Appendix 6-3

Long Term Control Plan Alternative Screening

City of Terre Haute, Indiana

Long Term Control Plan
Alternative Screening

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Introduction

The City of Terre Haute Long Term Control Plan Technical Team performed the screening process to narrow down the comprehensive alternatives previously defined and approved by the Indiana Department of Environmental Management (IDEM). The process resulted in four final alternatives that will be evaluated in detail at different overflow event design storms. A graphic representation of each of the chosen alternatives is included in the Appendix. The final four alternatives are as follows:

- Alternative 1 – North Storage/International Paper Storage Option I
- Alternative 5A – North Tunnel with Storage Tanks
- Alternative 5B – North Tunnel with International Paper Storage
- Alternative 7 – Tunnel to Main Lift Station

This document outlines the process that the Technical Team used to screen the alternatives from seven to four.

Cost Model

Costs were developed for each of the seven alternatives that had been previously determined by the Technical Team and approved by IDEM for further evaluation. The alternatives were developed to store or treat flows for the design storm resulting in four overflows per year for the system. The seven alternatives were:

- Alternative 1 – North Storage/International paper Storage Option I
- Alternative 2 – North Storage/International Paper Storage Option II
- Alternative 3 – Conveyance and Storage Option
- Alternative 4 – Storage Tanks Option
- Alternative 5 – North Tunnel
- Alternative 6 – Tunnel to Idaho Street
- Alternative 7 – Tunnel to Main Lift Station

The costs for each option are shown in Table 1.

Table 1
Terre Haute CSO LTCP Alternative Screening
Preliminary Opinion of Construction Cost Summary

Alternative	Description	Capital Cost
1	North Storage/International Paper Storage Option I	$125,000,000
2	North Storage/International Paper Storage Option II	$120,000,000
3	Conveyance and Storage Option	$179,000,000
4	Storage Tank Option	$171,000,000
5	North Tunnel	$130,000,000
6	Tunnel to Idaho	$149,000,000
7	Tunnel to Main Lift Station	$120,000,000

Costs were developed using bid tabulations from several communities for similar projects. Bid tabulations are generally the best indication of costs. Material and equipment and labor costs were determined from supplier estimates.

The Operations and Maintenance costs for each alternative were developed by using a percentage based on the type of project was to be constructed. The percentages used are 0.5% for primarily pipeline projects and 1.65% for projects that include a combination of pipeline, structures and lift stations as seen in Table 2.

Table 2
Terre Haute CSO LTCP Alternative Screening
Preliminary Opinion of Operations and Maintenance Costs Summary

Alternative	Description	O&M Cost
1	North Storage/International Paper Storage Option I	$1,250,000
2	North Storage/International Paper Storage Option II	$1,230,000
3	Conveyance and Storage Option	$2,020,000
4	Storage Tank Option	$2,010,000
5	North Tunnel	$1,180,000
6	Tunnel to Idaho	$1,280,000
7	Tunnel to Main Lift Station	$650,000

Screening Criteria

The Technical Team concluded that eight different criteria would be used for further screening of the alternatives.

- Capital Cost
  - Capital Cost includes the construction and non-construction cost for each alternative.
- Adaptability to Future Regulatory Regulations
  - Each alternative was evaluated on its measure of overall flexibility in terms of future regulations. For example, a tunnel cannot be easily increased in size, but an addition can be made to a storage facility if there is sufficient room to accommodate volume capture increase.
- Inconvenience During Construction
  - Each alternative will result in some short-term disruption to the public; however, the disruption will be greater in some alternatives. The degree of disruption will be evaluated with this criterion. For example, several alternatives would require

1st Street to be closed for a period of time which would cause a high degree of inconvenience during construction.

