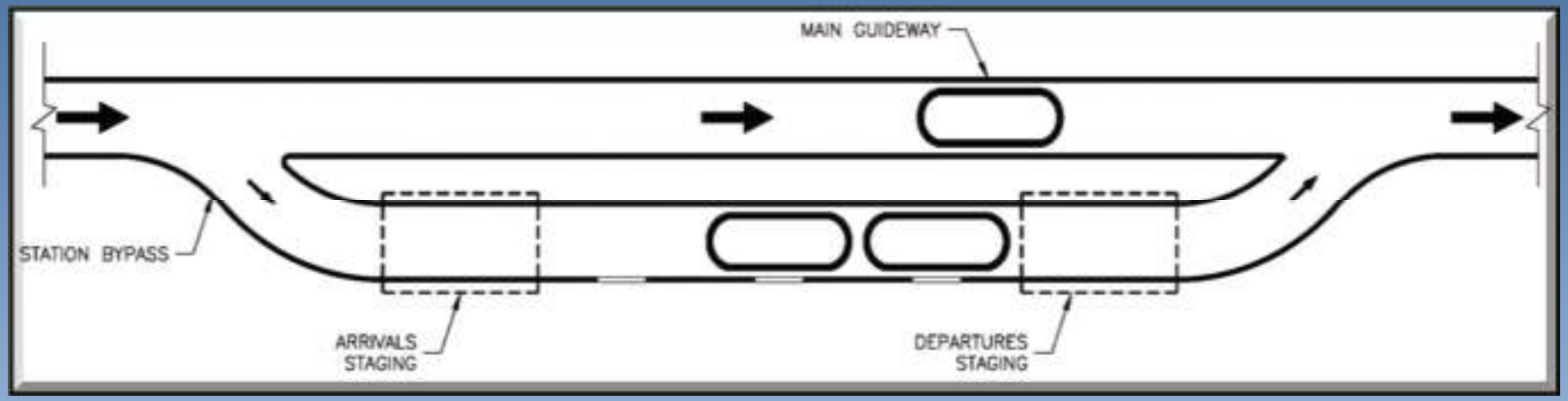
Capacity (cont.)

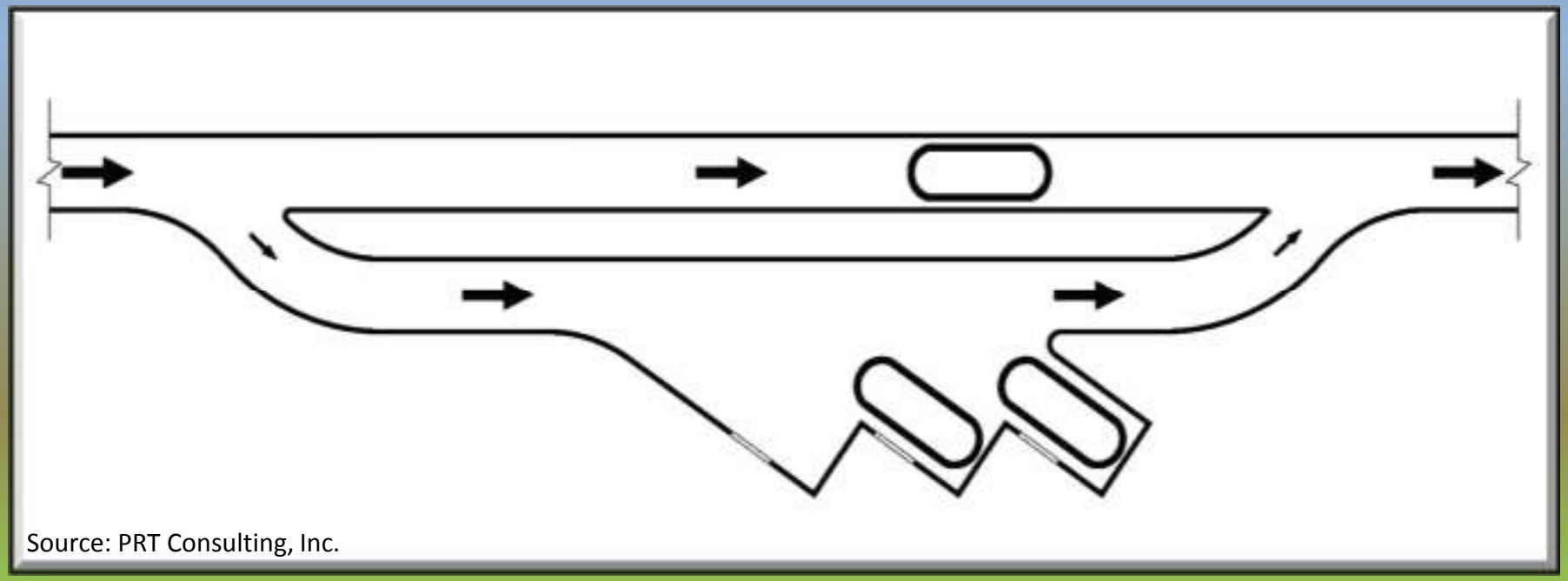
- **Theoretical Bay Capacity (assuming 4 passengers)**
  - Varies from 360 to 960 Passengers per Hour
  - Requires Ready Vehicles Immediately Available
    - Nearby storage and short headways

Geometrics

- **Guideways**
  - Vehicle Clearance Envelope 2.5m x 2.5m (8’ x 8’)
    - Includes structure for some systems but not others
- **Minimum turning radius**
  - Varies from 10m to 5m (33’ to 15’)
- **Maximum grade**
  - 10%
  - Consider Using 8% for Walkway Handicap Compliance

