APPENDIX O

INHC Lock Replacement Study, 2008 Updated Economic Analysis

Inner Harbor Navigation Canal Lock Replacement Study
2008 Updated Economic Analysis

PROJECT DESCRIPTION AND STUDY BACKGROUND

The IHNC Lock, opened in 1923, is located on the Inner Harbor Navigation Canal, which intersects the Mississippi River at mile 93 above Head of Passes and connects the eastern and western sections of the Gulf Intracoastal Waterway (GIWW) to one another. The lock is 75 feet wide and 640 feet long and has a depth over the sill of 31.5 feet. An Evaluation Study, completed in 1997 (Mississippi River-Gulf Outlet New Lock and Connecting Channel Evaluation Report, March 1997), determined that a larger replacement lock was economically justified and pre-construction activities have begun on the authorized plan, which includes a 1200 ft x 110 ft x 36 ft lock. However, during the 2002 – 2003 timeframe investigations of shallow-draft traffic moving through the existing IHNC Lock revealed a decline over several years raising concerns about overall project justification.

As a result, an Investigative Study (completed in 2005, prior to Hurricane Katrina), was performed to determine the causes and nature of the decline in IHNC Lock traffic and also to revise the long-term shallow-draft traffic forecasts used in the 1997 Evaluation Study. These revised forecasts were then used to update the shallow draft benefits associated with the authorized plan. Because shallow draft benefits comprised about 80 percent of the total project benefits in the 1997 Evaluation Study, it was concluded that overall project justification could be determined by focusing on the shallow draft benefit category. Using the remaining project cost estimates (total construction costs less costs already expended) developed at the time, and price level indexing all costs and benefits to 2001 levels, an updated Remaining Benefit Remaining Cost Ratio (RBRCR) was estimated. The overall results of the 2005 analysis are displayed in table 1 and show that the project was economically justified, with RBRCRs of 1.45 at the project discount rate of 7.125 percent, 1.5 at the Office of Management and Budget (OMB) rate of 7.0 percent, and 2.4 at the federal discount rate, current at the time of the study, of 5.125 percent.

The project discount rate was established as the federal discount rate that prevailed at the time of project authorization. The discount rate referred to as the OMB rate is directed by Executive Order 12893, “Principles for Federal Infrastructure Investments.” The Executive Order requires that benefits, costs, and benefit-to-cost ratios for new infrastructure investments of all federal agencies be evaluated at a discount rate of 7.0 percent to facilitate comparison and decision making. The current discount rate was included for information purposes.

Post-Hurricane Katrina

Subsequent to the devastating effects of Hurricane Katrina to the project area, an Order and Reasons was issued by the U.S. District Court in October 2006 that enjoined the Corps from continuing with the IHNC Lock project until a Supplemental Environmental

Table 1

2005 Investigative Study
Summary Of Average Annual Estimates
Authorized Plan – Float-In-Place Construction Method
(2001 Prices, $ millions)

	Project Rate 7.125 Percent	OMB Rate 7.0 Percent	FY 05 Discount Rate 5.125 Percent
Benefits			
Shallow Draft	78.1	78.7	89.0
Deep Draft [1/]	1.0	1.0	1.1
Vehicular [1/]	6.3	6.3	6.3
Savings to Fed. Project	1.7	1.7	1.7
Maintainence Closure - Navigation Losses Prevented	0	0	0
Total Average Annual Benefits	**87.1**	**87.7**	**98.0**
Costs			
Total Remaining Construction (First Cost) [2/]	480.4	480.4	480.4
Avg Annual Remaining Construction	58.4	57.0	38.6
Avg Annual O&M	1.5	1.5	1.5
Total Average Annual Costs	**59.9**	**58.5**	**40.1**
RBRCR	**1.45**	**1.50**	**2.44**

1/ Not Re-evaluated in detail. Interest rate and price level adjusted from 1997 Evaluation Study.
2/ Not Re-evaluated. Price level adjusted from 1997 Evaluation Study. Items of work were identified and the remaining costs were price level adjusted to reflect 2001 prices.

Impact Statement (SEIS) was completed. The following excerpt from the court order explains the reasoning behind the enjoinment:

> *"The effects of Hurricane Katrina have exposed the inadequacy of the Corps' planning and analysis. Moreover, in the year since Hurricane Katrina, local circumstances have drastically changed: the future of the MRGO is in doubt; the location height and significance of the levees are being re-evaluated; and priorities are shifting from the transportation needs of the community to the restoration of basis infrastructure. All of these post-Katrina developments expose the insufficiency of the present EIS."*

Consequently, as part of the court-ordered SEIS, the economic analysis presented in the 2005 Investigative Study was updated to reflect post Hurricane Katrina conditions. No major new analysis was considered necessary but previous assumptions were reviewed and updated where appropriate to develop a reasonable estimate of current project benefits and costs. For each of the component benefits and costs defined in the 2005 Investigative Study, the following sections of this report will detail the assumptions made and how they were updated to reflect current conditions.

UPDATING PROJECT BENEFITS

Shallow Draft Navigation Benefits

Shallow draft traffic that uses the IHNC lock is predominantly made up of transits with origins and destinations beyond the local area. Therefore, the effects of Hurricane Katrina on IHNC lock traffic were generally temporary in nature. Shallow draft traffic forecasts developed for the 2005 Investigative Study showed a 0.8 percent annual compound growth rate in IHNC Lock traffic for the period 2002 – 2055. Although the actual tonnage for the most recent year of 2007 is lower than the forecasted value (in 2007 actual lock tonnage equaled 17.4 million tons while forecasted tonnage equaled 18.8 million tons) , small annual variations in tonnage were anticipated in the 2005 Investigative Study traffic forecast. Since no discernable new trend can be identified that might call into question the assumptions of the forecast, it remains the best available empirical model for estimating long-run future trends in traffic at the IHNC Lock. Consequently, no major reanalysis is warranted to update this category of benefits. Price level estimates utilized in the 2005 study have been adjusted in the SEIS to incorporate 2007 cost changes.

Fundamentally, shallow draft navigation benefits are measured by the difference between the cost of transporting commodities via a non-water mode and the usually lower cost of transporting these same commodities by barge. This transportation rate differential underlies the savings to waterway transportation.

The 2007 rate used in this SEIS was calculated by applying the Producer Price Index (PPI) for Inland Water Freight Transportation to 2001 barge transportation rates (a 51

percent increase) and applying the PPI Index for rail transportation to 2001 non-water transportation rates (a 35 percent increase). Next a transportation rate differential (weighted by tons shipped) was calculated using the 2001 price level barge and non-water transportation rates (from the 2005 Investigative Study). Then a transportation rate differential was calculated using the updated 2007 price level barge and non-water transportation rates. Finally, the percentage increase from the 2001 weighted rate differential to the 2007 weighted rate differential (approximately 21 percent) was applied to adjust the overall shallow draft benefits estimated from the 2005 Investigative Study. Please note that the project base year (the year in which project benefits are expected to first be realized) has shifted 3 years forward in time as compared to the 2005 reanalysis. The project base year in the 2005 reanalysis was projected to be 2019, while the current projection for the base year is 2022. Table 2 displays the incremental shallow draft benefits (adjusted to 2007 price levels) associated with the authorized plan by year.