- O&M Staff Requirements/Reliability
  - Each alternative will increase the need for staff to perform routine operation and maintenance. The criterion evaluated both the number of staff required for each alternative as well as the complexity of the O&M for given alternative. An alternative that is more complex would require a higher degree of staff training.
- O&M Costs
  - Operations and Maintenance costs were evaluated based on overall annual cost estimates including staff labor costs. This criterion also includes additional equipment that would be necessary as well as supplies.
- Potential for Regulatory Support
  - This criterion represents the potential for acceptance by the regulatory agencies. For example, if a project involved unfamiliar elements or unreliable CSO control, the timeline and general acceptance for the alternative may be impacted.
- Smoothness of Rate Impact (Phasing)
  - The smoothness of rate impact involves the ability of the given alternative to be phased. A tunnel typically is constructed at the same time and thus would not lend itself to financial phasing, whereas other alternatives may be broken into a number of smaller projects.
- Uncertainty/Risk
  - This criterion represents uncertainties involved including the risk of construction issues for the given alternative (such as unknown site conditions for large tanks or tunnels), cost overruns and land acquisition.

Each criterion was weighted by the Technical Team. The goal was to determine the relative importance of each criterion. A score of 0 to 25 was given to each criterion. A score of 25 would represent the most important criteria and 0 would represent the least important. The weighting of the given criteria is given in Table 3.

Table 3
Terre Haute CSO LTCP Alternative Screening
Evaluation Criteria Weighting

Criterion	Weight (0 to 25)
Capital Cost	25
Adaptability to Future Regulatory Regulations	10
Inconvenience During Construction	20
Operations and Maintenance Staff Requirements/Reliability	15
Operations and Maintenance Costs	15
Potential for Regulatory Support	20
Smoothness of Rate Impact (Phasing)	15
Uncertainty/Risk	15

After the criteria were weighted, each alternative was ranked according to each scoring criterion by the Technical Team. Each criterion was given a score of 0 to 5. A score of 5 points meant that the alternative met the criterion completely. A score of 0 points meant that the alternative did not meet the criterion. The scoring was then multiplied by the weighting of each criterion to determine a total score and overall ranking. A total score was determined for each alternative by adding all of the weighted scores. Table 4 shows the weighted scores of each criterion as well as the overall score of each alternative.

Table 4
Terre Haute CSO LTCP Alternative Screening
Alternative Scoring/Ranking

Alternative	Description	Capital Cost	Wgt	Score	Adaptability to Future Regulatory Regulations	Wgt	Score	Inconvenience During Construction	Wgt	Score	O&M Staff Requirements/ Reliability	Wgt	Score	O&M Costs	Wgt	Score	Potential for Regulatory Support	Wgt	Score	Smoothness of Rate Impact (Phasing)	Wgt	Score	Uncertainty /Risk	Wgt	Score	Total Score	Ranking
1	**North/IP Storage I**	5	25	125	4	10	40	1	20	20	5	15	75	3	15	45	3	20	60	3	15	45	3	15	45	**455**	**2 (tie)**
2	**North/IP Storage II**	5	25	125	4	10	40	1	20	20	5	15	75	3	15	45	3	20	60	3	15	45	3	15	45	**455**	**2 (tie)**
3	**Conveyance and Storage**	1	25	25	1	10	10	1	20	20	1	15	15	1	15	15	1	20	20	4	15	60	2	15	30	**195**	**7**
4	**Storage Tanks**	2	25	50	1	10	10	1	20	20	1	15	15	1	15	15	1	20	20	4	15	60	2	15	30	**220**	**6**
5	**North Tunnel**	4	25	100	3	10	30	4	20	80	3	15	45	3	15	45	3	20	60	2	15	30	1	15	15	**405**	**4**
6	**Tunnel to Idaho**	3	25	75	2	10	20	5	20	100	3	15	45	3	15	45	3	20	60	2	15	30	1	15	15	**390**	**5**
7	**Tunnel to Main Lift**	5	25	125	4	10	40	5	20	100	3	15	45	5	15	75	5	20	100	1	15	15	1	15	15	**515**	**1**

As seen in Table 4, the highest ranking alternative is Alternative 7 – Tunnel to Main Lift Station. The second highest ranking alternatives were Alternatives 1 and 2 – both of which make use of the existing ponds at the International Paper site. Alternative 2 was eliminated because it conveys additional flow to the north. The north area is already heavily impacted by high CSO volumes and the goal is to take flow away from the northern outfalls. A third alternative was deemed necessary because there is some uncertainty in terms of property acquisition of the International Paper site. (The City of Terre Haute is currently in discussion with International Paper to acquire the property, but a final transfer of the property has not occurred.) In the event that the property cannot be acquired, a third alternative that does not involve the IP property was chosen. Alternative 5 will be evaluated as a third alternative.