Typical Station Layouts



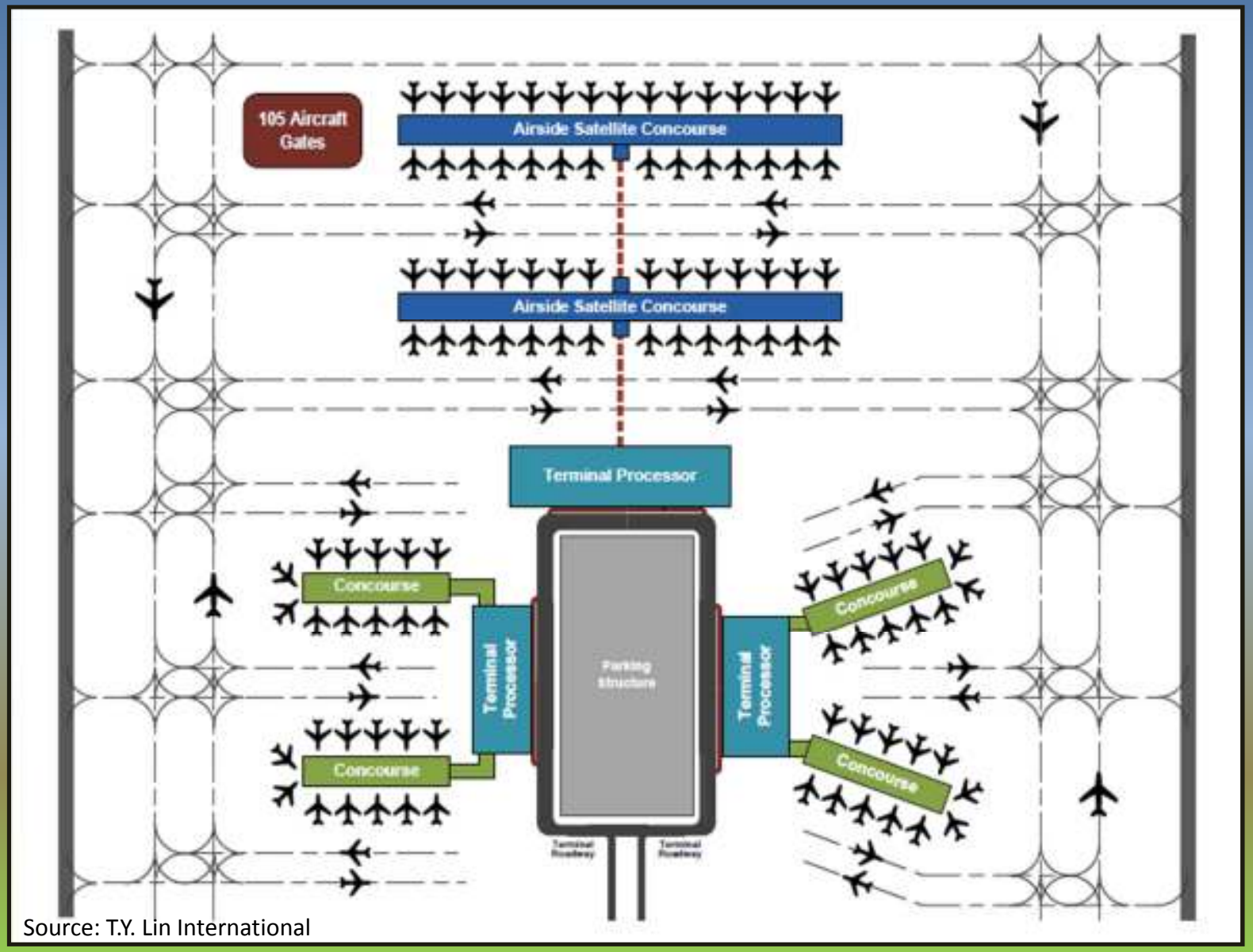


Source: PRT Consulting, Inc.

Planning-Level PRT Costs

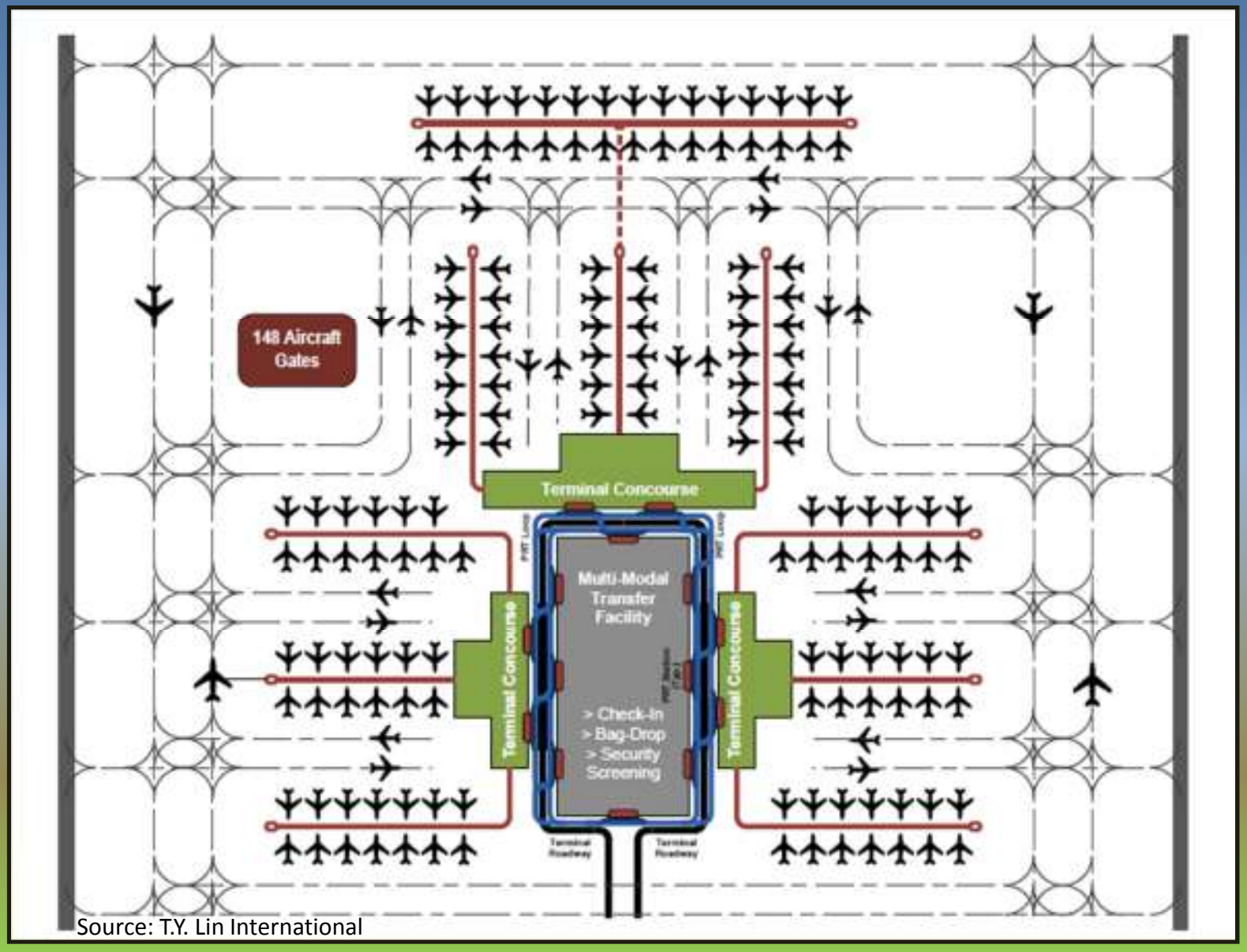
- **Capital**
  - $10M - $15M per One-Way Kilometer
  - All-Inclusive Except Right-of-Way & Utility Relocations
- **Operating and Maintenance**
  - Dependent on the Passenger Ridership (similar to APM)
    - Vehicle Maintenance (Less Complexity)
    - Guideway Maintenance (Less Complexity)
    - Aircraft Boarding Station w/Boarding Bridges
    - Control-Room Staffing and Maintenance