Table 7, the summary table at the end of this report, shows the 2007 updated average annual estimate of shallow draft benefits calculated at the interest rates noted above, except that the current (FY 08) discount rate is now 4.875 percent.

Deep Draft Benefits

Following Hurricane Katrina, Congress in 2006 directed the Corps of Engineers to develop a comprehensive plan to deauthorize deep draft navigation on the MRGO. In June of 2008, the Assistant Secretary of the Army for Civil Works forwarded the U.S. Army Corps of Engineers Chiefs Report (Mississippi River-Gulf Outlet (MRGO) Deep draft De-Authorization Study) to Congress thereby officially deauthorizing commercial use of the MRGO from the Gulf Intracoastal Waterway to the Gulf of Mexico in accordance with the Water Resources Development Act of 2007. This is expected to have a significant impact to deep draft navigation within the Port of New Orleans and correspondingly on the deep draft navigation benefits attributable to a new IHNC Lock.

In the 1997 Evaluation Study, benefits to deep draft navigation associated with a larger deep draft lock accrued to two categories of deep draft activity. The major category of savings was generated by lockages which may be called “intra-harbor” lockages. These lockages were required by operators needing to use deep draft loading and unloading facilities in the two distinct sections of the Port of New Orleans on either side of the IHNC Lock: the riverfront portion and the tidewater (MRGO) portion. Vessels that were too large to traverse the existing IHNC Lock had to voyage or “loop” from their initial point of cargo handling down the originally used entrance channel (Mississippi River or MRGO) into the gulf and then travel up the other entrance channel (Mississippi River or MRGO) to their second point of cargo handling. For example, a large vessel initially inbound via the MRGO, after unloading its cargo at an IHNC facility, would then have to sail back down the MRGO into the gulf, enter the Mississippi River at its mouth and subsequently travel upriver to a loading terminal on the riverfront. Thus, the major deep draft benefit of a larger deep draft lock is to facilitate backhauls within the port and to avoid the cost of having to “loop.”

A minor category of deep draft vessel activity that would appear to benefit from a larger deep draft lock is known as "Thru" lockages. This benefit accrues to the small number of vessels that would use the larger replacement lock to exit the tidewater (MRGO) facilities via the Mississippi River. These vessels, typically destined for ports along the Texas coast, could use the river route to shorten their transit time by traveling the slightly shorter distance.

The overriding intent of the 2005 Investigative Study was to determine if the observed decline in shallow draft navigation activity at the IHNC lock jeopardized the economic justification for the lock replacement project. The investigative study showed that at that time no changes in deep draft navigation had been observed, in contrast to shallow draft marine traffic. Also deep draft benefits represent a small portion of the total project benefits, such that only a large increase in deep draft activity could influence the project justification . Therefore it was determined that price level adjusting the deep draft benefits calculated for the 1997 Evaluation Study to 2001 price levels was the proper methodology for determining economic justification for the project.. The result showed estimated average annual deep draft benefits associated with the authorized plan to be $1.0 million using the project interest rate of 7.125 percent and a base year of 2019.

However, in anticipation of the MRGO's de-authorization, most companies along the MRGO section of the Port of New Orleans that required deep draft vessel support via the MRGO have either moved or are planning to move operations to the Mississippi River section of the port or to other ports along the gulf coast. The companies that choose to continue to operate along the MRGO area are those that can use the existing IHNC lock. Consequently, the deep draft activities that supported the deep draft benefits identified in the 1997 Evaluation Study and 2005 Investigative Study are no longer occurring. While future demand for deep draft lockages through the IHNC lock may arise, none appears to exist in the present aftermath of the MRGO's closure. Therefore, this SEIS assumes no deep draft benefits associated with the authorized plan over the period of analysis.

Vehicular Benefits

Three vehicular bridges cross the IHNC and provide access between St. Bernard Parish and the portion of the City of New Orleans bounded by the Mississippi River, the IHNC, and the Mississippi River Gulf Outlet (MRGO) within the City of New Orleans upriver of the IHNC: a low-level bridge at St. Claude Avenue, a mid-rise bridge at Claiborne Avenue and a low-level bridge at Florida Avenue. The St. Claude Avenue Bridge and the Florida Avenue Bridge must open to permit passage of most vessels transiting the IHNC lock. The Claiborne Avenue bridge possesses greater clearance over the channel and therefore requires less frequent opening.

Vehicular traffic benefits attributed to the authorized plan, as described in the 1997 Evaluation Study, arose from two sources. First, vehicles crossing the Inner Harbor Navigation Canal would have fewer bridge opening delays with the authorized plan because the proposed larger lock can accommodate more tows per lockage, thereby requiring fewer bridge openings to accommodate marine traffic. The length of time the

bridges are open per lockage would increase, but the number of lockages would decrease by a greater amount, thereby improving vehicular traffic efficiencies for the larger lock with respect to total bridge open time over a given period.

The second source of vehicular traffic benefits identified in the 1997 Evaluation Study arose from a planned addition of a high-rise bridge across the IHNC along the Florida Avenue corridor. The State of Louisiana planned to construct a high-rise structure at State expense independent of the IHNC lock replacement project. Therefore, a new high-rise bridge was assumed in both the with and without project conditions. Additionally, the Project Mitigation Plan calls for construction of a permanent access route linking St. Bernard Highway and West Judge Perez Drive, the two major traffic corridors in St. Bernard Parish, with Florida Avenue. This would improve Florida Avenue access and result in increased utilization of the Florida Avenue crossing. With increased utilization of the Florida Avenue crossing, the level of traffic congestion that would otherwise occur at the St. Claude Avenue Bridge and Claiborne Avenue Bridge would be reduced.

Vehicular traffic benefits calculated in the 1997 Evaluation Study were also used in the 2005 reanalysis after updating price levels and adjusting the project base year to 2019. However, in this updated analysis for the SEIS, vehicular traffic benefits are expected to be significantly lower because of two effects of Hurricane Katrina.

The first hurricane effect has been a notable decrease in the total number of vehicular bridge crossings over the IHNC since Hurricane Katrina. For the SEIS, the Corps contracted with the Regional Planning Commission for Jefferson, Orleans, St. Bernard, and St. Tammany Parishes to estimate the existing (post-Hurricane Katrina) and forecasted levels of vehicle traffic crossing the three IHNC bridges. The results showed that due to the large decrease in population after Hurricane Katrina, in neighborhoods that have typically used the IHNC bridges, vehicular bridge crossings in the year 2008 (33,145 crossings per day) are approximately 65 percent lower than the number of crossings prior to Hurricane Katrina in the year 2000 (93,488 crossings per day). However, because the base year of this project is currently estimated to be 2022, the relevant time period to estimate vehicular bridge crossings is the 50-year period of analysis from 2022 – 2071. Comparing vehicular bridge crossings forecast in the 1997 Evaluation Study with the Regional Planning Commission's post-Hurricane Katrina forecasts shows an average annual decrease in vehicular bridge crossings over the study period, of about 25 percent. The average annual vehicular bridge crossings forecast by the 1997 Evaluation Report for the 2022-2071 time period were approximately 103,000 whereas the post-Hurricane Katrina average annual vehicular crossings, for the same time period, are estimated by the Planning Commission not to exceed 78,000. With such a decrease in the total amount of IHNC bridge crossings, the without-project vehicular delays at the three bridge crossings would also decrease, thereby lowering vehicular benefits (described above) associated with the authorized plan.

