

614,000 Square Yards of Success

RECONSTRUCTING DETROIT METRO'S
LONGEST RUNWAY IN 100 DAYS

CONNICO
INCORPORATED

Kimley»Horn

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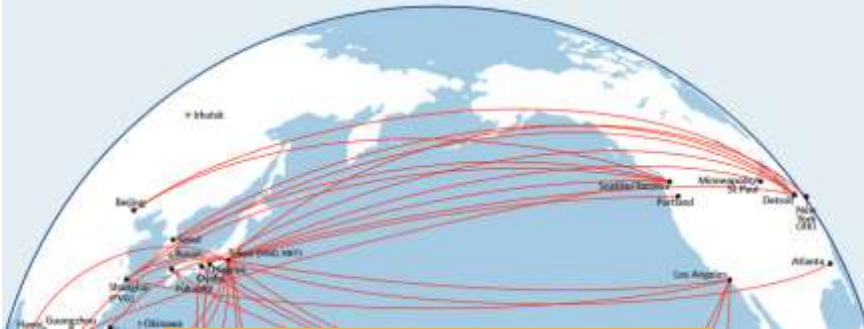
Airport Overview



- Client: Wayne County Airport Authority
- 52th Busiest Airport in the World (By Passenger Traffic, 2015)
- 18th Busiest Airport in the U.S. (Over 33 Million Passengers)
- 1,200 Flights per Day – U.S. and International
- 6 Runways, 2 Terminals, 18 Passenger Airlines, 145 Gates

Detroit Airport Service

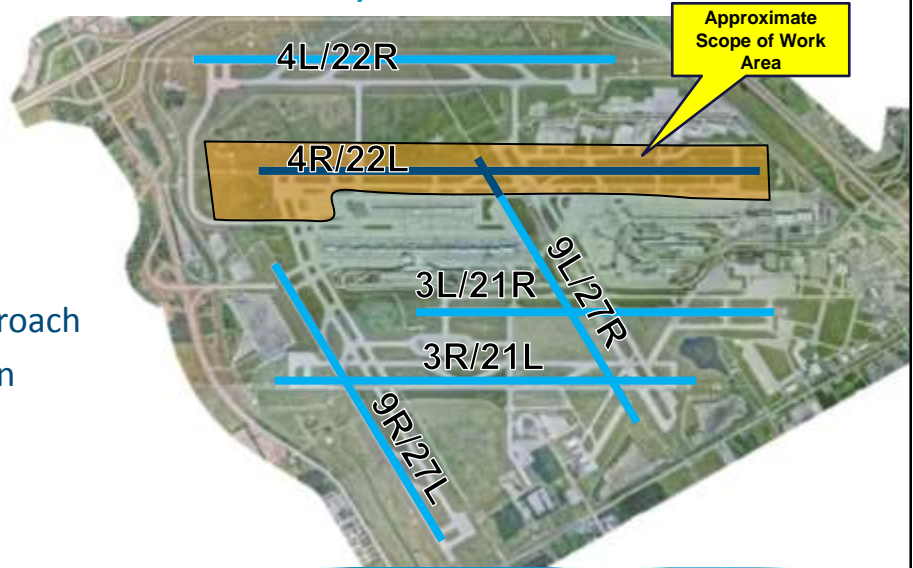
- DTW's importance as Delta hub
- Fully-loaded, fully-fueled aircraft - takeoff distance required