Conventional Airport Layout



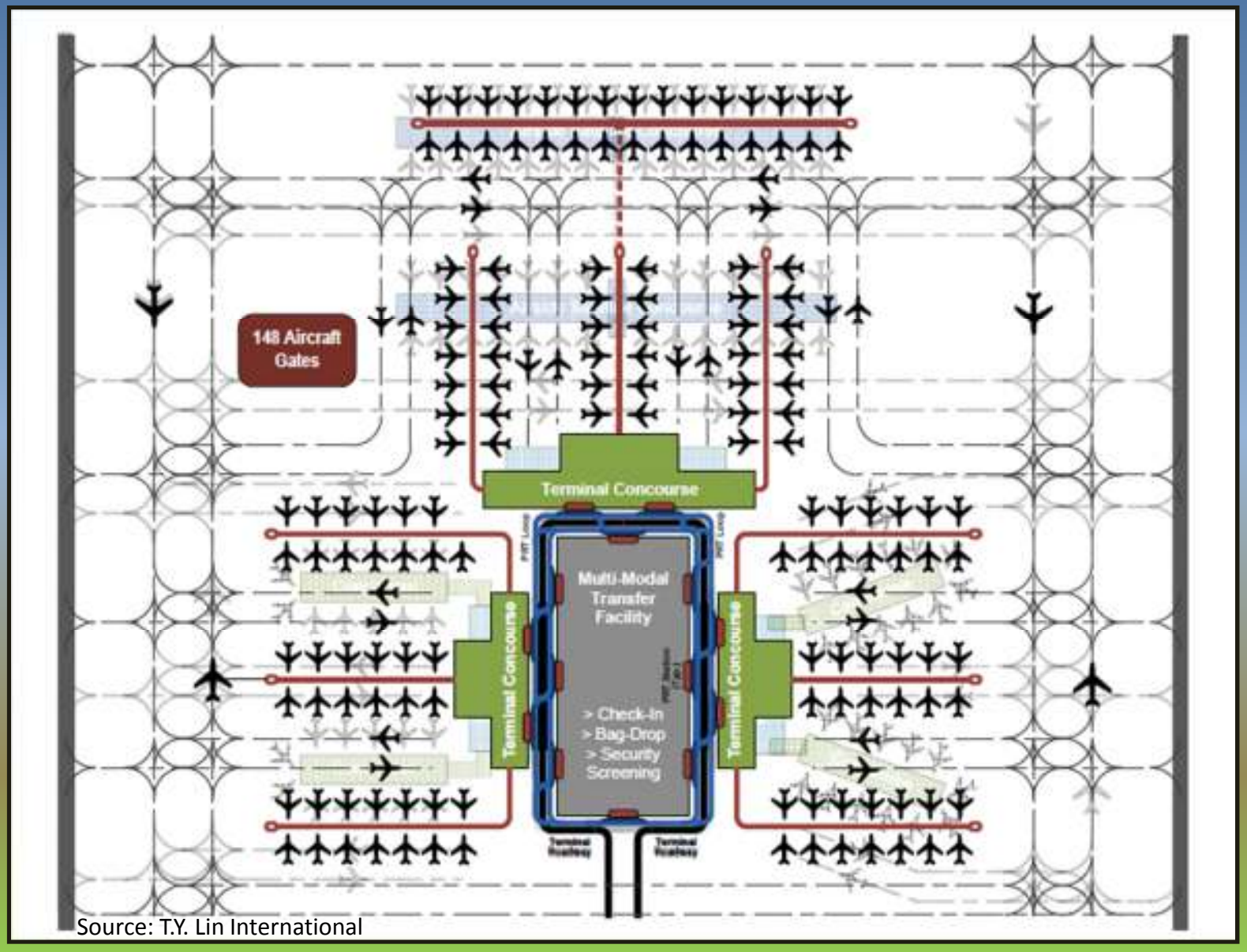
Source: T.Y. Lin International

PRT-Enhanced Airport Layout



Source: T.Y. Lin International

