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FREIGHT MOBILITY RESEARCH INSTITUTE (FMRI)
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Port Recovery in the Aftermath of Oil Spill Incident

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Abstract

Transportation systems and their components play a substantial role in the U.S. and world economies. This report serves as a guide to increase further research or perhaps to continue improving the traffic system in this growing economy. The setting for this study is an oil spill on the Mississippi River near the Port of New Orleans. Due to several oil spills in the past, port efficiency is stunted as delays to the movement of cargo on the roads, within the port itself and on container ships is slowed or, in worse case scenarios, entirely halted. Therefore, the purpose of this report is to provide a plan of action to revive normal port operations to the Port of New Orleans from a complete shutdown due to an oil spill situation. By using PTV Vissim as a microsimulation platform, a quick and efficient plan of action is designed. Next, literature on past port oil spills and contingency plans due to oil spills were further researched as part of the report to serve as a guide to designed the near perfect plan for execution. Once the model was completed, the model provided discrete information tabulated and visually represented in a series of tables. Unfortunately, not all relative recent traffic information was obtained from Port of New Orleans authorities. However, enough information from past traffic data and current Google map of the Port of New Orleans was used to design a plan of contingency.

Historical Oil Spills Port NOLA

Westchester Tanker

- A single hull tanker ran aground on the river bottom rupturing the hull
- Over 500,000 gallons of oil spilled
- Federal law dictated that all carries must be double hulled by 2015

Hurricane Katrina Oil Spills

- Approximately 50 oil spills reported and Murphy Oil was responsible for the largest release of oil at an estimated 819,000 gallons
- Oil was spilled into the densely populated area impacting over 1,700 homes and canals.
- Residential cleanup was difficult due to accessibility complications and downed powerlines

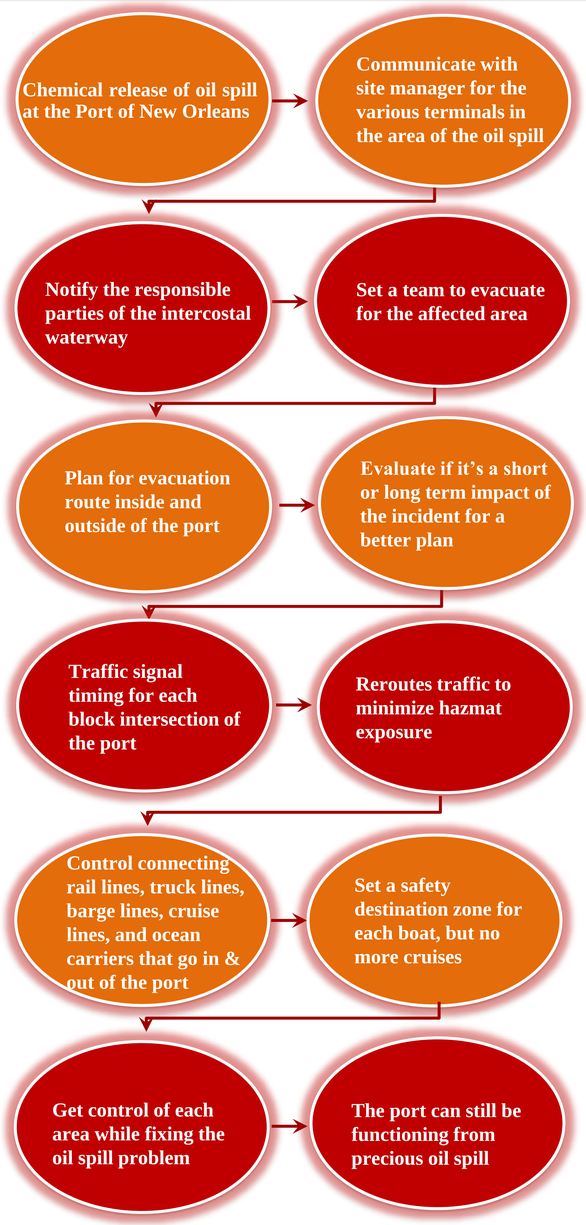
New Orleans Oil Spill

- A 61 foot barge collided with a tanker ship leaking fuel for nearly two days
- The smell of the fuel was so pungent that it could be smelled for miles detouring tourist from visiting the New Orleans French Quarters
- Plastic booms were used to protect the secondary passes as well as the Delta National Wildlife Refuge

Deepwater Horizon

- A surge of natural gas cracked the recently installed concrete core in which the gas ascended to the platform causing an explosion
- 11 worker were killed and it was estimated that 60,000 barrels of oil leaked per day
- By the time a permanent seal was applied an approximate 4,900,000 barrels of oil was released making this history's largest marine oil spill

