Chapter 8.
Conclusions and Recommendations

Conclusions

This reconnaissance study of the CRRP demonstrates that the project may be financially feasible under certain conditions, but many economic, institutional and environmental issues need further assessment. Anticipated population growth in the Arkansas and South Platte river basins combined with municipal and industrial needs in the Colorado River basin will generate sufficient future demand for water from the CRRP, even utilizing conservative demand projections. It is envisioned the project's water supply must be treated sufficiently for discharge into existing water bodies and/or raw water collection systems. The CRRP could have significant impacts on the flows potentially needed for the recovery of endangered fish species in the area designated by the U.S. Fish and Wildlife Service as "critical habitat" extending downstream of the potential diversion near the Utah state line. The impacts to these target flows might be mitigated or avoided with sufficient storage in the CRRP collection system to allow the project to cease diversions when such impacts are anticipated. Advanced treatment processes that could utilize membrane filtration or reverse osmosis technologies would likely be required. These processes are being used extensively in new water treatment plants and expansions to existing plants in Colorado and throughout the country. The potential size of the CRRP treatment facilities, ranging from 230 to 690 million gallons per day (the upper end is approximately equal to the combined capacity of all three Denver Water treatment plants) and relatively degraded water quality of the Colorado River water near the Utah state line requires that the handling of the residual waste stream of the water treatment plant be given special consideration in future studies. The electrical energy to pump water downstream of Grand Junction to the South Platte and Arkansas River basins is significant, but the power requirements should be considered in the context of the additional electrical generation resources that will be needed to supply the future Colorado population and economy. The environmental impacts and financial implications of developing the combinations of alternatives to the CRRP that could supply 250,000 to 750,000 af/yr may have impacts approximating or exceeding, those of the CRRP.

The CRRRS demonstrates that significant new sources of water supply will be required within the State of Colorado and that the CRRP is technically capable of satisfying these needs for water. After more than a century of water project construction, the lowest cost sources of supply have generally been developed. This study shows that while the CRRP may be economically feasible under certain conditions, it would require significant increases in system development charges and water rates over current costs for water. These increases may occur as well, during the development of other similar, more numerous projects that would be required to meet the same demands that could be met by CRRP. Additional study of project concepts and alternatives may identify ways in which project costs may be reduced. There are a number of institutional and environmental issues that require further assessment. There are also two other significant challenges that must be met if this project is to come to fruition: 1) matching the amount of project water delivered (and cost incurred) to match the increases in water demands (and utility revenues available) over time and 2) mitigating the environmental effects of the project.

Recommendations Regarding Future Studies

The results of the CRRRS need to be shared and reviewed with water users, agency personnel, special interests, and the general public. In addition, many of the key issues identified during this initial study of the CRRP need supplementary reconnaissance-level analyses. Public information programs and additional studies could be reasonably accomplished in a year and would allow appropriate discussion and consideration in the on-going Statewide Water Supply Initiative. Presented below are specific recommendations.

Presentation of CRRRS Findings to Affected Parties

A key aspect of the CRRP development is its consideration in the on-going SWSI process. This task would involve presentations to the various SWSI river basin planning groups to help assure that a wide range of CRRP alternatives are understood and considered, but perhaps more importantly, provide responses to questions raised about the CRRP and its strengths and weaknesses. Detailed study results should also be presented to various specialty interests including local, state and federal agencies.

Variations In Layout Of CRRP Structural Components

The conservative assumptions used in this reconnaissance-level study regarding structural components tend to overestimate the cost and complexity of the CRRP facilities. Specialized reconnaissance level studies would be needed to reduce the level of conservatism on the following structural components of the CRRP:

- Alternative diversion points to address concerns with the CRRP's interface with existing land uses
- Alternative diversion structure layouts to minimize impacts on fish migration upstream and downstream and to minimize entrainment of endangered fish species to an appropriate level
- Operation studies to define the general magnitude and location of monthly, seasonal and/or long-term water storage considering effects of potential diversions on downstream flow needs
- Alternative alignments or sections of alignments to incorporate potentially more cost effective open channel conveyance (canals)
- Alternative levels of treatment, required treatment technologies, multiple treatment locations, and handling of treatment by-products
- Multiple delivery points and the possibility of partial utilization of existing facilities
- Further assessment of sources and cost of pumping energy and required electrical transmission facilities

Methods To Enhance Economic And Financial Feasibility

Conceptual level analysis should consider ways to enhance the performance of the CRRP economically and financially. For example, future CRRP analyses should consider inclusion of conventional hydropower generation in the South Platte and/or Arkansas basins. In addition, incorporation of pumped-storage hydropower facilities would likely increase capital costs only marginally since the high pressure pipelines, pump stations, and operating storage are already included in the project but greatly enhance the revenue stream for the project and provide dynamic benefits to the electrical distribution grid. More detailed assessment of avoided costs and impacts of

alternatives to the CRRP should also be considered and would compliment and enhance the results and credibility of the SWSI.