Composite Layout



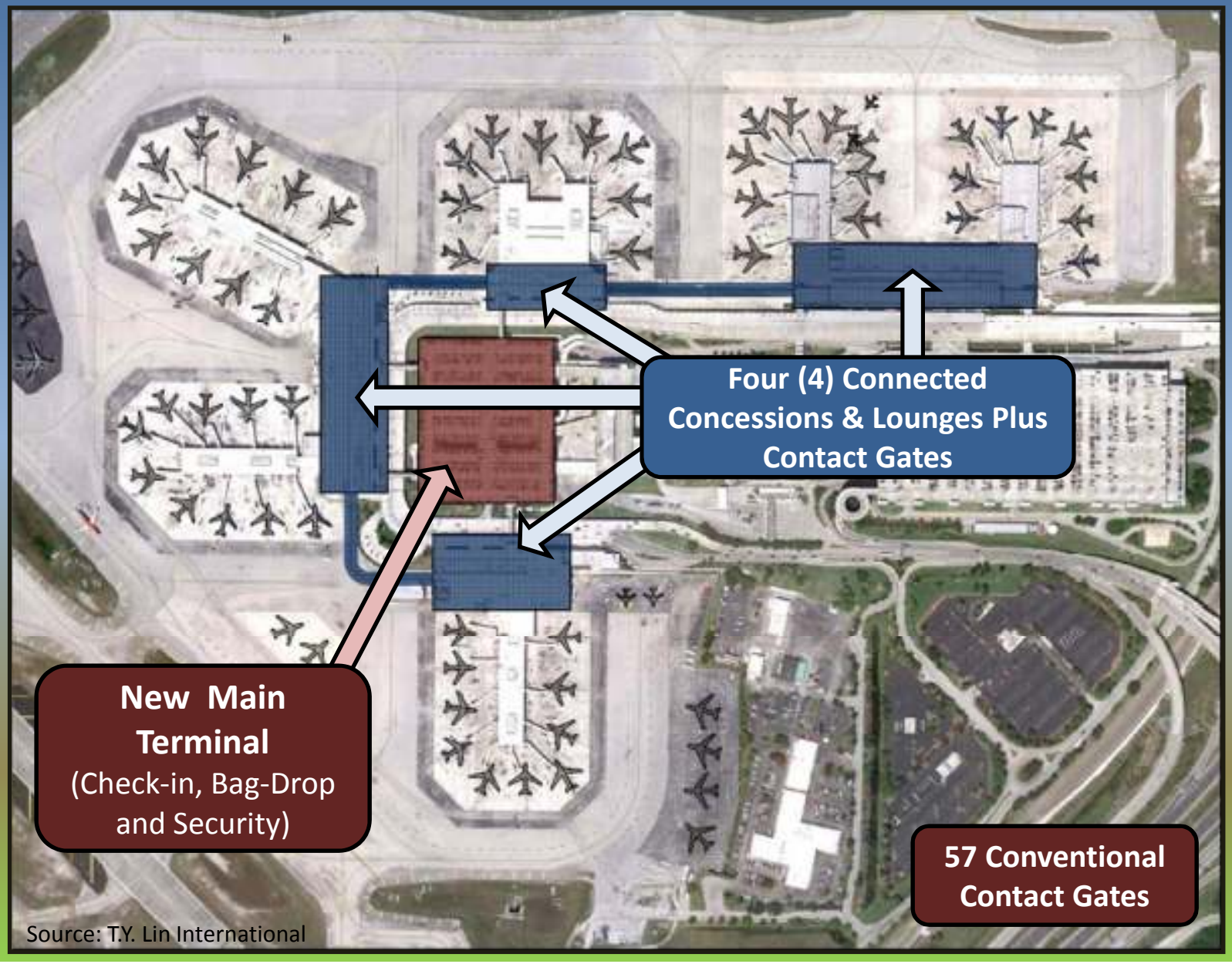
Source: T.Y. Lin International

Conventional Layout

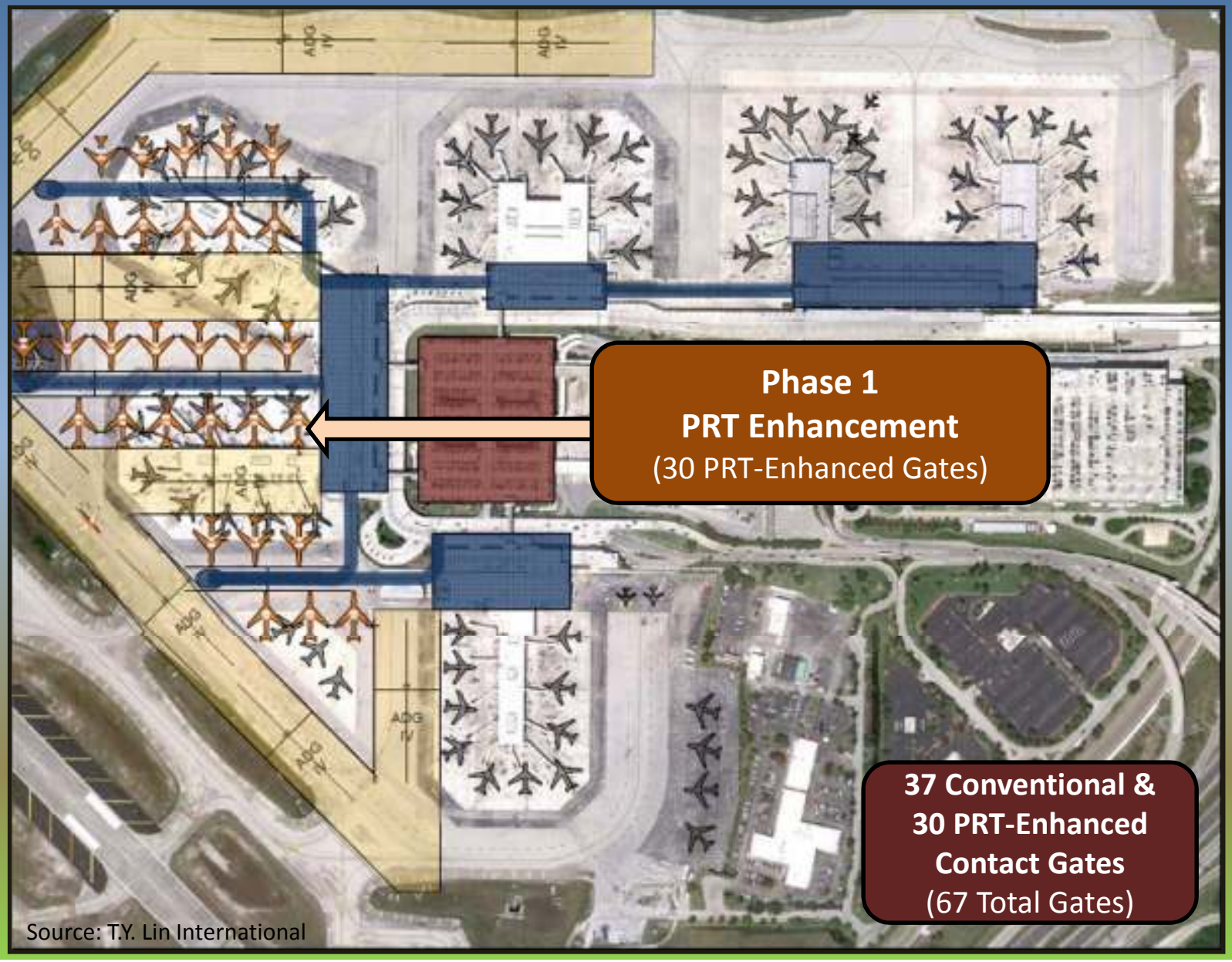
Source: T.Y. Lin International