The second reason that vehicular traffic benefits are expected to decrease (compared to the results shown in the 1997 Evaluation Report and 2005 Investigative Study) is the recent indefinite suspension by the State of Louisiana of plans to construct a new high-

rise structure at the Florida Avenue crossing (a decision made as a result of budget constraints and population decreases in the area). Consequently, the portion of vehicular benefits associated with increased utilization of the Florida Avenue Bridge computed in the previous studies is no longer appropriate in this analysis.

Taking into account the two post-Hurricane Katrina effects described above, overall vehicular benefits developed in the 2005 Investigative Study should decrease at a minimum by the same percentage as the average annual decrease in vehicular bridge crossings now expected during the 2022 – 2071 period of analysis. To calculate this revised estimate, the average annual vehicular benefits developed in the 2005 Investigative Study (which utilized 2001 price levels) were first adjusted to reflect 2007 price levels using the Consumer Price Index (CPI) for Urban Transportation (showing a 22.7 percent increase). These average annual estimates were then decreased by the 25 percent decrease in average annual vehicle bridge crossings expected, producing the revised average annual vehicular benefits at the various interest rates noted above. The calculation produces an estimate of average annual vehicular benefits of $5.8 million in 2007 prices.

However, this estimate should be viewed as an absolute maximum estimate of vehicular benefits. More realistically, further downward adjustment is required to account for the fact that the previously-planned high rise bridge at Florida Avenue is currently on indefinite hold by the Louisiana Department of Transportation and Development. Without both a higher bridge and permanent access road improvements, the level of increased utilization of the Florida Avenue Bridge assumed in the 2005 Investigative Study will not be realized. Without the assumed increase in Florida Avenue utilization, downward adjustment in the 2005 Investigative Study vehicular benefits is required. The degree of adjustment is directly related to the magnitude of increased utilization that was anticipated with the construction of a high rise bridge across the IHNC along the Florida Avenue corridor. If access road improvements remain a part of the Project Mitigation Plan, a small portion of the increased Florida Avenue utilization previously claimed is possible. Without access road improvements, increased Florida Avenue utilization is not anticipated.

The summary of average annual benefits displayed in table 7 assumes vehicular benefits to be zero. While some minor component of the earlier estimated vehicular benefit may remain, as some with-project vehicular delay reduction will occur due to reductions in total bridge open time at St. Claude and Claiborne, the decision to reflect vehicular benefits as zero for the current analysis is based on two considerations. The first is the significance of traffic redistribution (increased Florida Avenue utilization) on vehicular delay reductions, but which is now not expected to occur due to the absence of a high rise crossing at Florida Avenue, and second, the overall lowering of vehicular traffic delays (in a greater than linear fashion) associated with an approximate 25 percent average annual reduction in traffic.

Savings to Federal Project

Savings to Federal Projects refers to federal costs that would be avoided with project implementation. For the authorized plan, the avoided costs would include the operations, maintenance, and replacement (OM&R) costs, including major rehabilitation costs of the existing lock. For this reanalysis, projected OM&R costs for the existing lock, including major rehabilitation costs, were revised to reflect 2007 price levels. After excluding expenditures that have already occurred, the average annual equivalent values were calculated using the three different interest rates noted above. These estimates are presented in table 7, the summary table at the end of this report.

Maintenance Closure – Navigation Losses Prevented

This benefit category represents the difference between the cost experienced by navigation interests during maintenance closures for the without project condition and with project condition. These lock closures typically occur during lock dewaterings, have duration of approximately two months, and are scheduled to take place every 10 years for the existing lock and every 15 years for the replacement lock. The cost of closures was estimated for various future years and the increase cost to navigation became the estimated cost of closure for each of the future years analyzed. The transportation rates used for this analysis were in 2001 price levels, therefore the closure cost estimates were adjusted to 2007 price levels by the same method used to update the shallow draft benefits discussed above. The estimated closure costs for the existing lock and authorized plan are shown in table 3 by the years in which they are expected to occur. The average annual equivalent values for these streams of future year closure costs were then calculated assuming a project base year of 2022 and using the three different interest rates noted above. The difference between the average annual costs for the without project condition and the with project condition is shown in table 7, the summary table at the end of this report, and represents the costs of closure to navigation that would be avoided if the replacement lock were built and operating by the year 2022.

UPDATING PROJECT COSTS

Construction Costs

Lock only construction costs representing 2007 price levels were re-estimated in detail for two construction methods. The Float in Place (FIP) construction method, which was the method assumed in the 1997 Evaluation Study, has a lock construction cost of $879.8 million. The other construction method analyzed is Cast in Place (CIP) and has a cost of $824.5 million. The total lock construction costs by construction method and year are shown in table 4.

All other “non-lock” project costs (such as bridges, levee walls, roadways, buildings, guide walls and mitigation) were not re-estimated and new construction implementation schedules not delineated. These “non lock” costs, developed in the 1997 Evaluation Study, were, however, price level adjusted to reflect 2007 price levels using the Civil Works Construction Cost Index System (CWCCIS) in order to arrive at total project costs. Therefore, for this analysis (with the exception of social mitigation costs), the

assumption was made that these costs would be spread over the same time period and in the same proportion as the lock construction costs shown in table 4. The timing of all expenditures during construction is important for many reasons especially for the calculation of interest during construction costs. Since detailed social mitigation costs by year were available from the 1997 Evaluation Report, the decision was made to spread these (price level adjusted) costs over the new lock construction period by the same pattern used in the 1997 Evaluation Report.

Total "non-lock" costs after having been adjusted to 2007 price levels were estimated to be $383.1 million. Adding this figure to the total lock construction cost estimates shown in table 4 produces a total project cost of $1,263 million for the FIP construction method and $1,208 million for the CIP construction method. Table 5 displays the total project costs by construction method and year.

It should be noted that the total project cost estimates for the two construction methods includes costs that have already been spent. At the time of the 2005 Investigative Study, these "sunk" costs, in 2005 price levels, totaled $135.3 million. Since no additional funds have been spent on the project these costs were price level adjusted to 2007 prices using CWCCIS (previously described) factors from second quarter 2005 to second quarter 2007. This 2007 price level adjusted figure was estimated to be $151.0 million.

In order to calculate total remaining project costs (which are needed to develop a remaining benefit to cost ratio), this "sunk" cost estimate had to be subtracted from the total project cost estimates. Reviewing the time frames when these costs have been spent it was determined that these costs should be subtracted from the first 5 years of the total project schedule shown in table 5. For this analysis, the decision was made to divide the total "sunk" cost estimate of $151.0 million by 5 and then subtract this figure ($30.2 million) from each of the first five years of the total project cost shown in table 5 for the two construction methods. Table 6 displays the total remaining project cost estimates in 2007 price levels by year and construction method. Table 7, the summary table at the end of this report, displays the average annual equivalent values at the various interest rates noted above for each construction method.