In addition, Alternative 5 will be broken into Alternative 5A and Alternative 5B. Alternative 5B will include the use of the International Paper ponds. The use of the ponds in this alternative could result in a decrease in overall capital cost, but again, the uncertainty of the property acquisition does not allow for its use as a primary alternative.

Accordingly, the final four alternatives and their descriptions are as follows:

- Alternative 1 – North Storage/International Paper Storage Option I
  - Storage facility on the north side of Terre Haute to handle flows at the Chestnut (010) and Spruce (009) outfalls.
    - Closure of the Spruce outfall with all of the flows routed to the Chestnut outfall.
    - A floatable control facility constructed at Chestnut.
  - The International Paper Lagoons would be utilized for flows from Ohio (008) to Turner (003).
    - Conveyance piping from the Ohio Outfall constructed south to a new pump station at Hulman Street.
    - The Conveyance piping sized for ultimate conveyance of all flows within the park allowing all of the outfalls with Fairbanks Park to be closed.

- A pump station constructed at Hulman Street to convey flows via force main from the park as well as flows from the Hulman and Idaho conveyance to the existing lagoons at the International Paper site.
- Closure of the Hulman outfall (004) will be closed and Idaho will remain open for storm events greater than the 4 overflow per year design storm and installation of floatable controls.
- Conveyance of the Turner outfall (003) to the International Paper lagoons. Turner will remain open for storm events greater than the 4 overflow per year design storm and floatable controls will be installed.
- Utilization of the International Paper Lagoons for storage of CSO overflows until the existing wastewater treatment facility can provide treatment.

- Alternative 5A – North Tunnel with Storage Tanks
  - Construction of a tunnel from the Spruce outfall (010) to the Crawford Outfall (005).
    - The tunnel sized for conveyance and storage.
    - Closure of Outfalls 010 (Crawford), 009 (Spruce), 008 (Ohio), 007 (Walnut), and 006 (Oak) with all flow for storm events larger than the 4 overflow per year design storm conveyed to the Crawford (005) outfall.
    - Floatable Controls will be installed on the Crawford (005) outfall.
  - Storage facility (5 MG) at Hulman Street to store all volumes up to the 4 overflow per year design storm.
    - Closure of the Hulman outfall (004) and floatable controls installed on the Idaho (010) outfall.
  - Storage Facility (3.2 MG) at the Turner Outfall (003) to store volumes up to the 4 overflow per year design storm.
    - Floatable Controls installed on the Turner outfall.

- Alternative 5B – North Tunnel with International Papre Storage

- Construction of a tunnel from the Spruce outfall (010) to the Crawford Outfall (005).
  - The tunnel sized for conveyance and storage.
  - Closure of outfalls 010 (Chestnut), 009 (Spruce), 008 (Ohio), 007 (Walnut), and 006 (Oak) with all flow for storm events larger than the 4 overflow per year design storm conveyed to the Crawford (005) outfall.
  - Floatable Controls installed on the Crawford (005) outfall.
- Utilization of the International Paper Lagoons for flows from Hulman (004) to Turner (003).
  - The Hulman (004) and Idaho (010) flows conveyed to the International Paper Lagoons for storage.
  - A pump station constructed at Hulman Street to convey flows via force main from the Hulman and Idaho conveyance to the existing lagoons at the International Paper site.
  - Closure of the Hulman outfall (004) and Idaho will remain open for storm events greater than the 4 overflow per year design storm and floatable controls will be installed.
  - The Turner outfall (003) conveyed to the International paper lagoons. Turner to remain open for storm events greater than the 4 overflow per year design storm and floatable controls installed.
  - Utilization of the International Paper Lagoons for storage of CSO overflows until the existing wastewater treatment facility can provide treatment.