Methodology

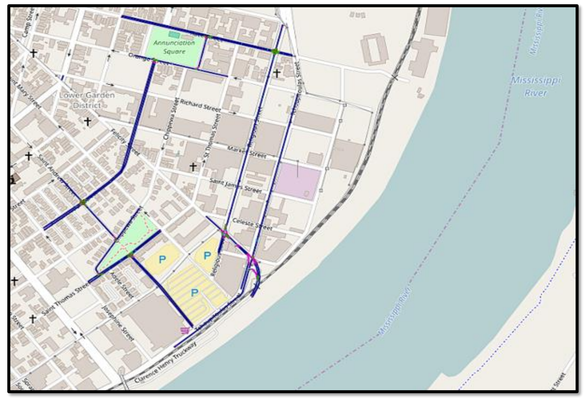


PORT NOLA
THE PORT OF NEW ORLEANS

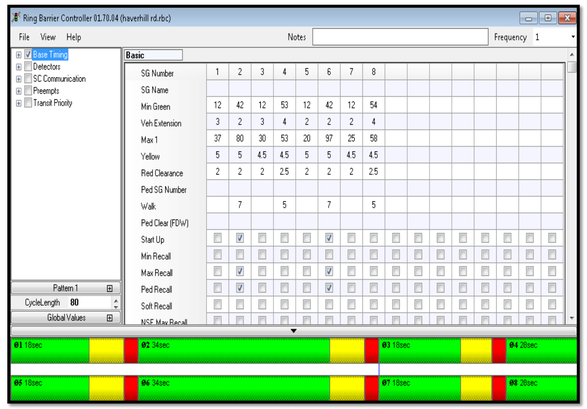
Case Study

To better understand the effects of an oil spill on port activities, contingency plans from the Louisiana Oil Spill Coordinators Office (LOSCO), marine accident reports from the National Transportation Safety Board (NTSB), and Geographic Response Plans (GRP) for the New Orleans Parrish & Jefferson Parrish were reviewed. Throughout the investigation and after going through various literature reviews the major concerns across all spectrums are public and environmental safety. However, the economic impacts of an oil spill at the Port of New Orleans would be severe. Port of New Orleans is the 13th largest port in the country and on cargo alone is worth $37 billion to the national economy. Therefore, ensuring successful port operations in the event of an oil spill is increasingly important.

In the New Orleans East Quadrant, on the north side of the Mississippi River, west of the Crescent City Connection (formerly known as the Greater New Orleans Bridge), there are 7 intermodal terminals that make up the Uptown River Cargo Terminals. East of the Crescent City Connection there are 7 more terminals that make up the Downtown River Cargo Terminals. Northeast of the Downtown River Cargo Terminals on the southeast corner of the Inner Harbor Canal are 2 more cargo stations that make up the Inner Harbor Cargo Facilities. Together these terminals and facilities make up the Port of New Orleans.



Port of New Orleans Network Model



Signal timing after Signal Optimization in PTV VISSIM version 9.0

Results & Analysis

Table 1. Network Performance - Normal Conditions

	Time Interval	Average Delay	Average Stops	Average Speed	Average Stop Delay	Total Distance Traveled	Travel Time
AVG	0-3600	44	1	28	24	2845	371926
STDDEV	0-3600	10	0	3	5	39	37634
MIN	0-3600	33	1	23	18	2799	326739
MAX	0-3600	62	2	31	32	2923	436477

Table 2. Network Performance - 25% Increase in HGV traffic

	Time Interval	Average Delay	Average Stops	Average Speed	Average Stop Delay	Total Distance Traveled	Travel Time
AVG	0-3600	48	1	27	27	2864	386661
STDDEV	0-3600	10	0	3	5	41	36858
MIN	0-3600	35	1	23	20	2825	336853
MAX	0-3600	62	2	30	33	2956	438089

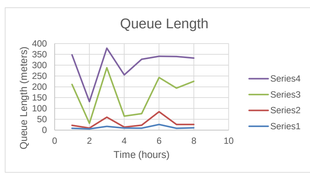
Table 3. Network Performance - 50% Increase in HGV traffic

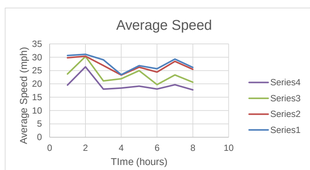
	Time Interval	Average Delay	Average Stops	Average Speed	Average Stop Delay	Total Distance Traveled	Travel Time
AVG	0-3600	66	2	23	33	2848	448892
STDDEV	0-3600	15	0	3	6	32	58665
MIN	0-3600	37	1	20	21	2828	337695
MAX	0-3600	84	2	30	38	2925	517220

Table 4. Network Performance - 75% Increase in HGV traffic

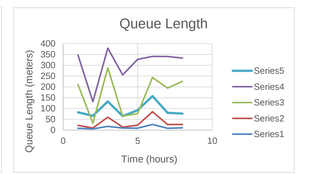
	Time Interval	Average Delay	Average Stops	Average Speed	Average Stop Delay	Total Distance Traveled	Travel Time
AVG	0-3600	87	2	20	37	2800	520695
STDDEV	0-3600	16	0	3	5	29	58627
MIN	0-3600	50	2	18	26	2766	386015
MAX	0-3600	99	3	26	43	2847	568418

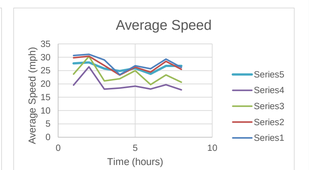
Without Signal Optimization

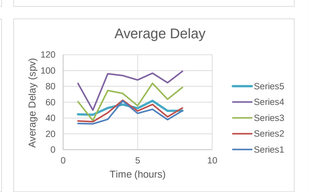




With Signal Optimization







Conclusions

In conclusion, the Port of New Orleans has been studied in the realm of an oil spill tragedy through literature review and simulations utilizing PTV Vissim. The Literature Review displayed numerous times in history the cause and effect of oil spills in the Mississippi River, near the Port of New Orleans, and how these spills can be properly dealt with to minimize delay and idleness. By running simulation runs on PTV Vissim, an action plan was designed to bring Port of New Orleans back to normality of operations efficiently. The simulations that were created were done so in order to get a physical grasp of just what happens when an incident such as an oil spill can do to a major port such as the Port of New Orleans. Once successfully ran, descriptive statistics about the traffic were extracted from the model.