Operations, Maintenance, and Replacement (OM&R) Cost

OM&R costs represent the cost to operate and maintain the larger authorized lock plan. Since these costs were not re-estimated for this analysis, the 2001 price level costs used in the 2005 Investigative Study were price level adjusted to 2007 price levels using CWCCIS (previously described) factors from second quarter 2001 to second quarter 2007. Table 7 displays the average annual equivalent values at the various interest rates noted above for each construction method.

SUMMARY

Table 7 summarizes the remaining annual costs, annual benefits and remaining benefit-to-cost ratios (RBRCR) for the authorized plan assuming a FIP construction method and a CIP construction method. Average annual equivalent values, were computed using the interest rates noted above, assuming a 50 year period of analysis and a base year of 2022. As table 7 shows, the RBRCR is less than 1.0 at the project interest rate and OMB rate for either construction method. The project discount rate of 7.125 percent produces a RBRCR of 0.90 for the FIP construction method and 0.92 for the CIP construction method. The OMB discount rate of 7.0 percent produces a RBRCR of 0.92 for the FIP construction method and 0.95 for the CIP construction method. However, the RBRCR is greater than 1.0 at the current federal discount rate of 4.875 percent for either construction method. For the FIP construction method the RBRCR is estimated to be 1.57 and for the CIP construction method the RBRCR is estimated to be 1.63 at the current federal discount rate.

Table 2
Incremental Shallow Draft Benefits
Authorized Plan
($1,000, 2007 Price Levels)

Year	Benefits
2025	56,327
2035	114,921
2045	188,882
2055	212,097

Table 3
Maintenance Closure Navigation Costs
($1,000, 2007 Price Levels)

Year	Existing Lock	Authorized Plan
2028	45,965	
2036		62,741
2038	40,882	
2048	32,713	
2051		63,501
2058	25,681	
2066		61,031
2068	25,681	

Table 4
Lock Construction Costs
(Millions $, 2007 Price Levels)

Time Period	Float-In-Place	Cast-In-Place
2010	62.6	41.6
2011	84.5	153.6
2012	121.8	132.6
2013	148.6	51.1
2014	71.1	97.1
2015	58.3	64.6
2016	53.7	41.9
2017	77.1	40.6
2018	79.3	123.4
2019	77.9	57.1
2020	28.2	13.3
2021	16.8	7.6
Total	879.9	824.5

Table 5
Total Project Costs
(Millions $, 2007 Price Levels)

Time Period	Float-In-Place	Cast-In-Place
2010	95.7	67.7
2011	117.1	216.7
2012	168.7	187.1
2013	214.4	80.9
2014	107.4	145.9
2015	81.1	91.5
2016	74.7	59.5
2017	110.9	61.4
2018	111.1	175.3
2019	114.1	86.8
2020	42.9	22.7
2021	24.7	12.2
Total	1,263.0	1,207.6

Table 6
Total Remaining Project Costs
(Millions $, 2007 Price Levels)

Time Period	Float-In-Place	Cast-In-Place
2010	65.5	37.5
2011	86.9	186.5
2012	138.5	156.9
2013	184.2	50.7
2014	77.3	115.7
2015	81.1	91.5
2016	74.7	59.5
2017	110.9	61.4
2018	111.1	175.3
2019	114.1	86.8
2020	42.9	22.7
2021	24.7	12.2
Total	1,112.0	1,056.6

Table 7
Summary Of Average Annual Estimates
Authorized Plan
(2007 Prices, millions $)

	Project Rate 7.125 Percent	OMB Rate 7.0 Percent	Fed Discount Rate 4.875 Percent	Project Rate 7.125 Percent	OMB Rate 7.0 Percent	Fed Discount Rate 4.875 Percent
	Float-In-Place Construction Method			Cast-In-Place Construction Method		
Benefits						
Shallow Draft	109.2	109.9	123.5	109.2	109.9	123.5
Deep Draft	0.0	0.0	0.0	0.0	0.0	0.0
Vehicular	0.0	0.0	0.0	0.0	0.0	0.0
Savings to Fed. Project	5.1	5.1	5.0	5.1	5.1	5.0
Maintenance Closure - Navigation Losses Prevented	1.2	1.2	0.8	1.2	1.2	0.8
Total Average Annual Benefits	**115.5**	**116.2**	**129.2**	**115.5**	**116.2**	**129.2**
Costs						
Total Remaining Construction (First Cost) 1/	1,112.0	1,112.0	1,112.0	1,056.6	1,056.6	1,056.6
Avg Annual Remaining Construction	127.1	124.2	80.6	123.1	120.2	77.5
Avg Annual O&M 2/	1.9	1.9	1.9	1.9	1.9	1.9
Total Average Annual Costs	**129.0**	**126.1**	**82.5**	**125.0**	**122.1**	**79.4**
RBRCR	**0.90**	**0.92**	**1.57**	**0.92**	**0.95**	**1.63**

1/ Lock Construction Costs have been re-evaluated in detail. All other costs were price level adjusted from 1997 Evaluation Study.
2/ O&M costs for existing lock have been re-evaluated in detail. O&M costs for authorized plan were price level adjusted from 1997 Evaluation Study.

2005 Investigative Study

Inner Harbor Navigation Canal (IHNC) Lock, Investigative Study

General

The IHNC Lock, opened in 1923, is located on the Inner Harbor Navigation Canal, which intersects the Mississippi River at mile 93 above Head of Passes and connects the eastern and western sections of the Gulf Intracoastal Waterway (GIWW). The lock is 75 feet wide and 640 feet long and has a depth over the sill of 31.5 feet. A Feasibility Study, completed in 1997, determined that a larger replacement lock was economically justified and pre-construction activities have begun on the authorized plan, which includes a 1200 ft x 110 ft x 36 ft lock. However, recent investigations of shallow-draft traffic moving through the existing IHNC Lock have revealed a steady decline over the past several years raising concerns about overall project justification.

As a result, an Investigative Study was initiated to determine the causes and nature of the decline in IHNC Lock traffic and also to revise the long-term GIWW shallow-draft traffic forecasts used in the 1997 Feasibility Study. These revised forecasts were then used to update the shallow-draft benefits associated with the authorized plan. Because shallow-draft benefits comprised about 80 percent of the total project benefits in the 1997 Feasibility Study, it is believed that overall project justification could be determined by focusing on this benefit category.

Traffic Analysis

This analysis examined the reasons for the recent decline in IHNC Lock traffic and evaluated whether the decline is either short term or long-term in nature. In addition, long-term (50-year) shallow-draft traffic projections were developed by commodity group for the entire waterway system being studied, which included the GIWW (Louisiana Portion); the GIWW (Morgan City Port Allen Route); the Inner Harbor Navigation Canal, La; and the Atchafalaya River, La. The National Ports and Waterways Institute (NPWI) from the University of New Orleans under contract from the New Orleans district performed this effort. A brief summary of their findings is provided below.