Delta's Asia-Pacific routes, per their in-flight magazine

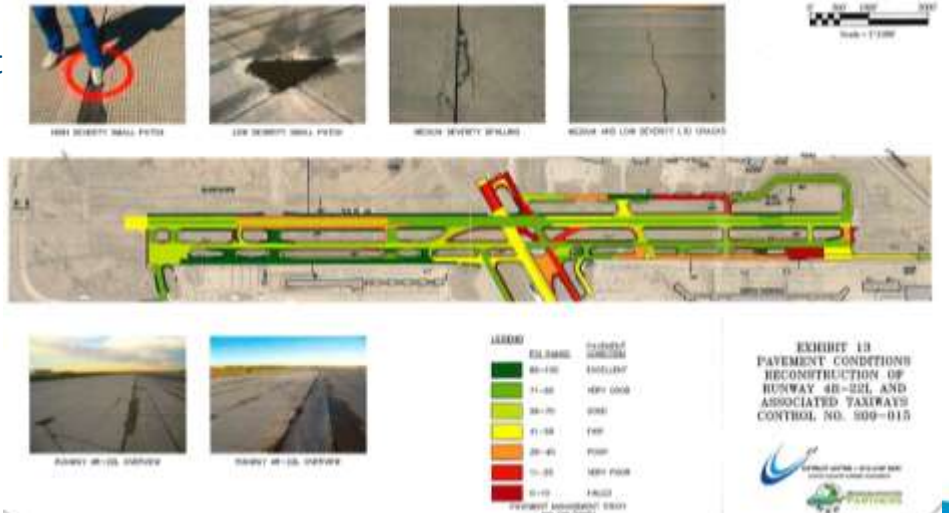
Runway 4R Overview

- 200 feet wide
- 12,003 feet long
- RW 4R – CAT III Approach
- Group VI designation



Existing Conditions

- Portions of runway pavement are over 50 years old!
- Original design aircraft was B-707
- Improve Runway to Meeting Current FAA Standards
- Aging Infrastructure



Initial Challenges

- Maintaining operations for widebody aircraft during summer months
- Choosing between a full and partial reconstruction
- What other projects would be necessary?
- Impacts on the airport and airlines?
- Construction – 1 year vs 2 year
- Updated FAA AC's



Meeting the Challenges

- Design completed **ALONG** with schedule
- Upfront planning of the entire project
- Avoid obstructing crosswind RWY 9L
- Include nearby enabling projects



Enabling Projects

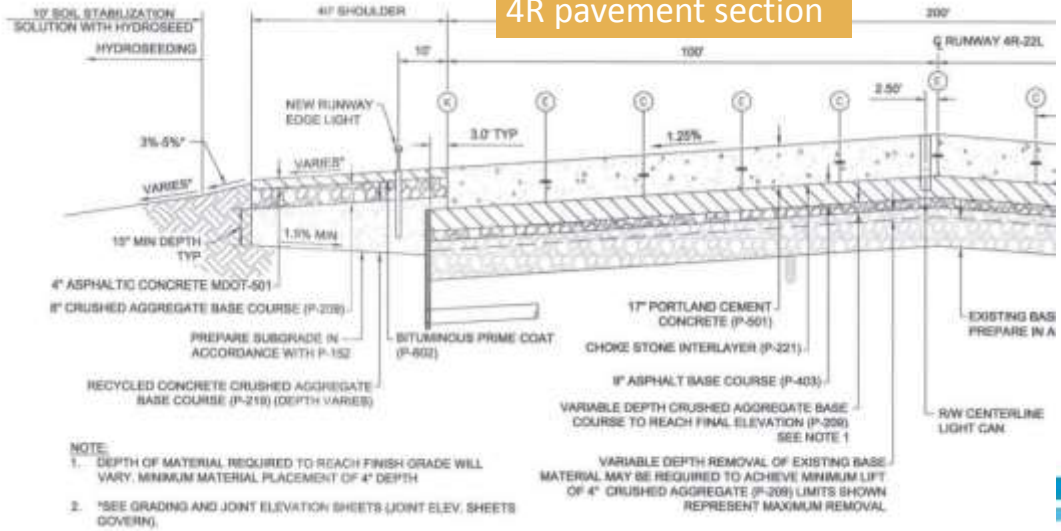
Contractor Bid Packages

- | | |
|--|---|
| 1.  Taxiway Z | 4.  Runway 4R/22L North Portion |
| 2.  Taxiway M Service Road | 5.  Runway 4R/22L South Portion |
| 3.  Airfield Lighting Vault | 6.  Runway Navigational Aid Relocation |



