



# CONCEPTUAL DESIGN REPORT SPOKANE WHITEWATER PARK



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**Introduction:** Whitewater parks are an emerging trend in the western United States as a way to provide river related recreation near a population center. Whitewater parks attract citizens of all ages and across socio-economic lines. Diverse communities ranging in population and geographic characteristics are turning back to their rivers as a source of recreation, education and local pride. Whitewater kayaking is one of the fastest growing outdoors sports in the country. Operation of whitewater parks across the country has shown that these types of projects provide a number of benefits including new recreational opportunities, economic stimulus, enhanced aquatic habitat, and environmental education opportunities. Parks also provide a venue for various types of events.

This report, funded by Friends of the Falls Association, presents a conceptual plan for the construction of a Whitewater Park in Spokane, Washington. Through a number of public meetings and the efforts of the Association there is public support in the Spokane community for the construction of whitewater developments near Sandifur Bridge. This site was chosen as part of initial site selection alternatives completed by Recreation Planning and Engineering (REP) in 2004. The following attributes make the Sandifur Bridge site an ideal choice for this project: bw right bank, adequate gradient, access from town, parking, and trails.

**Project Description:** The proposed location for the developments is focused around the Sandifur Bridge. Due to the channel width, stream gradient, and other in-stream characteristics, this location is ideal for kayaking. The proposed conceptual plan includes new pools and narrow drops that will allow for a longer boating season. The proposed improvements will combine bank developments with in-stream whitewater features to more fully integrate the Spokane River into the park experience at the Sandifur Bridge.

Proposed developments include:

1. In-stream whitewater developments (Please see Description of Developments)
2. Demolition of existing concrete pillars to the level of the riverbed.
3. Selective bank access developments (i.e. put-ins and take-outs, river trail, parking lots, etc.) and bank re-grading/restoration (i.e. vegetated terraces, boulder toe, seating areas, re-vegetation, etc.).



This development is envisioned to be attractive, functional, permanent, and designed to blend in with and improve the natural environment.

**Existing  
Conditions:**

The project area is located on the Spokane River approximately one mile west of Spokane's downtown Central Business District, at the Sandifur Memorial Pedestrian Bridge and just upstream of the confluence of the Spokane River and Latah Creek. The project area shorelines are owned by The City of Spokane and administered by Spokane Parks and Recreation. Adjacent land uses include People's Park and Highbridge Park to the northwest and southwest, the West Central Neighborhood to the northeast and the Peaceful Valley neighborhood to the east. The project area is at a u-shaped bend in the river with a steep south bank of disturbed and somewhat eroding banks. The north shoreline includes a flood plain area of gradual sloping terrain with shoreline willows, ponderosa pine and upland grass. The Spokane Tribe of Indians and Confederated Tribes of the Colville Reservation have indicated that the general area of the confluence of Latah Creek and the Spokane River is of cultural importance.

Previous development and ground disturbance has occurred in the area. Concrete piers remain which once supported a railroad bridge. The Sandifur Memorial Pedestrian Bridge was constructed on some of these piers in 2004. Remnants of the railroad bridge and other past development include metal, concrete and asphalt debris on the river bottom and along the south bank. The City of Spokane is currently initiating construction of a combined sewer overflow (CSO) retention basin on the south side of the river at this location. Currently no formal access to the river shoreline exists other than climbing down steep banks over rock and debris. This section of the river currently provides fishing and river floating opportunities. With the opening of the pedestrian bridge walkers, runners and bicyclists frequent the area.



**Multiple Objectives:**

This project will serve many users. Fishermen will continue to frequent the area both during boating season and during the off-season. The area will be enhanced for walkers, joggers, picnickers, and for just spending time next to the river to watch the boaters. Many citizens could use the area through city, school and adventure boating programs or simply to enhance a float trip down the river. Many youth oriented paddling programs have sprung up around the development of whitewater parks as a way to provide healthy, accessible recreation for young people.