<u>Recent History:</u>

Table 1 shows historical IHNC Lock traffic levels from 1990 – 2002 by major commodity group. As can be observed total IHNC Lock traffic declined essentially in a uniform manner from 23.1 million tons in 1990 to 17.3 million tons in 2002, equivalent to a decline of 25 percent for the period. At the time of this analysis, 2002 represented the latest information from the Waterborne Commerce Statistics Center (WCSC).

Coal traffic, responsible for 35 percent of the lock traffic in 1990, declined from 8.0 million tons to 2.1 million tons in 2002, a decline of 5.9 million tons. The steep decline in coal traffic is largely responsible for the overall decline in total lock traffic.

Table 1

IHNC Lock Traffic 1990 – 2002
(In Thousands of Short Tons)

Commodity Group	1990	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Farm Products	558	640	820	623	367	292	208	232	214	165	246	268
Metallic Ores	1,385	581	650	1,458	1,161	1,404	1,391	1,233	1,064	1,334	1,052	1,454
Coal	7,982	7,908	6,838	5,911	5,902	5,239	4,398	5,112	3,276	3,178	2,333	2,050
Crude Petroleum	2,275	1,828	2,044	1,800	1,454	1,752	1,824	1,594	1,645	1,548	1,265	1,621
Non-Metallic Minerals	1,930	1,321	1,878	2,805	2,233	2,970	2,770	2,871	3,036	3,134	3,136	3,066
Forest Products	130	152	167	250	187	231	378	339	231	277	135	145
Chemicals (Ind. & Ag)	2,399	2,244	2,162	2,741	2,837	2,960	3,813	2,998	3,602	4,074	3,800	4,145
Petroleum Products	5,929	5,799	6,549	5,722	4,804	5,527	5,144	4,530	4,362	4,287	4,162	4,504
All Others	467	377	413	323	1,806	1,530	1,117	934	612	753	467	2
Total	23,055	20,850	21,521	21,633	20,751	21,905	21,043	19,843	18,042	18,750	16,596	17,253

Source: Waterborne Commerce Statistics Center (WCSC)
Note: 1991 traffic was unavailable at the time of this report.

Petroleum products, which generated 26 percent of the lock traffic in 1990, declined from 5.9 million tons to 4.5 million tons in 2002, a decline of 1.4 million tons.

Methodology:

Because coal and petroleum products represented over 60 percent of IHNC Lock traffic in the 1997 Feasibility Study, and because these two commodity groups are responsible for the majority of the overall decline since the 1997 analysis, the emphasis on the traffic analysis was directed to these two groups. The basic approach that the NPWI used for these two groups was to develop a detailed market analyses for each commodity group using secondary data from published sources supplemented with primary data from interviews with industry operators and managers. The other commodity groups were addressed by using secondary data from published sources. A complete description of the methodology and sources used can be found in the reports prepared by the NPWI. These are Inner Harbor Navigation Canal (IHNC) Lock Investigative Study and Traffic Projections on Shallow-Draft Inland Waterway System in Louisiana.

Major Reasons for Decline and Future Outlook:

Commodity flow data indicate long term decreasing traffic trends for both coal and petroleum products. Long-term and consistently declining markets are normally associated more with structural changes in market conditions compared to short-term price-quantity variations. Since long-term structural changes in the industry lead to downsizing and rationalization of resources (e.g., selling assets, moving to another area, etc.) a recovery is much more difficult than price-induced short-term changes.

Coal

The regional market for coal traffic is based on the supply needs of 12 power plants located in the Gulf Coast region east of the IHNC lock.

During the last decade environmental regulations have lowered the demand for Illinois Basin high-sulfur coal, representing more than 90 percent of the IHNC Lock coal traffic, and increased the demand for imported South American coal. The main advantage of imported coal is its high BTU and low sulfur content.

Imported South American coal is shipped mainly through the Port of Mobile thereby avoiding the IHNC Lock. The use of imported coal by Gulf Coast plants has been steadily growing, from 4.5% in 1999 to 28.8% in 2003. However, the most likely future is that there will be no further substitution of Illinois Basin coal with imported coal. The discussions with power plant operators and Energy Information Administration (EIA) subject area specialists indicated that the market penetration of imported coal has reached a plateau, especially following the recent rise in the cost of international shipping and the growing demand for South American coal in Europe. Consequently, no change in the existing sourcing and routing patterns are expected and, therefore, trends in lock traffic

will develop in parallel to the regional demand for coal. Accordingly, some growth in IHNC Lock traffic is anticipated. However, unless clean coal burning technologies make a dramatic research break-through to satisfy environmental considerations, a return to early 1990 traffic levels is unlikely.

Petroleum Products

The Gulf Coast has the largest concentration of refineries in the nation, with most of them situated at waterfront locations along the lower Mississippi, the GIWW, and other waterway extensions. Discussions with the industry confirmed that the main traffic is between refineries in the Lower Mississippi and Houston area and their affiliates along the eastern portion of the GIWW in Alabama and Mississippi.

Transportation fuel movements through the lock usually take place when a refinery on one side of the lock has to serve a customer on the other side of the lock. For example, fuel supplies from the refineries in the Lower Mississippi area often move transportation fuels to its Alabama and Florida terminals via barges. Presently, there is no east-west pipeline for products. Another typical case of lock traffic is between refineries, when these refineries have complementary capabilities. That is, some refineries may lack some of the downstream units, especially for production of specialty fuels. A related inter-refinery movement of products through the lock is simply in cases of shortages or excesses in a specific distillate.

Discussions with the refinery and barging industries indicated that the reduction in product traffic between 1990 and 2002 could be attributed to: (a) industry consolidation and (b) expansion of downstream capabilities. The consolidation refers to the merger and acquisition activities among oil companies, such as that between Exxon and Mobil and Chevron and Texaco. The effect of this consolidation is to make each region essentially self-contained, making movements less necessary. The availability of refineries on both sides of the IHNC Lock eliminates the need to transfer products between refineries and distribution terminals that involve crossing the lock, as described above.

Expansion of downstream capabilities of existing refineries also eliminates some of the need to transfer products between refineries, since each may have a wider range of capabilities. As both trends are expected to continue, the declining trend in lock traffic of these commodities is likely to continue. In addition, no change in the present transportation pattern, such as shift to pipelines, is expected.

Discussions with the industry indicated that existing trends are likely to continue in the near future, but no observations were made with regards to the longer term. As adequate information is not available for a long-term forecast, it is more appropriate to use the forecast values through 2010 and assume no change of conditions beyond 2010.

IHNC Lock Traffic – Conclusions

The patterns of IHNC Lock traffic for the period 1990-2002 were examined in detail and the underlying market dynamics responsible for these changes were analyzed. Traffic declines in coal and petroleum products were responsible for about 90 percent of the downturn during the period. Structural changes in the market, such as constraints imposed by environmental regulations restricting the use of high-sulfur coal, and consolidation of refinery activities by major oil are the main underlying reasons.
The market adjustments brought about by structural changes are generally long-term, associated with rationalization of industry resource use (e.g., down-sizing, selling assets, conversion to other uses, etc.) and consequently impose rigidities to recovery.