Conventional Layout

Modified Terminal Layout

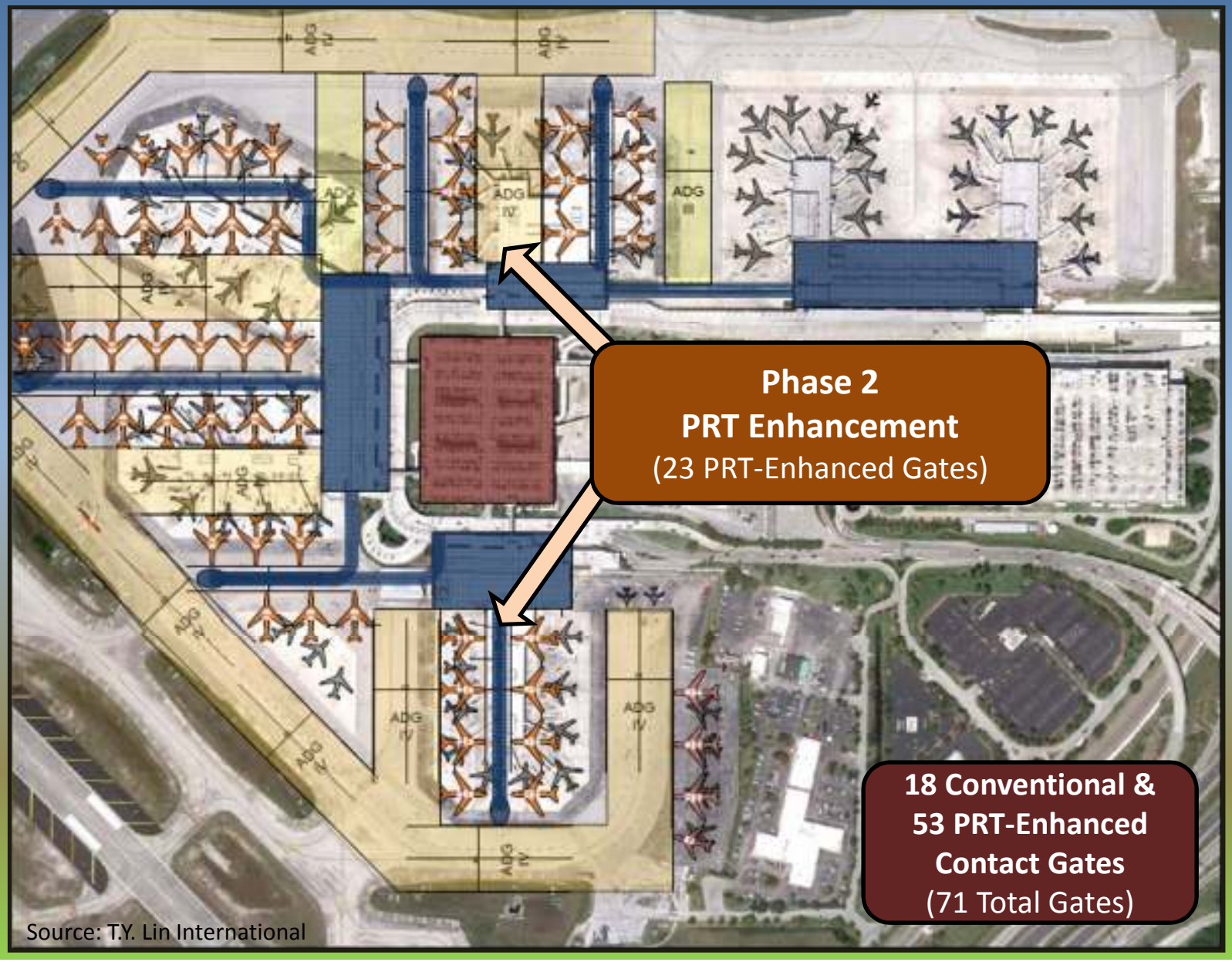


PRT-Enhanced Layout



Source: T.Y. Lin International