Engineering: Permanent Pavements

4R pavement section



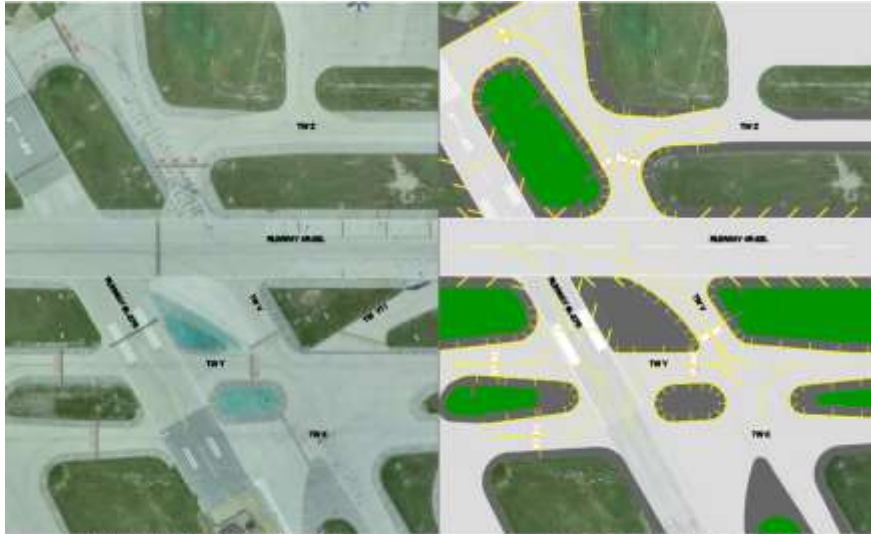
Engineering: New Geometry



EXISTING HOTSPOT

PROPOSED DESIGN

Engineering: New Geometry



EXISTING HOTSPOT

PROPOSED DESIGN

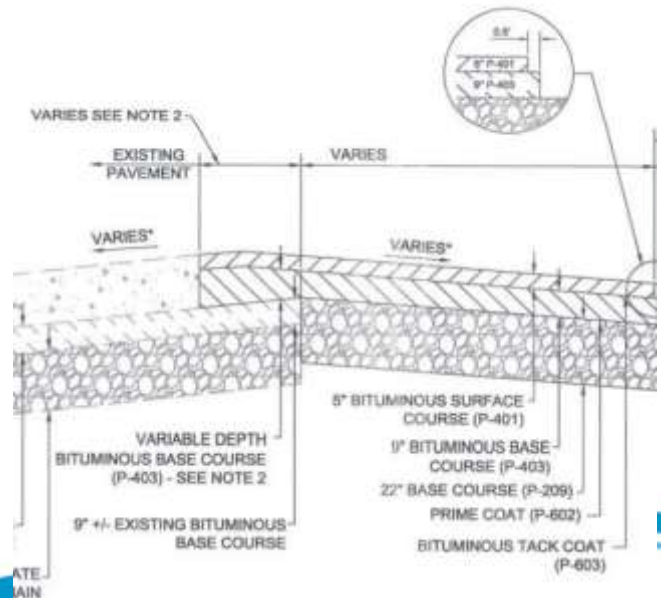
Design Challenges



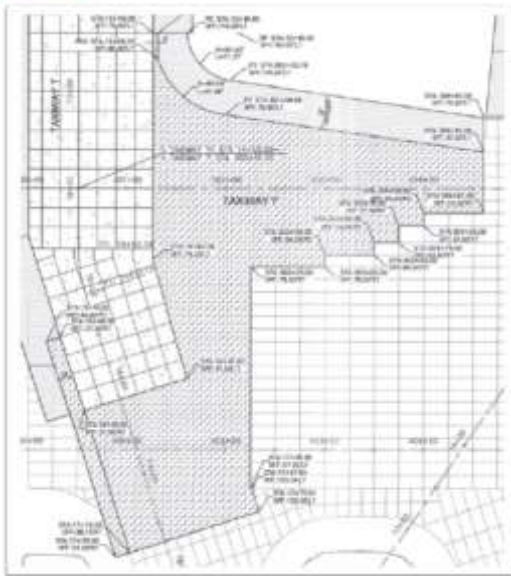
Design Challenge: Temporary Pavements

ENGINEERING CHALLENGES

- How to meet existing aprons, crowns, etc.
- Meet design criteria, including frost depth



Design Challenge: Temporary Pavements



SCHEDULING CHALLENGES

- Locate temporary areas in order to minimize operational impact
- Remove, build, re-remove, re-build

Design Challenge: NAVAIDS

- Engineering and scheduling implication
- Coordination with multiple divisions within FAA



Design Challenge: Airfield Signage



ENGINEERING CHALLENGES

- Final taxiway naming designations
- Coordination with Jeppesen Charts and meeting publication deadlines