Environmental Evaluations

This preliminary environmental evaluation focuses on potential major environmental issues for a reconnaissance level study of the CRRP. If the CRRP is developed further, additional environmental evaluations will be needed. For example, preliminary assessment is made of the impact of CRRP diversions on downstream flow recommendations for endangered fish species. Additional analysis of the flows is on-going by others and formal adoption of flow recommendations is still in progress. Therefore, additional study of the timing of CRRP diversions and the ability of the project to tailor diversions to meet the flow recommendations merits further analysis. For example, storage in the CRRP system will enhance the project's ability to vary the diversion rates without adversely impacting annual yields. A daily analysis of flows will likely be required instead of the reconnaissance-level monthly characterizations presented herein. Environmental assessments of effects along the pipeline alignments and water quality issues downstream of the CRRP diversion and in the receiving water also merit additional study. In addition, this preliminary environmental evaluation is based on current environmental laws and regulations. However, environmental laws and regulations change (e.g., new species are listed, currently listed species could recover, critical habitat is designated, recovery plans are modified, and court decisions are rendered), as do interpretation of environmental law. Development of a project of this magnitude will take many years and subsequent environmental evaluations will need to consider and anticipate changes in environmental laws and regulations.

Future Water Demands In The Three River Basins

The characterization of potential water demands and the degree to which other potential water supply projects would satisfy these demands needs to be more fully addressed. This could be assessed separately and provided for consideration in the SWSI process. A key issue for the CRRP is the amount of future demand that could reliably be provided through other water supply projects and demand management strategies prior to bringing the CRRP on-line. This assessment could provide essential information for the State to consider when assessing how quickly to move forward with development of the CRRP.

Alternatives to the CRRP

A key distinguishing feature of the CRRP is its potential ability to satisfy a large portion of Colorado's future water needs. Therefore, additional analysis is needed of how this large-scale opportunity compares to other options including: 1) development of new sources of water; 2) transfers of existing sources (including agricultural to municipal water use transfers and their inherent effects on rural communities); and 3) demand management. The degree to which other projects and water conservation programs may satisfy future water demand needs to be assessed and is a part of other on-going CWCB studies. As these efforts proceed, additional information on the technical, economic and environmental performance of the alternatives to the CRRP will be needed. The environmental impacts and financial implications of developing the combinations of alternatives to the CRRP that could supply 250,000 to 750,000 af/yr may have impacts approximating, or exceeding, those of the CRRP.

CRRP Implementation Issues

Implementation of the CRRP would require several distinct phases progressing from the reconnaissance level studies presented herein, through feasibility level design, final design and permitting, and finally, construction. In addition to the issues of advancing any large public infrastructure project from one phase to the next, the development of the CRRP must also address the project-specific issues identified in this reconnaissance study. Formal and informal input was received concerning many technical, economic, environmental, and institutional issues affecting the overall feasibility of the CRRP and how the CRRP might be developed. This input was received from varied sources including prospective project users; regulatory and land use agency personnel; contractors, equipment manufacturers, material suppliers; and the general public.

Based on the input received to date, CRRP implementation options must address several major questions in addition to wide-ranging technical design details. These major questions include:

1. Is a project the size of the CRRP really needed and are there better ways to supply Colorado's future water needs?
2. Can the CRRP be tailored to compliment existing and likely future water supply programs?
3. What are the main factors influencing the potential implementation of the CRRP?
4. Can the implementation of the CRRP be staged to match the forecasted increase in water demands over a period of years or decades?
5. Are there ways to enhance the overall layout of the CRRP to improve technical, economic and environmental performance?
6. What are the next steps in CRRP development and how long would it take to bring the project on-line?

The rest of this chapter responds to the questions presented above.