- Alternative 7 – Tunnel to Main Lift Station
  - Construction of a tunnel for conveyance and storage of all flows from Chestnut (010) to Turner (003).
  - Closure of all outfalls in the system. No floatable controls required.
  - Construction of a pump station at the south end of the tunnel in order to evacuate the tunnel and convey the flows to the existing wastewater treatment facility.

Common Alternatives

Based on each alternative, the common elements that have been previously proposed may be modified. For example, no floatable requirements will be necessary for Alternative 7 – Tunnel to Main Lift Station since all of the existing outfalls would be closed and floatable control would be unnecessary. Floatable controls are included in the Common Alternatives, but would not be required for Alternative 7. This evaluation will take place during the detailed analysis and the list of common elements will be adjusted as necessary. The Common Alternatives are provided for reference in Table 5.

Table 5
Terre Haute CSO LTCP Alternative Screening
Common Alternatives

Item	Description
1	Parallel Force Main/Main Lift Station Upgrades
2	New Headworks at WWTF
3	Chlorine Contact Tank Upgrades
4	Back-Up Structure for Hulman/Idaho Storage
5	Walnut Diversion Structure
6	Floatables Controls at Spruce (010)
7	Floatables Controls at Hulman/Idaho (004/011)
8	Large Diameter Pipe Rehab – North Hulman with Weir
9	Large Diameter Pipe Rehab 0 North Walnut
10	Separation of East 003
11	Separation of West 009

Detailed Analysis

Each remaining alternative will be further evaluated for the following design storms/overflow frequencies during continuous typical year simulations as shown in Table 6.

Table 6
Terre Haute CSO LTCP Alternative Screening
Design Storms

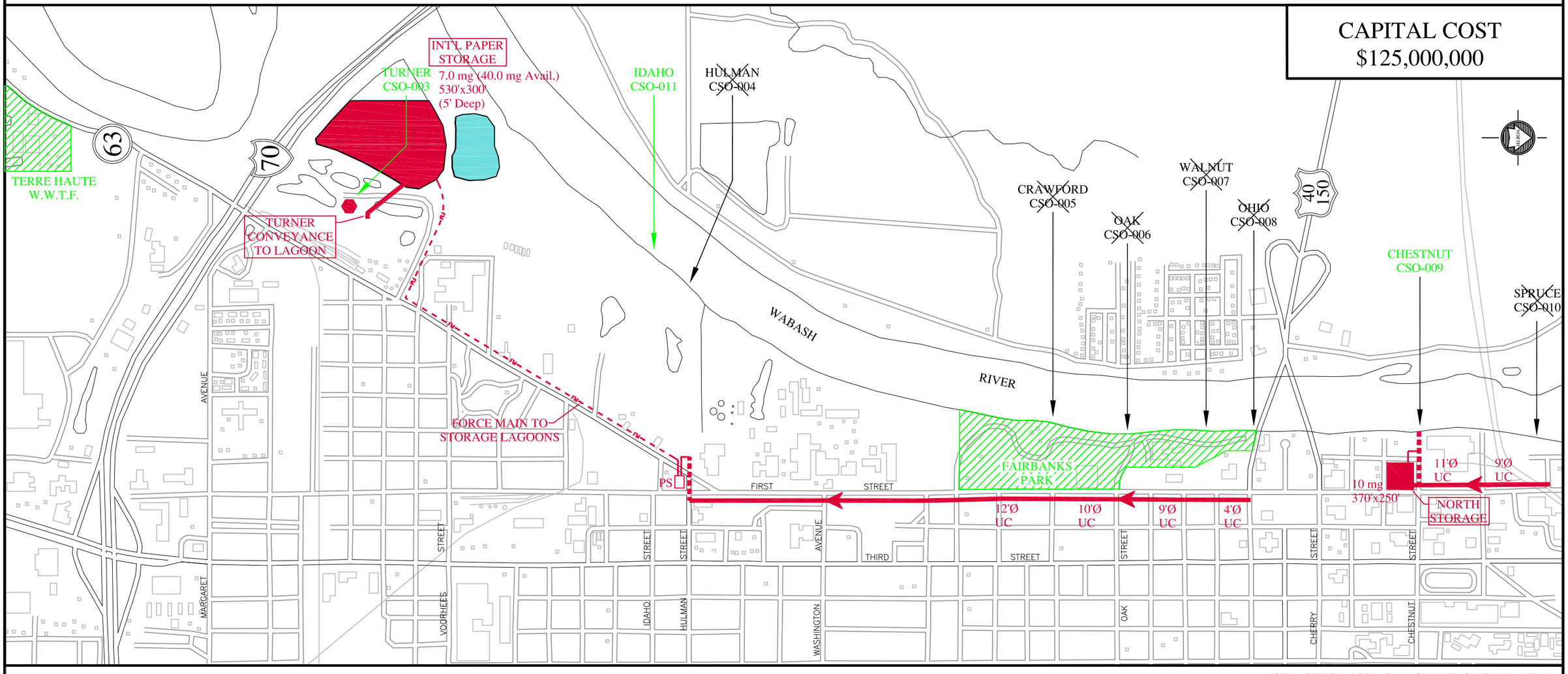
Rainfall (inches)	Estimated Annual Overflow Frequency
0.818	12
1.21	6
1.56	4
2.043	1
3.888	<1