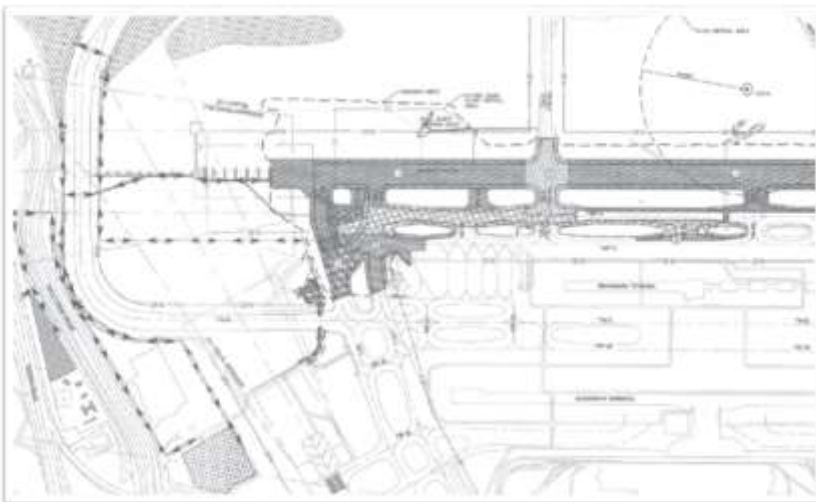
SCHEDULING CHALLENGES

- Material delivery, physical labor availability for installation

Field Challenges



Field Challenge: Active and Busy Airfield



ENGINEERING SOLUTIONS

- Staging area placement
- Multi-year batch plant use
- Construction haul routes

Field Challenge: Active and Busy Airfield

SCHEDULING SOLUTIONS

- Educate workforce
- Zero-tolerance infringement
- Coordination with airlines and airport
- Maintaining access to terminals and maintenance hangars



Field Challenge: Active and Busy Airfield

SCHEDULING SOLUTIONS

- Maintaining access to terminals and maintenance hangars
- Adjustments to Taxiways, Taxilanes, and TOFA's



Field Challenge: Dueling Contractors



ENGINEERING SOLUTIONS

- Similar work scopes and timeframes
- Draw appropriate boundaries
- Electrical coordination

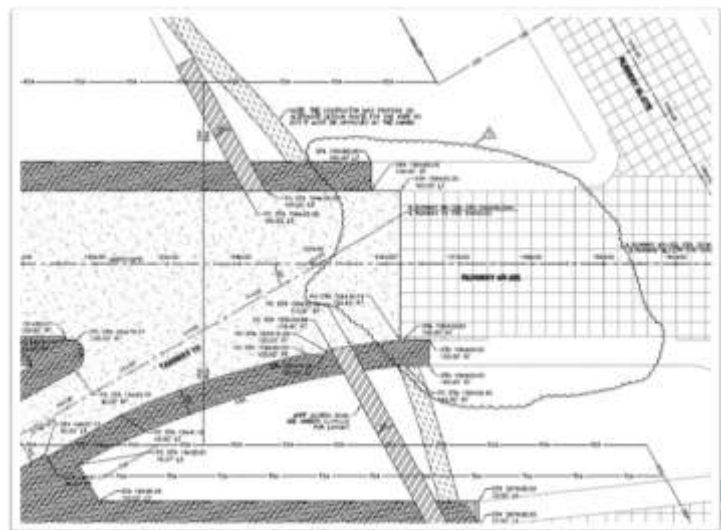
SCHEDULING SOLUTIONS

- Manage expectations
- Require deliverables and commit to deadlines

Field Challenge: ARFF Road at Boundary

ENGINEERING SOLUTIONS

- Alter project limits
- Allow contractor flexibility
- Frequent communication
- Upfront communication in construction documents



Field Challenge: ARFF Road at Boundary

SCHEDULING SOLUTIONS

- Clearcut procedures
- Constant review with DTW ARFF
- Contractor given flexibility in work order