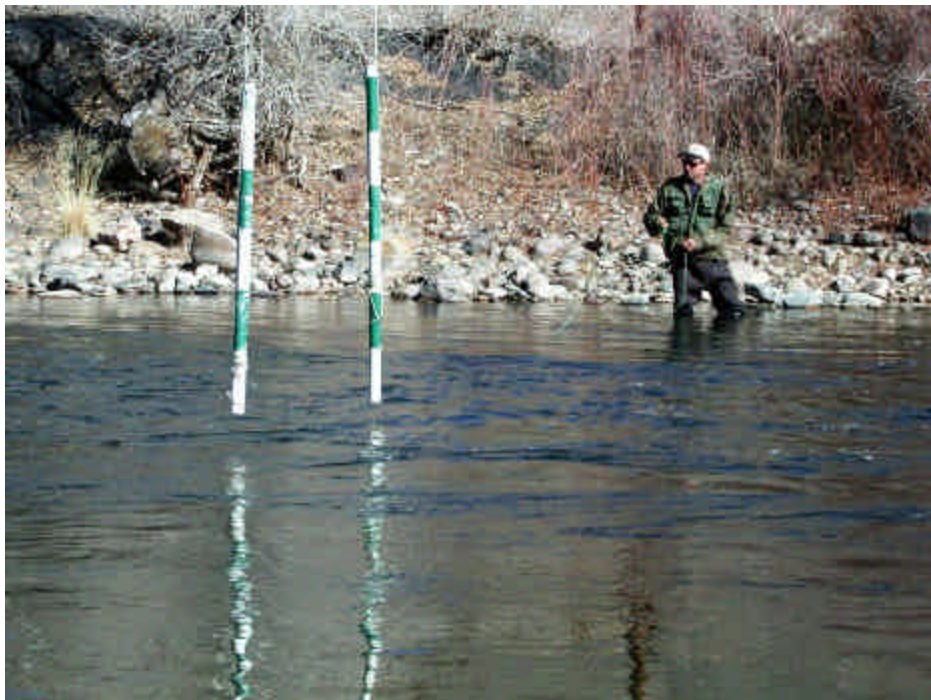


Figure 1. A fisherman enjoying the trout habitat created in the Whitewater Park, Salida, Colorado.

**Accessibility:**

The site is accessible from both sides of the river. Primary access to the site is available on the south side of the river from Clark Avenue. Pedestrian access to the bridge is provided by the existing asphalt bicycle/pedestrian paths from the existing Clark Avenue parking area. Boater access will be available with the construction of a gravel path that leads from the parking lot underneath the south bank of the bridge.



An additional gravel access trail could be added on the north bank to connect the park area to the Sandifur Bridge walkway. Viewing areas on the north and south banks will be kept relatively undeveloped to fit the existing park scheme, but minor modifications may be made to enhance viewing opportunities. The location of the structure also allows viewing from the Sandifur Bridge, but the bridge should not be the primary viewing area since it is used by pedestrians and bicyclists. The existing parking facilities at Clark Avenue, with additional parking at nearby Highbridge Park appear to be sufficient to serve this new use, but we recommend that they are expanded and upgraded over time. The conceptual site plan shows potential development on both the north and south banks of the river further supporting park activities.

A vehicle access boat ramp for was discussed for this location but, it was decided that this site was not the ideal location for a motorized launch. The banks are steep and relatively unstable in this area. The proposed development is designed to improve stability and reduce erosive conditions. Unimproved access available upstream is currently used by boaters and emergency craft. It is anticipated that upstream access will be improved in the future.



**Multiple Uses:**

All developments are free and open to the public. Whitewater developments will be designed for a wide range of boating enthusiasts of all skill levels, with emphasis on the novice level during most flows. It is anticipated that experienced kayakers will be attracted to the feature at certain flow levels. The following groups have been identified as likely users of the whitewater feature:

- Public Safety Craft
- Rafters
- Recreational boaters
- Spectators
- Fisherman

Public safety craft are currently able to navigate their craft upstream in this area and will be able to do so after the proposed in-stream development has been implemented.

1. All structures are designed to be navigable for all types of whitewater watercraft, including emergency powerboats (Zodiacs, jet boats) at a wide range of normal flows.

The term “rafter” refers to all users of inflatable vessels on the whitewater course. This group is largely inexperienced with whitewater and watercraft in general. The following design criteria are considered essential to meeting the needs of rafters:

1. The user must be provided with an open access type of whitewater feature that is appropriate for general use;
2. The user must be able to easily enter and exit the course at any point in the immediate area;

Recreational boaters (including whitewater rafters and catarafters) refers to a broad spectrum of generally experienced users of recreational boating equipment that desire an outstanding whitewater feature but also require places to pull out and rest, relax, and recuperate. The following design criteria are considered essential to meeting this group’s needs:

1. The user requires functional access for getting equipment to and from the feature;
2. The whitewater feature must have quality whitewater appropriate for surfing, challenging boating, and competitive events;



Spectators will likely comprise a large user group for the whitewater feature. This group will generally not plan to take part in specific watercraft activities at the course but rather will observe activities at the course. The following design criteria are considered essential to meeting spectators' needs:

1. The whitewater course must offer minimal seating;
2. The course must have adequate parking, strolling, and seating amenities; and
3. The user desires complete trail access to the feature.