PRT-Enhanced Layout



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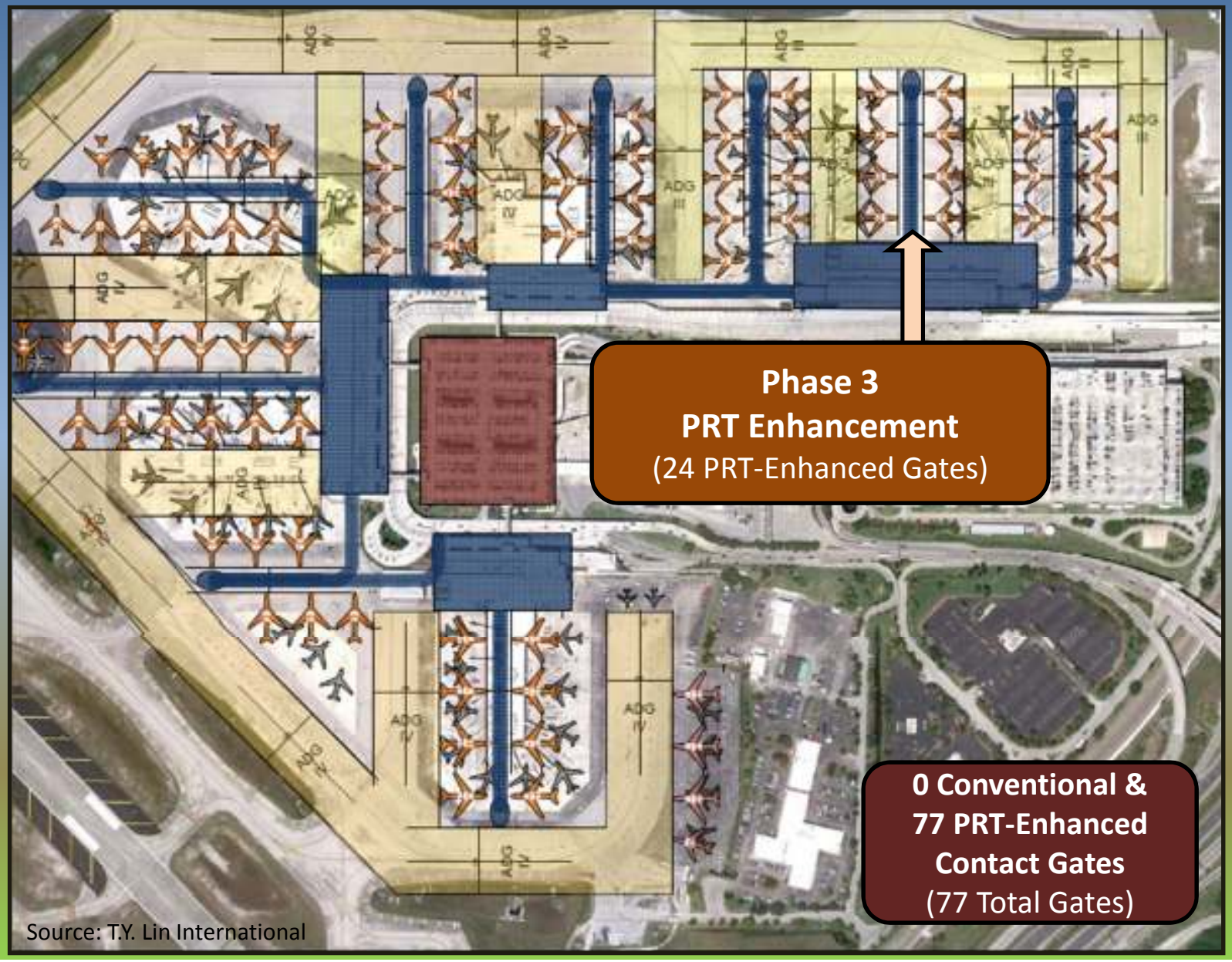
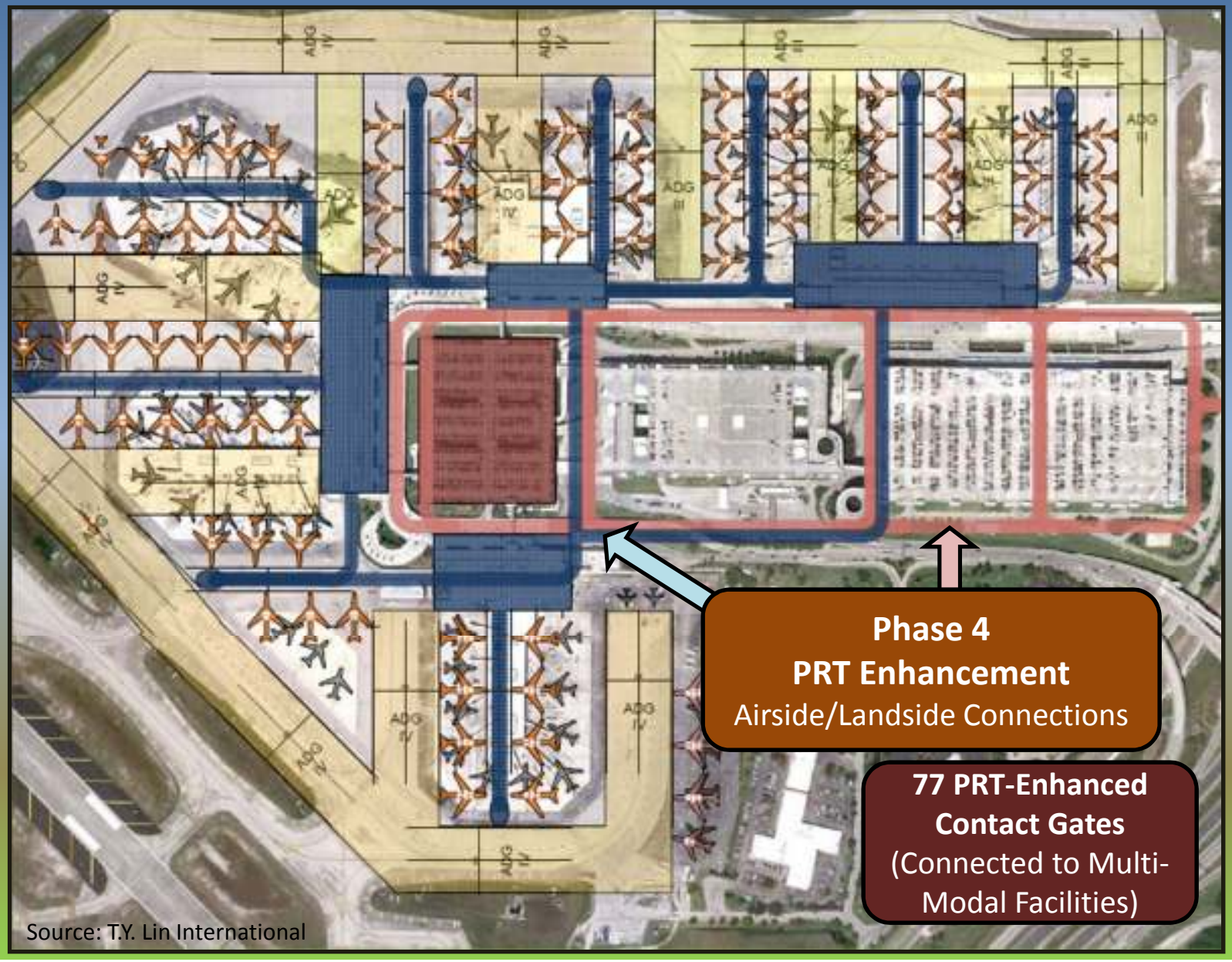
PRT-Enhanced Layout