Comparison of The Need for the CRRP With Alternatives to the CRRP

The concepts to the CRRP are not amenable to a direct and definitive comparison with the CRRP because the alternatives are non-specific as to size, location or other characteristics. Further, per acre-foot resource commitments or contributions have not been calculated and are beyond the scope of this reconnaissance level study. If the Project Team were to scale up the water resource alternatives for comparison with the CRRP, this would present other difficulties since non-potable water reuse, water conservation and non-renewable groundwater probably cannot reach the yields of a CRRP. Therefore, Table 8-1 presents a general comparison of the CRRP and alternatives to it.

The CRRP offers unique advantages in terms of total potential yield and the certainty of that yield. The certainty of CRRP yield is likely higher with the smaller delivery scenarios, up to 500,000 af, since the project yield might be more questionable as the volume increases and diversions impact the target flows established in the endangered species recovery plan.

The limited yield potential of CRRP alternatives deserves special consideration. As indicated in the water demand evaluation discussed earlier in this report, future water requirements over the next 50 years might far exceed the

potential yields of most, if not all, of the alternatives to the CRRP. For example, water reuse and conservation have finite limits, however desirable they might be as a water resource.

The CRRP's cost per acre-foot is higher than most, though not all, water resource alternatives available. Certain storage and transbasin diversion alternative might be as expensive and may not provide CRRP's economy of scale.

If the CRRP is constructed as a single, large and fixed water resource alternative, it is the most inflexible in terms of its ability to follow the demand curve. For example, groundwater wellfields can be developed incrementally (well by well) to increase yield as water demand increases, avoiding the financial burden that the CRRP represents as delivery capacity greatly exceeds potential water use and sale in the early years following its completion. Those financial burdens may be reduced, however, if that excess capacity could be used to help replenish the depleted Denver aquifer in the early years of the CRRP's operation.

Table 8-1 depicts the comparative results of each grouping to CRRP according to costs and benefits from an economic, social and environmental perspective.

Table 8-1: A Comparison of CRRP vs. Alternatives

Water Resource Categories	Potential Yield	Certainty of Yield	Direct Cost per af	Flexibility to Follow Demand Curve	Economic Costs and Benefits	Social Costs and Benefits	Environmental Costs and Benefits
CRRP	Can meet projected demands through 2050	Once developed, very high degree of certainty, except at 750,000 af/year delivery	$12-$22k per af depending on corridor and scenario	Inability to follow demand curve with present configuration	Very large up-front capital cost; roadway impacts; no loss to other Colorado water suppliers; major economic stimulus	Creates uncertainty and risk for all stakeholders; will consolidate and maybe reduce future water conflicts	Disposal of treatment residuals and excess fill removal primary concerns; consolidation of environmental conflicts; more supply in consuming regions
CRRP Alternatives*:							
Agricultural to Municipal Water Transfers	Limited senior rights in locations useful to municipalities	High degree of certainty, assuming senior rights	Much less than CRRP, excluding conveyance costs	Relatively flexible in following demand curve	Basin of origin, third-party costs; efficiency gains from transfers	Potential out-migration of population; loss of community institutions	Reduced return flows in basin of origin; ag related pollutants reduced; wetland impacts and lower base flows
Non-Potable Water Reuse	Limited to non-native flows, location of demand	Very high degree of certainty	Less than CRRP	Somewhat flexible in following demand curve	Effluent use downstream reduced; efficiency gains	Public acceptability can be limited; providers use own source (less conflict)	Downstream habitat affected; open space better maintained if irrigated with reuse water
Water Conservation	Finite as a base resource	Uncertain yield due to market response	Most conservation programs much less than CRRP	Very flexible in following demand curve	Reduced resources for utilities short term; efficiency benefits	Common public purpose; fairness issues	Negligible environmental effects with exception of less return flows, lower base flows and expansion of use
New Storage	Can meet projected demands only if suitable water rights are obtainable	Once developed, high degree of certainty specific to project	Less than or comparable with, CRRP	Inflexible in following demand curve	Displacement of land use; third party effects; economic, tax stimulus including recreation benefits	Potential displacement of homes and businesses; construction effects	Habitat losses; wildlife, aquatic resource losses; ecosystem changes; impact water quality reduces dilution flows
Transbasin Diversions	Can meet projected demands only if suitable water rights are obtainable	Degree of certainty specific to project	Less than or comparable with, CRRP	Inflexible in following demand curve	Present and future economic losses to basin of origin without adequate measures	Third party impacts	Change in stream flow regime; loss in basin of origin, gain in basin of use
Non-Renewable Groundwater	Limited yield	Somewhat uncertain yields	Much less than CRRP	Highly flexible in following demand curve	Economic costs of depletion, future use; financial burdens follow beneficiaries closely	Potential conflicts over aquifer depletions; precarious water resource policy	Increased stream flows

* Combinations may be required to achieve similar levels of yield.