The river quality for each alternative will then be determined through the river model to determine the number of days exceeding the Indiana standard for water quality. A cost and performance relationship will then be determined for each alternative. Finally, the financial capability analysis will be conducted for each alternative.

Terre Haute CSO LTCP - North Storage/International Paper Storage Option I

ALTERNATIVE 1

CAPITAL COST
$125,000,000



LEGEND

- RELIEF SEWER AND FLOW
- MAIN LIFT STATION
- STORAGE TANK (INCLUDES SIZE AND VOLUME)
- UC — ULTIMATE CONVEYANCE
- 12"Ø — RELIEF SEWER SIZE
- NEW PUMP STATION
- FM — NEW FORCE MAIN
- CSO-009A — NEW CSO FROM CONSOLIDATION
- ~~OHIO CSO-008~~ — EXISTING CSO TO BE ELIMINATED
- OHIO CSO-008 — EXISTING CSO TO REMAIN
- CSO TUNNEL
- STORAGE STRUCTURE DISCHARGE

NOTE: SIZES BASED ON 4 OVERFLOWS PER YEAR

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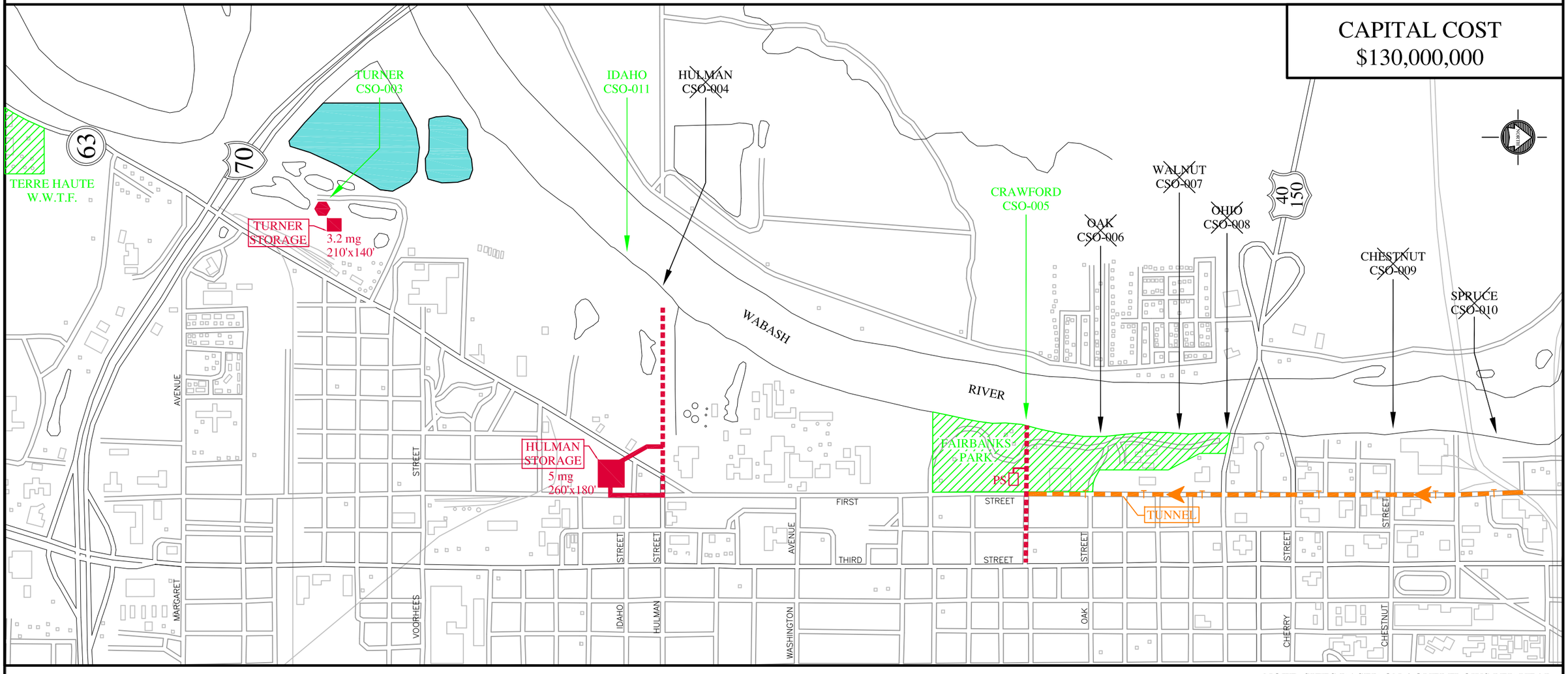
TERRE HAUTE
A LEVEL ABOVE

Terre Haute CSO LTCP - North Tunnel with Tank Storage

ALTERNATIVE 5A

CAPITAL COST
$130,000,000



LEGEND

- RELIEF SEWER AND FLOW
- MAIN LIFT STATION
- STORAGE TANK (INCLUDES SIZE AND VOLUME)
- UC — ULTIMATE CONVEYANCE
- 12"Ø — RELIEF SEWER SIZE
- EXISTING INFRASTRUCTURE
- CSO-009A — NEW CSO FROM CONSOLIDATION
- ~~OHIO CSO-008~~ — EXISTING CSO TO BE ELIMINATED
- OHIO CSO-008 — EXISTING CSO TO REMAIN
- CSO TUNNEL
  DIAMETER - 17 FEET
  LENGTH - 5,600 FEET
  VOLUME - 9.5 mg