Fishing is a popular recreational activity on the Spokane River. These users are specifically interested in maintaining and improving the in-stream and riparian habitats along the Spokane River. Additionally, these users would like to see responsible design that promotes responsible usage in terms of access and preservation of undisturbed areas. Members of this group desire that all improvements be implemented in a way that minimize short term and long term impacts to the local habitat. This includes best practice sediment control and grouting procedures as well as strict adherence to all permit requirements.

1. All in-stream work should conform strictly to permit requirements and should have a minimum impact, both short and long term, on the in-stream and riparian habitat.
2. Development should promote responsible usage.
3. Development should appear natural and provide for improvements for in-stream habitat.
4. The feature should allow unhindered passage of drift boats and dories.



**Removal of  
Abandon Pillars  
From Riverbed:**

Suggested developments include the removal of the abandoned bridge pillars. These pillars, located upstream of both the proposed double “U” drop and the pedestrian bridge are remnants of an old bridge structure. Public meetings revealed some concern about existing navigational safety risks associated with these structures. These navigation issues are unrelated to the proposed “U” drop structure. The pillars increase the likelihood of future navigation and safety issues due to their size and location in the riverbed. Removal of these pillars may also increase flood carrying capacity at the location of the site.

There are currently no foreseeable problems with removal of the abandon pillars. Concrete removal is a relatively standard procedure and does not require alternative design plans. Determination of historical significance and consultation with the State Historical Preservation Office may be necessary.

**Traffic And  
Crowds:**

The existing road system provides access to the south bank. Signage could direct traffic for large events to use Government Way rather than through the Peaceful Valley neighborhood. Formalizing and expanding the existing parking on the south bank would provide spaces for daily park users and events. Event overflow parking could be temporarily accommodated with parking controls along the road and into the nearby Highbridge Park. Event seating could be provided with temporary portable bleachers placed on either bank.

**Bank  
Stabilization:**

Bank stabilization will be limited to the whitewater structure and construction of a path from the parking lot to the launch area. In general, the design of the structure will act to direct energy towards the center of the river channel, away from the banks. Construction of a path to the launch area will include some bank stabilization. A good path to the launch area will reduce the frequency of visitors cutting over the bank.

**Cultural  
Resources:**

The park is within a culturally sensitive area of the Spokane River. FOF is working with tribes on cultural resources issues. Cultural resources testing may be performed for the north and south bank areas considered for developments. Hydraulic analysis of the in-stream developments would be performed to confirm that there would be no adverse impacts to the existing shoreline caused by the developments. Consultation with affected tribes will be necessary throughout the project design and construction.

**Subsurface  
Evaluation:**

A geologic hazards evaluation was performed by GeoEngineers, Inc. This report was published as part of the State Parks’ bid document for the Sandifur Memorial



Bridge/ Centennial Trial project in 2003. This report will be utilized in the construction of our structure. The report indicates that the conditions at the Sandifur Bridge site appear adequate for a project of this type.

Field explorations including borings and test pits preformed by GeoEngineers, Inc. in January, 1999 indicate that the proposed project site is composed of five broad soil types: gravely sand (fill); upper, coarse sand (native); middle, cross-bedded sand (native); terrace sand; and lower, inter-bedded sand. Two exploratory borings and one test pit located approximately within 100 feet of the river on the north bank indicated that the subsurface conditions included loose to medium dense, gravely sand and coble near the surface and very dense inter-bedded, lithic fine and course sands with increasing depth. These samples were taken at depths between 10 and 40 feet. Exploratory boring located approximately 100 feet from the river on the south bank revealed similar conditions at similar depths.

The geologic evaluation does not include information concerning subsurface conditions beneath the majority of the low-flow riverbed. This may be due to increased difficulties and costs associated with sampling under in-stream conditions. However, it can be inferred that subsurface conditions beneath the riverbed in this area are similar to those of the banks.

**Fisheries:**

This project is designed to maintain existing fish habitat conditions and improve the surrounding riparian environment. The proposed “U” Drop structures are designed to mimic the naturally occurring conditions on the Spokane River. “U” Drop structures create deep, self scouring, plunge pools that provide feeding lanes, cooler temperatures in the hot summer months, and overhead protection from predators for a variety of fish species. Preservation of native vegetation and additional riparian planting on banks adjacent to these pools can provide similar developments. The project will be hydraulically designed to have no effect on downstream fish habitat and to allow for fish passage.

Habitat Requirements For Trout:

Trout habitat varies substantially with the size of fish and their relative age groups. Each age class requires specific criteria for habitat. Associated design criteria for this project are focused on determining areas that were most suitable for habitat improvements and integrating our design with the river’s natural ecosystem.