Structural alternatives tend to have economic costs that could be equal to or greater than CRRP due to the fragmentary nature of new storage and transbasin diversions. The social resource commitments required of the communities involved with CRRP will likely balance the benefits for the communities, will consolidate the debate over water resource development, but will accept the risks associated with CRRP. Environmental costs of CRRP are unknown, but might well be comparable on a per acre-foot basis. Structural alternatives probably offer fewer benefits than the CRRP. Non-structural alternatives create lower costs than CRRP, but fewer benefits, too. Social costs of both CRRP and this group of alternatives are probably minor in relation to the other costs.

Certain generalized observations can be made in comparing the water resource alternatives to the CRRP:

- The resource costs or commitments associated with the agricultural to municipal water transfers might be greater than those of the CRRP if one was to consider that the equivalence of the 500,000 af delivery scenario would hypothetically be a dry up of 250,000 acres of irrigated land in Colorado, assuming 2.0 af of consumptive water use per acre.

- It is quite possible that new storage alternatives, if accumulated to a total of 500,000 af of annual yield, might represent at least equivalent costs and benefits to the CRRP. The fragmentary nature of many new storage projects as compared with one large pipeline is unlikely to be favorable.

- Transbasin diversions are likely to require significant resource commitments. The CRRP is a modified version of the transbasin alternative with an attempt to minimize hydrologic impacts in the Colorado River basin and the headwater counties.

- In terms of economic and social benefits, the CRRP is likely to offer certain advantages over the other alternatives. Unlike any other resource alternative, the CRRP comes at a zero opportunity cost to State of Colorado water users. West Slope users, for example, will still have access to CRRP water before it flows to the diversion point at the Colorado-Utah border. The economic stimulus of the various project aspects could also be important to economic development efforts along the pipeline corridors and elsewhere in the state. From a social standpoint, the opportunity to consolidate the water resource development conflicts of the state into a single project, as opposed to the numerous likely conflicts over the next 50 years, must be considered an attractive element.

- Environmental costs of the CRRP are unknown, but might well be greater than any of the other water resource alternatives, except transbasin diversions.

In sum, the CRRP offers certain advantages and disadvantages over other water resource alternatives. The CRRP is less well understood than other water resource alternatives, but the comparison of the advantages and disadvantages indicate a mixed picture compared with alternatives.

Tailoring The CRRP To Compliment Other Projects

This assessment of the CRRP provides a conservative result in that this study has assumed no integration of the CRRP with existing or proposed water storage and conveyance facilities even though the CRRP alternatives presented herein include advanced water treatment to facilitate discharge of water into existing streams, reservoirs or pipelines. Integration of the project with existing reservoirs may provide benefits to both projects by potentially

reducing CRRP costs for operational or longer term storage and by supplementing existing reservoir supplies so that they can operate at fuller levels and deliver more water in dry periods.

Many of the existing facilities that would be candidates for integrated operations were developed and/or are currently operated by federal agencies. Integration of the CRRP directly with these facilities would certainly constitute a significant federal action requiring NEPA compliance. In addition, these federal projects were initially authorized by Congress for specific purposes and CRRP integration may or may not be in compliance with these purposes. If CRRP integration conflicts with original project authorizations, Congress could act to remedy these issues including appropriate compensation for affected uses. Conversely, CRRP integration may significantly benefit the purposes of existing projects through the provision of additional water supplies to them. In addition to the legislation authorizing the construction of federally supported projects, these projects are typically operated under public laws and/or administrative policies and procedures that were put in place following the construction of the projects. Therefore, there are typically other institutional constraints to project integration that go beyond issues associated with just the authorizing legislation.