NOTE: SIZES BASED ON 4 OVERFLOWS PER YEAR

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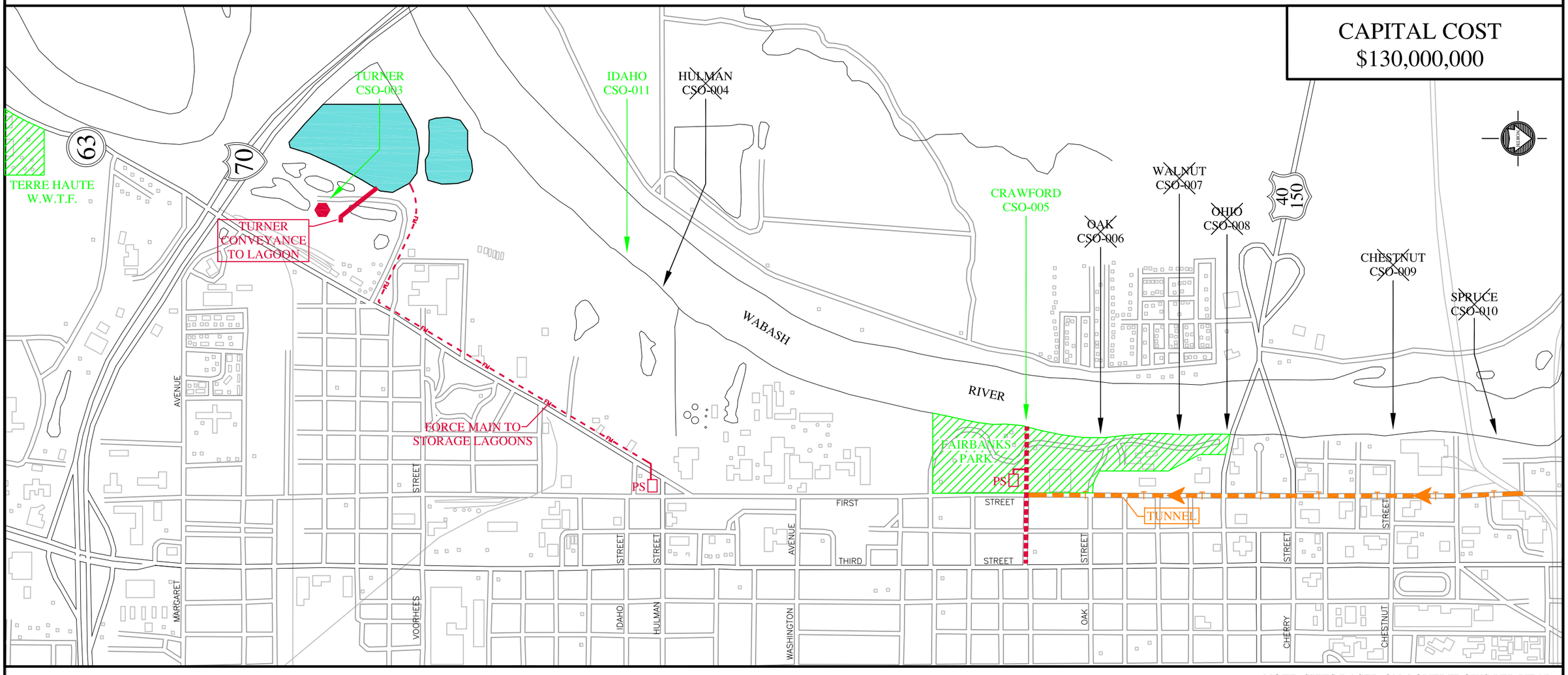
TERRE HAUTE
A LEVEL ABOVE

Terre Haute CSO LTCP - North Tunnel with IP Storage

ALTERNATIVE 5B

CAPITAL COST
$130,000,000



LEGEND

- RELIEF SEWER AND FLOW
- MAIN LIFT STATION
- STORAGE TANK (INCLUDES SIZE AND VOLUME)
- UC — ULTIMATE CONVEYANCE
- 12"Ø — RELIEF SEWER SIZE
- EXISTING INFRASTRUCTURE
- NEW PUMP STATION
- FM — NEW FORCE MAIN
- CSO-009A — NEW CSO FROM CONSOLIDATION
- ~~OHIO CSO-008~~ — EXISTING CSO TO BE ELIMINATED
- OHIO CSO-008 — EXISTING CSO TO REMAIN
- CSO TUNNEL
  DIAMETER - 17 FEET
  LENGTH - 5,600 FEET
  VOLUME - 9.5 mg