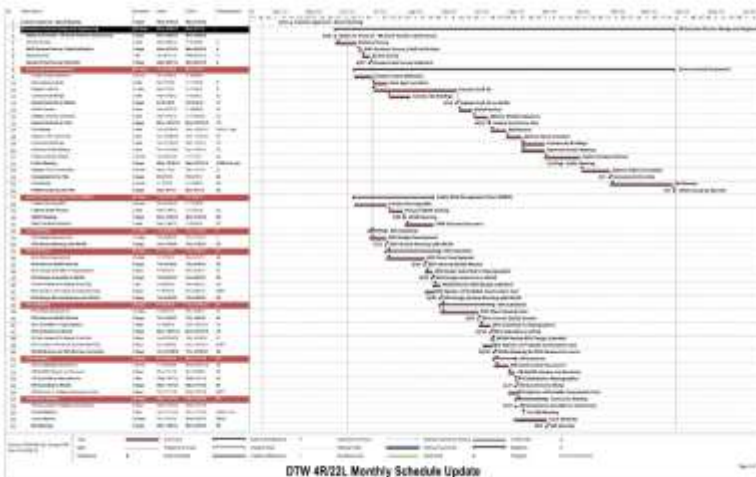
Field Challenge: Michigan

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						June 2013 weather Actual: 81° 64° 0.09 in Average: 75° 55° 0.12 in
2 Partly Cloudy ☀️ Actual: 74° 55° 0.00 in Average: 75° 55° 0.11 in	3 Partly Cloudy ☀️ Actual: 66° 46° 0.00 in Average: 76° 50° 0.12 in	4 Partly Cloudy ☀️ Actual: 72° 50° 0.00 in Average: 76° 56° 0.11 in	5 - Mostly Cloudy ☁️ Actual: 74° 53° 0.00 in Average: 76° 56° 0.12 in	6 - Mostly Cloudy ☁️ Actual: 70° 57° 0.00 in Average: 77° 57° 0.13 in	7 - Mostly Cloudy ☁️ Actual: 63° 53° 0.00 in Average: 77° 57° 0.12 in	8 - Mostly Cloudy ☁️ Actual: 72° 58° 0.00 in Average: 77° 57° 0.13 in
9 - Rain 🌧️ Actual: 77° 59° 0.02 in Average: 78° 58° 0.12 in	10 - Tstorms 🌩️ Actual: 71° 62° 0.11 in Average: 78° 58° 0.12 in	11 - Overcast ☁️ Actual: 82° 63° 0.00 in Average: 78° 58° 0.13 in	12 - Tstorms 🌩️ Actual: 76° 64° 0.49 in Average: 79° 59° 0.12 in	13 - Tstorms 🌩️ Actual: 79° 63° 1.24 in Average: 79° 59° 0.13 in	14 - Partly Cloudy ☀️ Actual: 79° 63° 0.00 in Average: 79° 59° 0.13 in	15 - Rain 🌧️ Actual: 80° 58° 0.01 in Average: 79° 60° 0.12 in
16 - Tstorms 🌩️ Actual: 84° 65° 0.27 in Average: 80° 60° 0.13 in	17 - Tstorms 🌩️ Actual: 87° 60° T in Average: 80° 60° 0.11 in	18 - Tstorms 🌩️ Actual: 74° 57° 0.00 in Average: 80° 61° 0.12 in	19 - Scattered Clouds ☁️ Actual: 74° 51° 0.00 in Average: 81° 61° 0.11 in	20 - Scattered Clouds ☁️ Actual: 80° 56° 0.00 in Average: 81° 61° 0.11 in	21 - Partly Cloudy ☀️ Actual: 86° 62° 0.00 in Average: 81° 61° 0.12 in	22 - Tstorms 🌩️ Actual: 88° 70° 0.80 in Average: 83° 62° 0.10 in
23 - Partly Cloudy ☀️ Actual: 89° 70° 0.00 in Average: 82° 62° 0.12 in	24 - Rain 🌧️ Actual: 87° 83° T in Average: 82° 62° 0.11 in	25 - Tstorms 🌩️ Actual: 80° 83° 0.56 in Average: 82° 62° 0.11 in	26 - Tstorms 🌩️ Actual: 83° 68° 0.32 in Average: 82° 62° 0.11 in	27 - Tstorms 🌩️ Actual: 83° 67° 1.49 in Average: 82° 63° 0.11 in	28 - Tstorms 🌩️ Actual: 79° 65° 0.35 in Average: 83° 63° 0.11 in	29 - Rain 🌧️ Actual: 78° 65° 0.06 in Average: 83° 63° 0.11 in