From institutional or legislative perspectives, it may be easier to integrate CRRP operations and water supplies with non-federal projects, the most notable, of course, being the Blue River and Moffat systems owned by Denver Water and the Homestake system owned by Aurora and Colorado Springs. CRRP supplies could be introduced directly into these existing systems but another possibility would be to use the CRRP supplies as exchange or replacement water. This type of arrangement would have a wide variety of technical, economic, and environmental issues and, to date, none of the three cities have indicated any opinions or any interest in considering CRRP options pending its review of this report.

The CRRP could also be used to supplement existing and proposed water supplies in the Colorado, Gunnison, and/or White/Yampa river systems depending on the corridor(s) eventually selected. Physical deliveries could be made along the pipeline alignment to existing facilities or to existing stream reaches suffering from diminished flows. Secondary pipelines from the main pipeline could also be constructed and additional storage could be constructed to serve the multiple benefits of CRRP operational storage and local water supply.

Main Factors Affecting CRRP Implementation

There are several factors that may have significant effects on developing the CRRP. These factors include endangered species, handling of water treatment by-products, conveyance of water in the three river basins to end-users and waterbodies, availability of pumping energy, and minimizing the duration of construction activities.

Potential effects on downstream Endangered Species

Compliance with ESA requirements and established flow recommendations is discussed extensively in Chapter 7. Potential approaches to mitigate impacts require significant further study.

Handling Of Water Treatment By-Products

As shown in Chapter 6, the level of treatment needed for the CRRP water supplies in order to potentially discharge it into natural and/or man-made water bodies over such a broad geographic area brings significant cost and environmental concerns. All project development strategies for the CRRP should address these issues early in subsequent studies if the development strategy is to be credible. Detailed studies will be needed and they should be initiated early-on so that baseline data can be generated to support assessments of long term effects. Information should be obtained from other areas around the country where degraded water supplies are being used or are being considered for future domestic and other uses.

Conveyance Of Water To End-Users And Waterbodies In The Colorado, South Platte And Arkansas River Basins

This reconnaissance study appropriately stops short of identifying which water uses would be supplied in each of three basins. Various development scenarios will need to be defined in future studies, even if they are still performed at a reconnaissance level of detail. These scenarios could bracket the broad range of possibilities by evaluating various percentages of the CRRP delivery being allocated to different uses within the three major river basins. Subordinate scenarios could consider the range in water supplies that might be delivered to general areas, or sub-basins, so that preliminary assessments could be made of the cost, technical feasibility and environmental/institutional issues of this water conveyance.

Availability Of Pumping Energy

CRRP development strategies will need to address the availability and the cost of acquiring pumping energy for the project. As discussed in Chapter 6, the ability of existing generating resources are sensitive to the size of the CRRP. It should also be noted that development of the CRRP would only occur with continued population growth in Colorado and that new electrical generation resources will be needed to supply the resulting increases in residential, commercial and industrial electrical power needs with or without the CRRP as a primary source of water. Key questions, therefore, are how much additional generating capacity will be needed in addition to the capacity needed for other purposes and how much additional generating capacity would be needed for the CRRP compared to other sources of future water supply? CRRP development strategies need to further assess the current and likely future energy availability, ways to minimize CRRP's energy consumption, alternative sources of pumping energy including emerging technologies and renewable energy sources that might be tailored to CRRP's specific concentrated loads, and ways to minimize the economic impacts of supplying the pumping energy including the incorporation of pumped-storage electrical generation facilities within the CRRP delivery system.

Construction Duration

The overall cost of CRRP construction will be significantly influenced by the amount of capital that must be in place at the start of the multi-year construction period. Appropriate allowances for interest payments during construction and other costs associated with securing project financing are included herein. Project development strategies should consider methods to decrease the amount of time required for construction including alternative project delivery methods including "design-build" approaches for at least certain components of the system. Advance purchase of electro-mechanical equipment with long delivery timeframes could also be considered. Other measures to help assure that the project does not incur unexpected delays during permitting and other delays during construction should also be considered.