NOTE: SIZES BASED ON 4 OVERFLOWS PER YEAR

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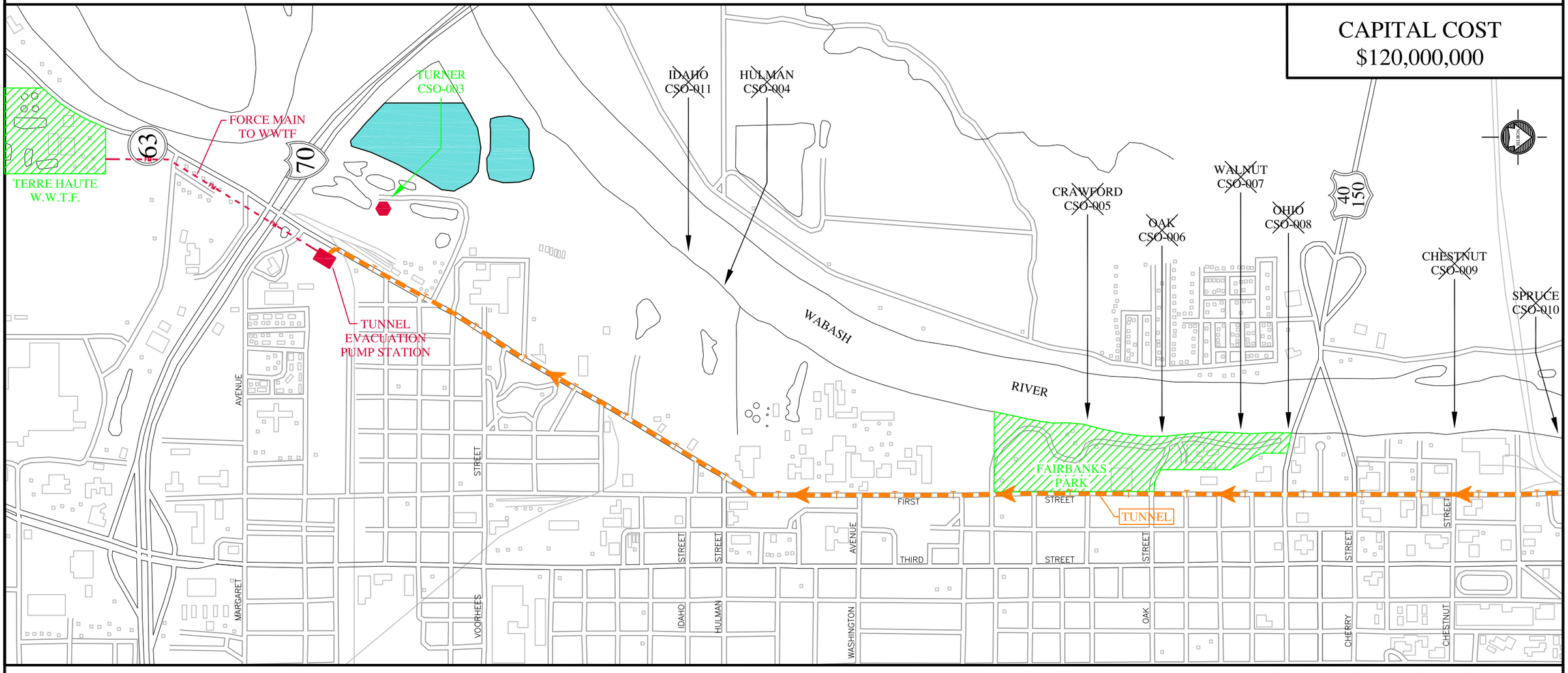
TERRE HAUTE
A LEVEL ABOVE

Terre Haute CSO LTCP - Tunnel to Main Lift Station

ALTERNATIVE 7

CAPITAL COST
$120,000,000



LEGEND

- RELIEF SEWER AND FLOW
- MAIN LIFT STATION
- STORAGE TANK (INCLUDES SIZE AND VOLUME)
- UC — ULTIMATE CONVEYANCE
- 12"Ø — RELIEF SEWER SIZE
- EXISTING INFRASTRUCTURE
- FM — NEW FORCE MAIN
- CSO-009A — NEW CSO FROM CONSOLIDATION
- ~~OHIO CSO-008~~ — EXISTING CSO TO BE ELIMINATED
- OHIO CSO-008 — EXISTING CSO TO REMAIN
- CSO TUNNEL
  DIAMETER - 17 FEET
  LENGTH - 14,700 FEET
  VOLUME - 24.6 mg

NOTE: SIZES BASED ON 4 OVERFLOWS PER YEAR

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TERRE HAUTE
A LEVEL ABOVE