PRT-Enhanced Layout



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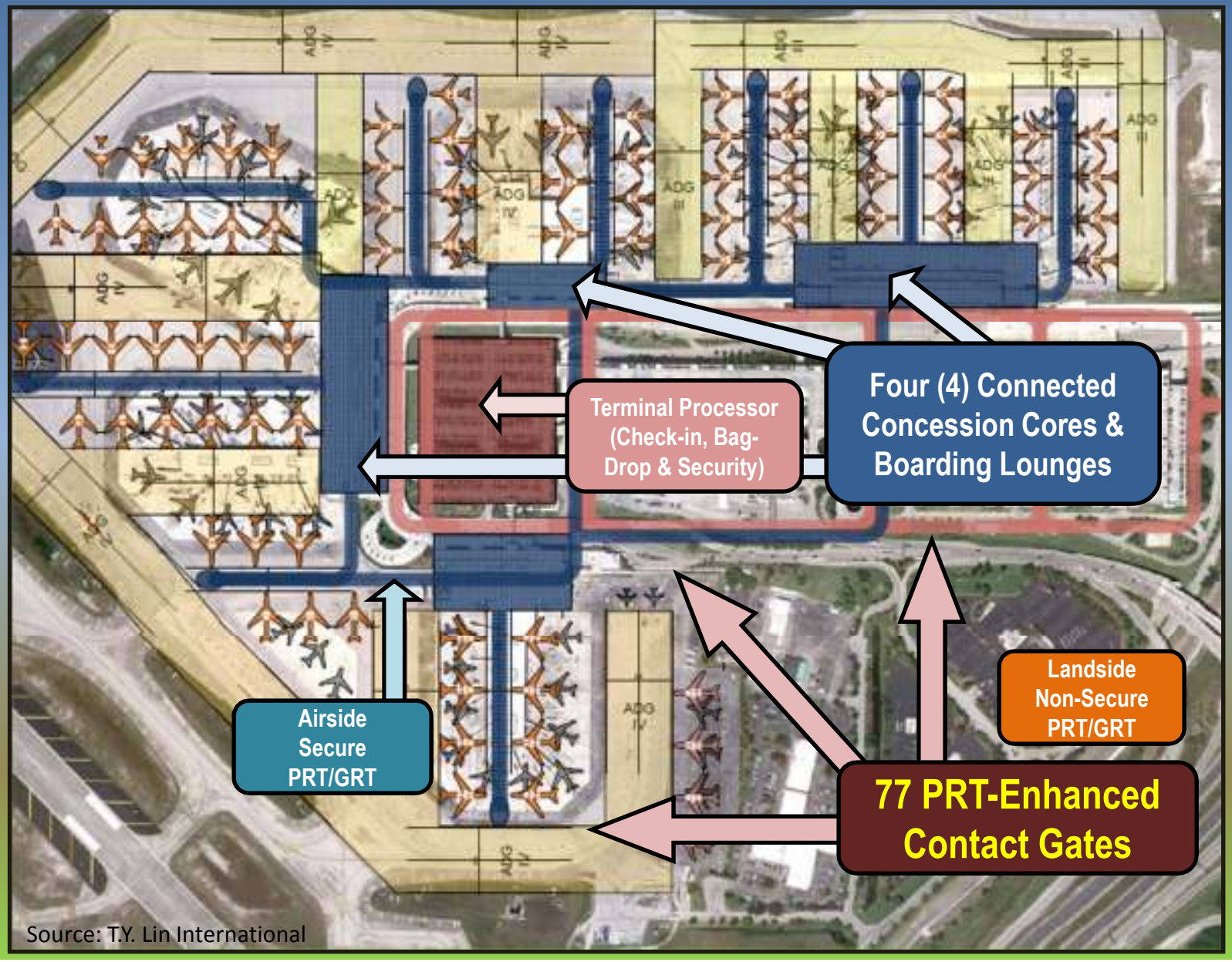
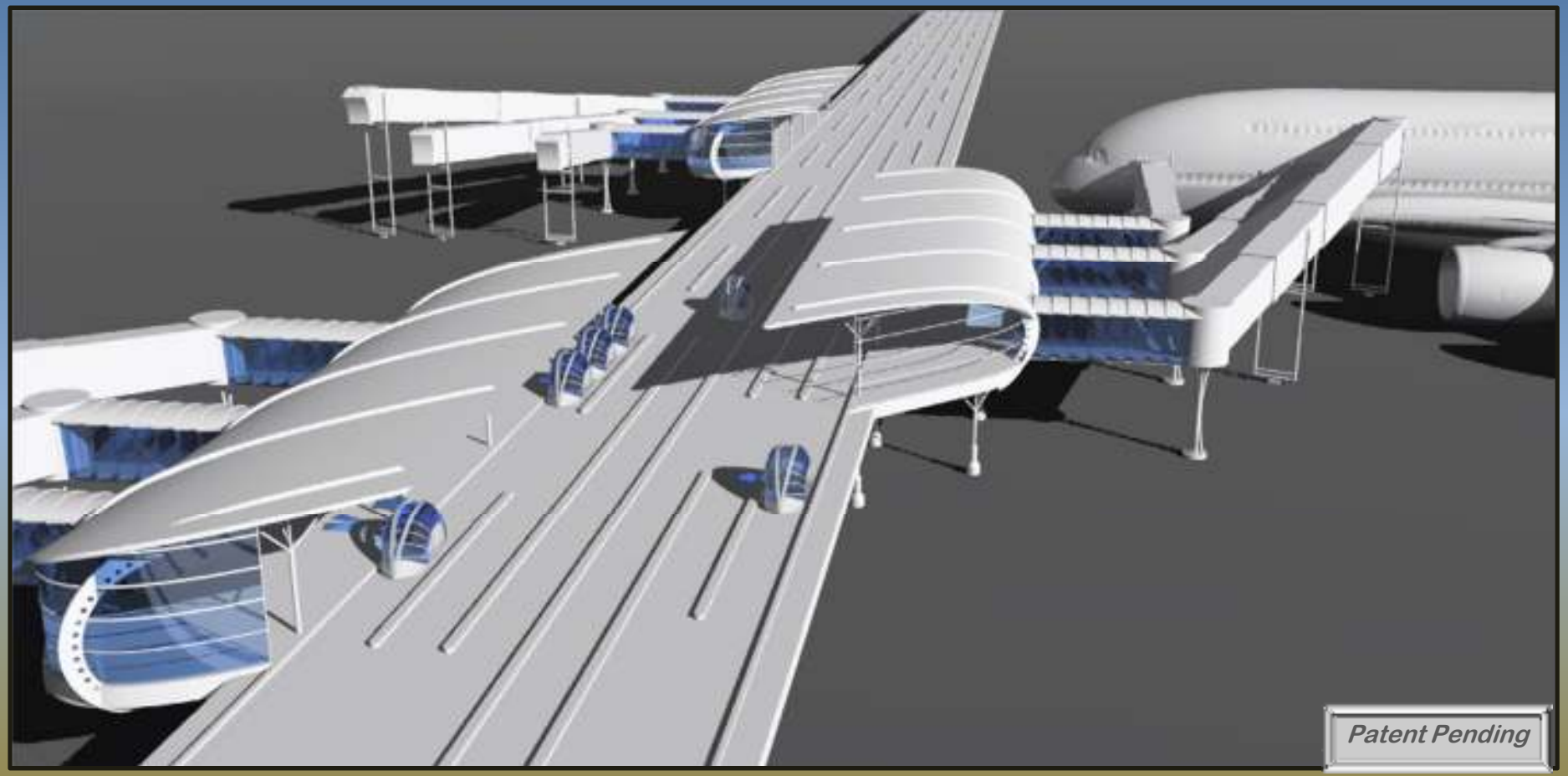
Conventional Layout