Staged Implementation of the CRRP

As discussed earlier in this chapter, a key disadvantage of the CRRP in relation to other potential water supply alternatives is CRRP's relative inability to be gradually implemented to match future growth in water demands. Without methods to stage the implementation of the CRRP, a large water supply would become available before or after it is most needed. There are, however, potential ways to stage CRRP implementation, each with their own advantages and disadvantages. For example, one approach to staged implementation could involve sequential expansion of initially constructed facilities including diversion capacity, treatment capacity, and additional pumps even though the costs of pipe and tunnel construction would be incurred upfront. Another approach would be to initially construct only portions of the overall delivery system. As an illustrative example only, one concept would be to construct a pipeline carrying treated water from near the Utah state line as currently envisioned to the upstream end of the "15-Mile Reach" or beyond, perhaps as far upstream as the Shoshone powerplant or Green

Mountain Reservoir. The operation of first stage systems might likely be as complicated and controversial as the ultimate CRRP system and would require detailed study with considerable input from affected interests. There are also many other variations that could include multiple, but smaller individual pipelines and other diversion points that could be considered.

Regardless of the staged implementation approach, each phase of project implementation would need to stand on its own merits from environmental permitting perspective and there would be a risk that subsequent phases might not be implemented for a variety of reasons.

Potential Enhancements to the CRRP Layouts

There are many ways that the physical layouts of the CRRP facilities might be enhanced. Since this is a reconnaissance-level study, conservative assumptions were used that tend to overestimate the size and impacts of the facilities. Alternative project development strategies could consider methods to decrease the facility sizes and impacts including the following:

- Alternative diversion points
- Alternative types of diversion structures
- Alternative levels of treatment
- Alternative treatment technologies
- Open channel conveyance canals for portions of the alignments
- Multiple treatment locations
- Multiple delivery points

Next Steps

The CRRRS was conducted at a reconnaissance level and distinguishes the major differences in alternative project configurations. As the very first step in compiling information on the CRRP, the most important purpose of this study is to provide information for a wide variety of interests including water supply entities, regulatory and land use agencies, and the general public to consider. The general process of developing a public infrastructure project is shown in Table 8-2.

Table 8-2: Typical Project Implementation Phases

	Implementation Phases	Purposes	Time Required (years)[1]
Chronological Sequence[2] / Time ↓	Reconnaissance Studies	Provide initial information for interested parties to consider	1
	Supplementary Reconnaissance Studies	Provide additional information to clarify previous studies, answer specific questions, and address the interaction of the project with other on-going or proposed projects.	1
	Feasibility Studies	Initiation of detailed geological, geotechnical, environmental and other field studies to support selection of alternatives for pre-design studies.	1– 3
	Pre-Design Studies	Define the location and likely footprints of all major structures; identify likely sources of construction materials; and provide detailed information on technical, economic, environmental, and social/legal/institutional issues to support the selection of one or more preferred alternatives.	1 – 3
	Regulatory Compliance	Identify, prepare, and obtain requisite local, state, and federal permits for the construction of the project.	3 – 6
	Final Design – Plans, Specifications, and Bidding Documents	Provide information needed by contractors on which to base legally-binding bids for construction.	2 – 4
	Construction Bidding	Obtain the least-cost reliable bid for construction of all and/or components of the project assuming multiple bid packages.	1
	Construction	Self explanatory	4 – 6
	Project Start-up	Test and implement project components as they are completed (assuming multiple bid packages). Also test the entire project in a sequential manner to minimize safety concerns and assure a fully functional project prior to contractor demobilization.	1 – 2

[1] Typical minimum time frames for a project of the magnitude of the CRRP. Time frames represent the amount of time needed to execute the work once it has been approved and does not include allowances for delays in decision making processes between phases. The time required to come to agreement on performing subsequent phases of work can often exceed the time required to do the work.

[2] Implementation phases can often overlap to shorten the overall time required for project implementation. For example, Regulatory Compliance often overlaps with Pre-Design, and Final Design activities and Construction bidding might begin for some components of the project (bid packages) before the final designs are fully completed on other project components.

As shown above, the minimum time expected to implement the CRRP would be about 15 years if all the implemented phases were performed sequentially (without any overlap) and no special measures were taken to expedite the phases. Alternatively, if all the phases could be accomplished without significant delays; certain design activities were overlapped (fast-tracked), eliminated or combined; purchase of long-lead-time electro-mechanical equipment (for example, pumps and turbines) were expedited, and innovative project delivery methods (for example, design-build approaches versus traditional design-bid-build) were used, the absolute minimum time for CRRP implementation would be on the order of 10 to 12 years. At the other extreme, the table above shows that a time frame of 27 years would be required to implement the project if all phases are performed sequentially and none of the methods discussed above are used to advance the schedule.