Forecasted Traffic Levels

Using the mid growth rates developed by the NPWI, table 2 displays the updated traffic forecasts by year and commodity group for the IHNC Lock, assuming no lock constraints i.e. increases in traffic and the associated increases in delays and transportation costs will not constrain waterway traffic growth. Table 3 displays the corresponding growth rates by time period.

For comparison purposes, table 4 displays the IHNC Lock mid-growth unconstrained traffic projections used in the 1997 Feasibility Report. Table 5 displays the corresponding growth rates by time period.

By far the greatest difference between the 1997 traffic forecast and the revised traffic forecast for the IHNC lock is in coal. In the 1997 Feasibility Study, for the base year of 1990, 8.0 million tons of coal traversed the IHNC Lock and was forecasted to grow to 26.3 million tons by 2060. In the 2005 revised forecast, for the base year of 2002, 2.1 million tons traversed the IHNC Lock and is forecasted to grow to 3.8 million tons by the year 2055.

Figure 1 graphically shows the magnitude of the difference in IHNC Lock traffic projections between the 1997 Feasibility report and the 2005-updated forecast.

Transportation Costs

Transportation costs to the shipper by the various modes of transportation (typically water and rail) from the 1997 analysis were updated to reflect 2001 prices. This is an essential input to the economic analysis since the benefits of waterway transportation are computed as the difference between the two modes.

In the 1997 analysis, the Tennessee Valley Authority (TVA), under contract with the New Orleans District, developed transportation costs by the various modes for movements that traveled any portion of the waterways within the study area. The costs represented 1992 price levels. Subsequently, TVA has developed similar costs for

Table 2

2005 Update Unconstrained Traffic Projections
IHNC Lock Traffic
Mid Growth
(In Thousands of Short Tons)

Commodity Group	2002	2005	2015	2025	2035	2045	2055-65
Farm Products	268	268	401	401	468	535	669
Metallic Ores	1,454	1,565	1,901	2,180	2,572	3,075	3,578
Coal	2,050	2,214	2,541	2,951	3,238	3,484	3,771
Crude Petroleum	1,621	1,520	1,216	963	1,115	1,064	1,013
Non-Metallic Minerals	3,066	3,372	5,007	6,795	7,817	8,634	9,503
Forest Products	145	145	217	217	217	254	290
Industrial Chemicals	3,087	3,720	6,727	8,151	9,141	10,565	12,266
Agricultural Chemicals	1,058	1,275	2,306	2,794	3,134	3,622	4,205
Petroleum Products	4,504	3,845	2,307	2,033	1,868	1,648	1,428
All Others	2	2	2	2	2	2	2
Total	17,253	17,925	22,625	26,488	29,571	32,883	36,726

Table 3

2005 Update Percent Growth
IHNC Lock Traffic
Mid Growth
(In Thousands of Short Tons)

Commodity Group	Yr 02 - 05	Yr 05 – 15	Yr 15 - 25	Yr 25 - 35	Yr 35 - 45	Yr 45 - 55	Yr 55 - 65
Farm Products	0%	50%	0%	17%	14%	25%	0%
Metallic Ores	8%	21%	15%	18%	20%	16%	0%
Coal	8%	15%	16%	10%	8%	8%	0%
Crude Petroleum	-6%	-20%	-21%	16%	-5%	-5%	0%
Non-Metallic Minerals	10%	48%	36%	15%	10%	10%	0%
Forest Products	0%	50%	0%	0%	17%	14%	0%
Industrial Chemicals	21%	81%	21%	12%	16%	16%	0%
Agricultural Chemicals	21%	81%	21%	12%	16%	16%	0%
Petroleum Products	-15%	-40%	-12%	-8%	-12%	-13%	0%
All Others	0%	0%	0%	0%	0%	0%	0%
Total	4%	26%	17%	12%	11%	12%	0%

Table 4

1997 Feasibility Unconstrained Traffic Projections
IHNC Lock Traffic
Mid Growth
(In Thousands of Short Tons)

Commodity Group	1990	2000	2010	2020	2030	2040	2050	2060
Farm Products	558	686	830	1,004	1,215	1,470	1,808	2,146
Metallic Ores	1,385	1,260	1,223	1,186	1,150	1,116	1,083	1,049
Coal	7,982	10,243	11,985	14,022	16,406	19,195	22,746	26,297
Crude Petroleum	2,275	1,570	2,009	1,768	1,556	1,369	1,212	1,054
Non-Metallic Minerals	1,930	2,027	2,128	2,235	2,346	2,464	2,587	2,710
Forest Products	130	153	165	178	192	208	226	243
Industrial Chemicals	1,908	2,518	2,971	3,506	4,137	4,882	5,834	6,786
Agricultural Chemicals	491	663	769	893	1,035	1,201	1,411	1,621
Petroleum Products	5,929	6,894	7,601	8,424	9,385	10,512	11,957	13,401
All Others	467	122	130	139	149	159	171	182
Total	23,055	26,136	29,811	33,355	37,571	42,576	49,033	55,489

Table 5

1997 Feasibility Percent Growth
IHNC Lock Traffic
Mid Growth
(In Thousands of Short Tons)

Commodity Group	Yr 90 - 00	Yr 00 - 10	Yr 10 - 20	Yr 20 - 30	Yr 30 - 40	Yr 40 - 50	Yr 50 - 60
Farm Products	23%	21%	21%	21%	21%	23%	19%
Metallic Ores	-9%	-3%	-3%	-3%	-3%	-3%	-3%
Coal	28%	17%	17%	17%	17%	18%	16%
Crude Petroleum	-31%	28%	-12%	-12%	-12%	-12%	-13%
Non-Metallic Minerals	5%	5%	5%	5%	5%	5%	5%
Forest Products	18%	8%	8%	8%	8%	8%	8%
Industrial Chemicals	32%	18%	18%	18%	18%	20%	16%
Agricultural Chemicals	35%	16%	16%	16%	16%	17%	15%
Petroleum Products	16%	10%	11%	11%	12%	14%	12%
All Others	-74%	7%	7%	7%	7%	7%	7%
Total	13%	14%	12%	13%	13%	15%	13%