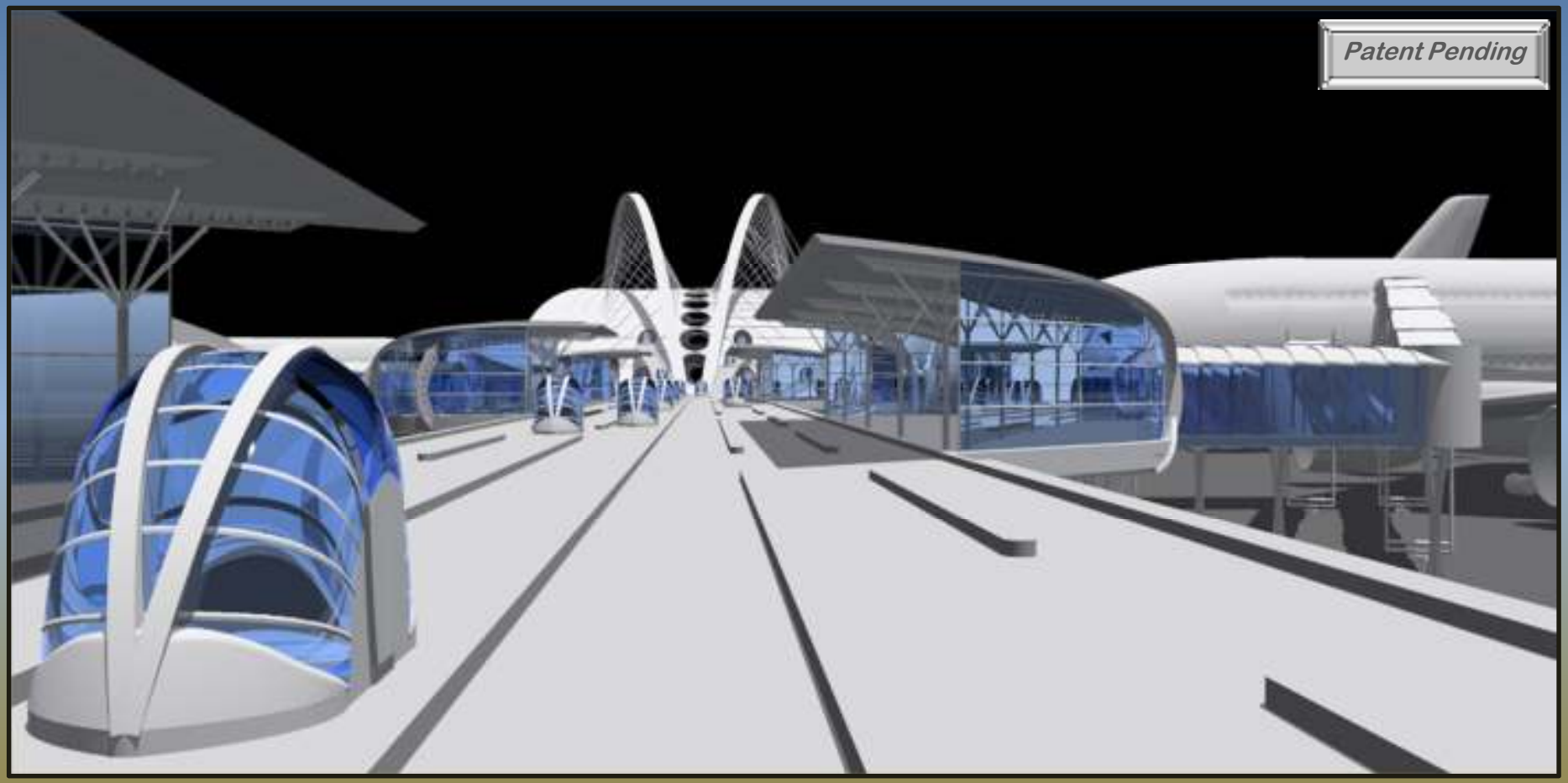
PRT Guideway w/Boarding Stations



- Six (6) Lane PRT Guideway w/ Aircraft Boarding Stations
- Multi-level Passenger Boarding Bridges

2011-02-22

Elevated Aircraft Boarding Station



- Elevated PRT Guideway w/ Aircraft Boarding Station
- Covered Boarding Station (Enclosed as Required)

2011-02-22

Aircraft Boarding Station

Aircraft Boarding Station

QUESTIONS

(Following Presentations)

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