Field Challenge: Michigan

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1 Rain ☁️🌧️ Actual: 85° 61° 1.49 in Average: 83° 63° 0.30 in	2 Rain ☁️🌧️ Actual: 74° 61° T in Average: 83° 63° 0.30 in	3 Mostly Cloudy ☁️ Actual: 83° 63° 0.00 in Average: 83° 63° 0.11 in	4 Overcast ☁️ Actual: 82° 71° T in Average: 83° 64° 0.10 in	5 Rain ☁️🌧️ Actual: 83° 79° 0.01 in Average: 83° 64° 0.30 in	6 Rain ☁️🌧️ Actual: 83° 70° 0.27 in Average: 84° 64° 0.10 in
7 Rain ☁️🌧️ Actual: 82° 70° 0.01 in Average: 84° 64° 0.11 in	8 Tstorm ☁️🌧️ Actual: 83° 68° 0.38 in Average: 84° 64° 0.30 in	9 Tstorm ☁️🌧️ Actual: 89° 71° 0.34 in Average: 84° 64° 0.30 in	10 Tstorm ☁️🌧️ Actual: 88° 69° 0.02 in Average: 84° 64° 0.30 in	11 Partly Cloudy ☁️☀️ Actual: 80° 64° 0.00 in Average: 84° 64° 0.11 in	12 Scattered Clouds ☁️☀️ Actual: 82° 58° 0.00 in Average: 84° 64° 0.30 in	13 Scattered Clouds ☁️☀️ Actual: 83° 64° 0.00 in Average: 84° 64° 0.10 in
14 Scattered Clouds ☁️☀️ Actual: 89° 69° 0.26 in Average: 84° 64° 0.10 in	15 Tstorm ☁️🌧️ Actual: 93° 75° 0.26 in Average: 84° 64° 0.31 in	16 Tstorm ☁️🌧️ Actual: 90° 77° 0.02 in Average: 84° 64° 0.31 in	17 Partly Cloudy ☁️☀️ Actual: 94° 75° 0.00 in Average: 84° 64° 0.11 in	18 Tstorm ☁️🌧️ Actual: 94° 75° 0.19 in Average: 84° 64° 0.11 in	19 Tstorm ☁️🌧️ Actual: 95° 73° 0.02 in Average: 84° 64° 0.11 in	20 Tstorm ☁️🌧️ Actual: 87° 72° 0.30 in Average: 84° 64° 0.11 in
21 Partly Cloudy ☁️☀️ Actual: 85° 60° 0.00 in Average: 84° 64° 0.12 in	22 Rain ☁️🌧️ Actual: 81° 70° 0.01 in Average: 83° 64° 0.11 in	23 Tstorm ☁️🌧️ Actual: 87° 62° 0.54 in Average: 83° 64° 0.11 in	24 Partly Cloudy ☁️☀️ Actual: 70° 57° 0.00 in Average: 83° 64° 0.12 in	25 Scattered Clouds ☁️☀️ Actual: 76° 54° 0.00 in Average: 83° 64° 0.12 in	26 Partly Cloudy ☁️☀️ Actual: 79° 60° 0.00 in Average: 83° 64° 0.12 in	27 Tstorm ☁️🌧️ Actual: 75° 57° 0.18 in Average: 83° 64° 0.11 in
28 Partly Cloudy ☁️☀️ Actual: 70° 52° T in Average: 83° 64° 0.12 in	29 Mostly Cloudy ☁️ Actual: 72° 57° 0.00 in Average: 83° 64° 0.12 in	30 Partly Cloudy ☁️☀️ Actual: 79° 54° 0.00 in Average: 83° 64° 0.11 in	31 Rain ☁️🌧️ Actual: 77° 67° 0.10 in Average: 83° 64° 0.12 in	July 2013 weather		

Field Challenge: Michigan



ENGINEERING SOLUTIONS

- SP-50: schedule submittal requirement
- Weekly and monthly schedule updates
- Completion incentive
- Liquidated damages
- Contractor flexibility in phasing
- Identify long lead items

Field Challenge: Michigan



- SCHEDULING SOLUTIONS

- UPDATE and USE construction schedule (including the contractor)
- “Pro-project” management style



Outcome of applying engineering AND scheduling solutions to problems, both before and during construction?



Project Facts

- 614,000 square yards of 17-inch concrete pavement—equivalent to approximately 197 lane-miles of highway pavement
- 7,800 tons of RCP—outweighs the steel structure of the Eiffel Tower by more than 500 tons
- 30 miles of pipe
- 110 miles of electrical cable

THANK YOU!