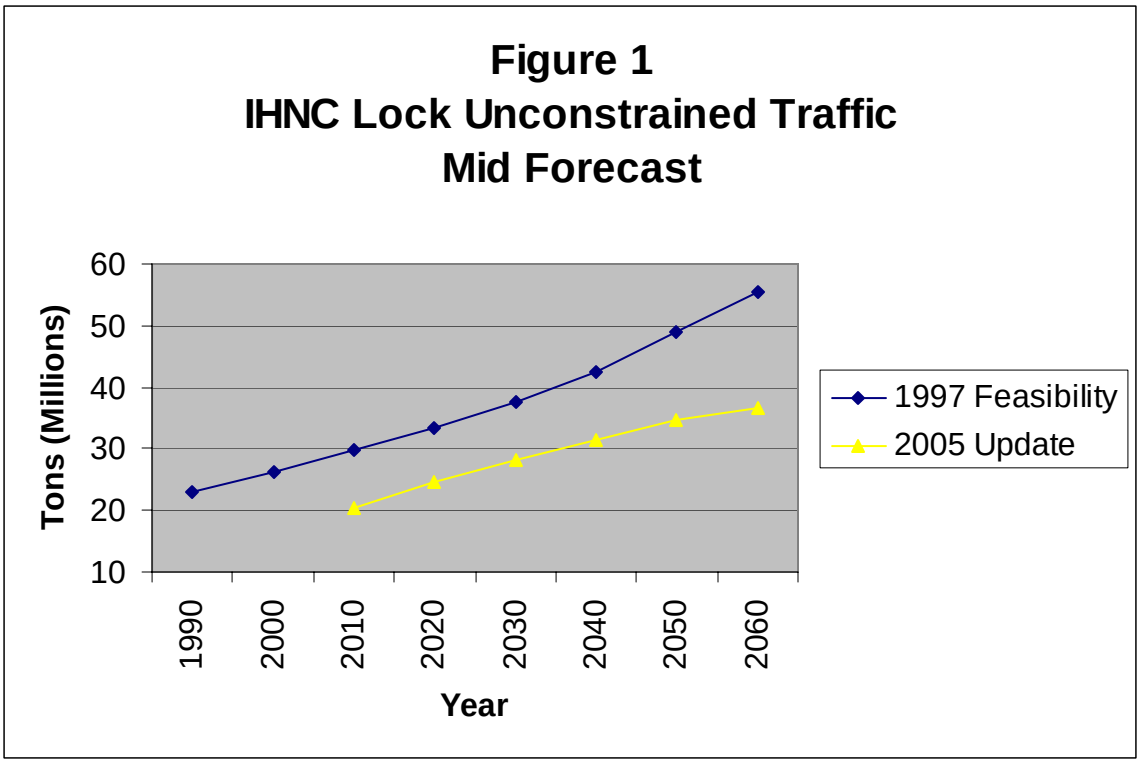
Figure 1
IHNC Lock Unconstrained Traffic
Mid Forecast
Tons (Millions)
60
50
40
30
20
10
1990
2000
2010
2020
2030
2040
2050
2060
Year
1997 Feasibility
2005 Update

another ongoing lock replacement study within the New Orleans District, representing 2001 price levels. These updated transportation rates were used in this analysis.

For comparison purposes, the distribution of gross cost savings per ton (the difference between an IHNC water route and the next least costly non-IHNC water route or mode) for the IHNC Lock traffic is displayed in table 6 for the 1997 Feasibility Study and the 2005 updated analysis.

In addition, a weighted (by tons) gross cost savings by commodity group is also displayed in table 7 showing 1992 and 2001 savings for the total system. As is shown, gross cost savings by ton, for the most part, have declined over the period of 1992, when the original TVA analysis was completed, to 2001, when TVA completed the updated analysis.

System Analysis

As in the 1997 study, a system approach is required to evaluate the National Economic Development (NED) benefits of potential navigation improvements to the Gulf Intracoastal Waterway System. This analytical approach explicitly recognizes that individual locks are only components in a complete navigation system, and that alterations of the traffic processing characteristics of specific components will have impacts throughout the navigation system. The General Equilibrium Model described below is used to perform this system analysis.

General Equilibrium Model

The General Equilibrium Model (GEM) used in the 1997 analysis was also used in this updated analysis to evaluate the existing conditions, the future without-project conditions, and the future conditions with the improved IHNC Lock in place. As was discussed in the 1997 Feasibility Report, GEM is a tool used for the economic evaluation of potential changes to various components of a navigation system. The model estimates the total transportation costs, including congestion costs, incurred by individual movements desirous of using all or portions of a navigation system. System transport costs for these individual movements are then compared to the total transport costs of that movement via the least-cost alternative mode or alternative non-system water route. If the alternative means of transport has lower costs than water system transport for a given movement, then that movement is presumed to be diverted from the navigation system to the alternative mode/non-system water route. Conversely, movements enjoying less costly transportation on the navigation system are presumed to use the navigation system, realizing net savings of the difference between the cost of system transport and the next least costly alternative means of movement. The sum of all these transportation costs savings represents the total resource savings to the nation attributable to the navigation system.

Table 6

IHNC Lock Traffic
Gross Cost Savings Distribution

Gross Cost Savings ($)	2005 Update (2001 Prices) Tons	% of Total Tons	1997 Feasibility (1992 Prices) Tons	% of Total Tons
<0	306,645	2%	410,052	2%
>=0 <1.50	166,956	1%	2,216,696	10%
>=1.50 <4.00	1,796,785	10%	6,849,096	30%
>=4.00 <7.00	3,336,291	19%	2,025,369	9%
>=7.00 <11.00	5,914,666	34%	1,748,160	8%
>=11.00 <16.00	2,789,022	16%	3,687,050	16%
>=16.00 <24.00	1,719,164	10%	4,208,653	18%
>=24.00 <31.00	731,262	4%	1,194,425	5%
>=31.00 <36.00	245,431	1%	214,612	1%
>=36.00 <42.00	130,354	1%	344,205	1%
>=42.00 <50.00	109,489	1%	42,962	0.2%
>=50.00	6,935	0.04%	113,721	0.5%
Total	17,253,000	100%	23,055,000	100%

Table 7

Gross Cost Savings
By Commodity Group
Total System - 1997 Feasibility vs 2005 Update

Commodity Group	1997 Feasibility Weighted Gross Cost Savings ($) (1992 Prices)	2005 Update Weighted Gross Cost Savings ($) (2001 Prices)
Farm Products	9.22	15.18
Metallic Ores	25.40	17.27
Coal	2.44	2.46
Crude Petroleum	15.98	14.21
Non-Metallic Minerals	21.26	13.39
Forest Products	7.52	7.23
Industrial Chemicals	18.83	16.22
Agricultural Chemicals	20.86	14.56
Petroleum Products	15.44	9.74
All Others	12.23	15.61

As was done in the 1997 analysis, GEM was run in this analysis for various future years to determine the system wide transportation savings for the future without-project condition and for the future with-project condition. The difference in the system benefits between these two conditions represents the NED savings attributable to the improved IHNC lock in place.

Shallow-Draft System Analysis - Results

Incorporating the updated inputs (traffic forecasts and transportation rates) described above, GEM was run to estimate the total transportation cost savings (NED benefits) attributable to the with-project and without-project conditions. The model was used to estimate the benefits to the existing and improved systems for the calendar years 2015, 2025, 2035, 2045, 2055, and 2065. For intermediate years, the system transportation benefits are estimated by assuming a constant change in benefits between the years explicitly modeled. The new IHNC lock is scheduled to be operational in the year 2019.

Table 8 displays the total system transportation savings by year for the without-project condition and the total system and incremental transportation savings by year for the with-project condition. System transportation cost savings represents the total transportation cost savings attributable to the entire modeled system of waterways (existing system elements and any improvements in place). Incremental transportation cost savings represents the portion of total system transportation cost savings attributable to the potential improvement under consideration (measured as the difference between with-project and without-project total transportation cost savings).

Table 9 displays the average annual incremental transportation savings associated with the authorized plan. Presented in the first section of the table is the estimate developed in the 1997 Feasibility Report by price level, interest rate and base year (the first year of project operation) used in the 1997 analysis. The second section of the table compares the 2005-updated estimate with the 1997 estimate after adjusting the 1997 estimate to reflect the same price level, interest rate and base year used in the updated analysis.

As is shown, when the 2005-updated average annual incremental savings estimate is compared to the estimate used in the 1997 report, after being adjusted to the same price level, interest rate and base year, a significant decrease is apparent. The 2005-updated estimate is approximately 28 percent lower than the 1997 estimate would be if the same project interest rate, price level and base year were used. This reduction is primarily due to the reduction in traffic forecasts.

Other Benefit Categories

Deep-Draft Navigation Benefits

As described in the 1997 Feasibility Study, benefits to deep-draft navigation arise from two categories of deep-draft vessel activity. The major activity category, in terms of both

Table 8

Shallow-Draft
Total & Incremental Transportation Savings
(2001 Price Level, $1,000)

Condition	2015	2025	2035	2045	2055	2065
Without-Project (Total)	1,113,454	1,220,001	1,277,356	1,313,353	1,325,272	1,325,272
1200 x 110 x 36 ft Lock (Total)	1,126,793	1,266,552	1,372,333	1,469,453	1,500,559	1,500,559
(Incremental)	13,339	46,551	94,976	156,100	175,287	175,287

Table 9

Average Annual Incremental Transportation Savings
($1,000)

	1997 Feasibility	2005 Update	1997 Feasibility
Price Level	1996	2001	2001
Interest Rate	7.375	7.125	7.125
Base Year	2012	2019	2019
Avg Annual	**87,448**	**78,086**	**108,014**

number and magnitude of savings, is generated by lockages which may be called “intra-harbor” lockages. These lockages result from a vessel’s desire to use deep-draft loading and unloading facilities in the two distinct sections that make up the complex of the Lower Mississippi River deep-draft facilities, the riverfront and the tidewater portion of the Port of New Orleans (the IHNC and the MR-GO). The second activity category arises from lockages for vessels departing from the tidewater section of the Port of New Orleans via the passes of the Mississippi River. These “thru” lockages are motivated by potential savings in vessel sailing time.

For this reanalysis, due to the relatively small amount of savings, compared to the shallow-draft benefits, it was decided to use the deep-draft benefits calculated in the 1997 Feasibility Study. In the 1997 Feasibility Study, the deep-draft average annual benefit estimate in 1993 prices was $991,000 using an interest rate of 7.375 percent and a 2012 base year. After price level adjusting these benefits to 2001 prices, using the Institute of Water Resources (IWR) Deep-Draft Vessel Operating Costs for the years 1993 and 2001 (a 10 percent decrease), the average annual deep-draft benefits associated with the authorized plan was estimated to be $1.0 million using the project interest rate of 7.125 percent and a base year of 2019.

Vehicular Benefits

Vehicular traffic benefits, described in the 1997 Feasibility Study, arose mainly from the fact that vehicles needed to cross the Inner Harbor Navigation Canal will have fewer bridge opening delays in the with-project condition. This occurs because the new larger lock can accommodate more tows per lockage thereby requiring fewer bridge openings to process the traffic. The length of time the bridges are open goes up, but the number of lockages goes down by a greater amount, thereby generating an efficiency for the larger lock with respect to bridge open time.

The vehicular traffic benefits calculated in the 1997 Feasibility Study were used in this reanalysis. In the 1997 Feasibility Study, the vehicular average annual benefit estimate in 1992 prices was $5.9 million using an interest rate of 7.375 percent and a 2012 base year. After price level adjusting these benefits to 2001 prices, using the Consumer Price Index Transportation (a 16 percent increase), the average annual vehicular benefits associated with the authorized plan were estimated to be $6.3 million using the project interest rate of 7.125 percent and a base year of 2019.

Savings to Federal Projects

Savings to Federal Projects refers to cost that would be avoided with project implementation. For the authorized plan, the avoided costs would include the operations, maintenance, and replacement (OM&R) costs on the existing lock. OM&R costs, developed for the 1997 Feasibility Study were used for this analysis. In the 1997 Feasibility Study, the Savings to Federal Projects average annual benefit estimate in 1996 prices was $1.6 million using an interest rate of 7.375 percent and a 2012 base year.

After these costs, were adjusted to 2001 prices using the Engineering and Design-Civil Works Construction Cost Index System (CWCCIS)(a 9 percent increase), the average annual Savings to Federal Projects were estimated to be $1.7 million using the project interest rate of 7.125 percent and a base year of 2019.

Project Costs

First Costs

Remaining project expenditures by year in 2005 dollars, including mitigation costs, are displayed in table 10 for the authorized plan. As is shown, the total remaining project cost is estimated to be $585.7 million. Using the project interest rate of 7.125 percent the interest during construction is estimated to be $373.6 million. These costs, when annualized, were adjusted to 2001 prices using CWCCIS. The average annual estimate was computed to be $58.4 million.

Operations Maintenance & Replacement Costs

OM&R costs developed in the 1997 Feasibility Study for the authorized plan was used for this analysis. In the 1997 Feasibility Study, the OM&R average annual cost estimate in 1996 prices was $1.4 million using an interest rate of 7.375 percent and a 2012 base year. After these costs, in 1996 price levels, were adjusted to 2001 prices using the (CWCCIS) (a 9 percent increase), the average annual OM&R cost for the authorized plan was estimated to be $1.5 million using the project interest rate of 7.125 and a base year of 2019.

Economic Justification

Table 11 displays the composition of total average annual benefits and costs (2001 price levels) as well as the corresponding annual net benefits (average annual benefits minus average annual costs) and benefit-to-cost ratio (BCR) for the authorized plan using the project interest rate of 7.125 percent, a 7.0 percent interest rate and the FY06 interest rate of 5.125 percent. As is shown annual net benefits are estimated to be $27.2 million using the project interest rate of 7.125 percent producing a BCR of 1.5. Using a 7.0 percent interest rate, annual net benefits are estimated to be $29.2 million producing a BCR of 1.5. Using the FY06 interest rate of 5.125 percent, annual net benefits are estimated to be $57.9 million producing a BCR of 2.4.

Table 10

Remaining Construction Expenditures
By Year Including Mitigation Cost
(2005 Prices; $1,000's)

Year	Authorized Plan
2006	20,000
2007	45,000
2008	50,000
2009	55,000
2010	70,000
2011	90,000
2012	80,000
2013	70,000
2014	45,000
2015	24,000
2016	19,000
2017	12,681
2018	5,000
Total	585,681

Table 11

Summary Of Benefits and Costs
Authorized Plan
(2001, $1,000)

	7.125 Percent	7.0 Percent	5.125 Percent
Benefits			
Shallow Draft	78,086	78,702	88,960
Deep Draft	998	1,001	1,050
Vehicular	6,319	6,316	6,273
Savings to Fed. Project	1,703	1,703	1,708
Total Average Annual Benefits	87,106	87,722	97,991
Costs			
Remaining Construction	58,394	56,989	38,569
O&M	1,509	1,510	1,523
Total Average Annual Costs	59,903	58,499	40,092
Average Annual Net Benefits	27,203	29,223	57,899
BCR	1.45	1.50	2.44