*Spawning and Embryo:* Ideal conditions include medium sized gravel <5% fine sediment and relatively cooler temperatures (1, 2). It was noted in the Conceptual Design Review Meeting (December 8, 2005) that the Double Crested “U” Drop structure is currently located upstream of potential spawning habitat. It is unlikely



that long-term scour will have a notable impact on the tailout of the existing downstream pool based on its size and proximity to the project area. However, a scour analysis can be performed for the “U” Drop in the design phase if necessary.

*Juvenile* Juvenile trout occur at shallower depths and lower velocities than adults. Both fry and juvenile brown trout prefer velocities of <15 cm/s (3). Water depth and velocity exceed typical juvenile trout habitat conditions throughout the majority of the site location.

*Adult*: The deep pools that “U” Drops create are specifically good habitat for adult trout, but their benefits do extend to other fish species. Deeper pools with cover provide excellent habitat for salmonoids (4). Deep pool habitat is particularly important during the winter, when anchor ice can form in shallow riffles, and during periods of particularly low flow. Individual species requirements vary. However, in general, deep pools and in-stream cover are frequently cited as the most important habitat attributes determining salmonoid abundance (5,6,7). Large deep pools comprise a significant portion of habitat in this section of the Spokane River. The conceptual design is focused on maintaining these conditions.

#### Fish Passage:

The “U” Drop structure is designed to accommodate the migration of juvenile and adult fish through the center and interstitial channels of the structure at a variety of flows throughout the season. REP typically designs its structures to produce velocities of 7 ft/sec in the low flow portion of the structure based on figures provided by the U.S. Army Corp of Engineers (USACE) and various other research utilized in previous fish passage projects.

Interstitial rock channels built adjacent to the low flow portions of the Drop structure provide velocities as low as 3.5 ft/sec. The design for these channels includes several staggered boulders with larger interstitial grooves that increase channel roughing and provide substantial breaks in velocity and mid-drop pools. Channel roughening is a well established method for reducing water velocities by increasing the friction at the river’s bottom. This design utilizes information gathered from the Redlands Diversion Dam, the Pueblo Fish Passage Project and two other fish passage projects that REP is currently working on. Fish passage has played a major role in the design of “U” Drop structures. Designs have also been modified to accommodate slower velocities in cases where endangered species were involved.

Larry Hunter’s *Analysis of Fish Swimming Performance Data* provides a general form of the swim speed equation and research on burst and prolonged speeds for a variety of fish species (8). This research indicates that local fish species such as rainbow



trout, suckers and whitefish will be able to pass through the “U” Drop at velocities between 3 to 7 ft. /sec.

REP also uses specific metrics as design constraints in order to ensure that the structures do not create a barrier to in-stream migration. The following constraints are consistent with the research listed above. These constraints were identified on projects involving fish passage on which REP has worked with the USACE and similar governmental bodies, including projects in Pueblo, Colorado; Grand Junction, Colorado; Calgary, Alberta; Sparks, Nevada; and many other areas. Many of these projects were implemented on rivers that were inhabited by smaller minnows and juvenile fish. In the past the USACE has provided REP with some guidelines for areas where fish passage is of concern. It was the conclusion of the USACE, when designing the Pueblo project that “it may be possible to incorporate aspects of a recreational use boating passage in the portions of the fish passage that would incorporate features not necessarily compatible with fish passage specifications, but still providing sufficient area for both uses to co-exist.”

When designing projects, REP includes the following criteria provided by USACE:

1. Fish passage should incorporate a continuous series of pools with a velocity of 0 to 2 ft./sec, interconnected with runs /cascades with maximum velocity of 4 to 5 ft./sec. A few interspersed short cascades (maximum 1 ft. horizontal) with velocity up to 7ft. /sec. are acceptable.
2. Where possible, changes in flow pattern direction and velocity should be gradual, in order to lead fish from one feature to another (not exceeding 45 degree angle change or 1ft./sec per foot velocity change).
3. Minimum pool depth should be 3 ft. and all features of the fish passage should be deep enough so that fish may remain hidden from view (water clarity dependant).
4. The downstream entrance (s) of the fish passage should be a non-turbulent pool with a minimum 3 ft./sec velocity and located within a thalweg (deepest portion or main channel) of the river. The entrance(s) should be located as close as possible to areas where fish congregate below the obstruction and should be at the farthest upstream point available to fish. The upstream extent should be located so fish will not readily be swept back downstream over the obstruction. The exit should open into a sheltered, non-turbulent pool upstream from the obstacle.



All suggested developments are designed to integrate into the natural landscape and mimic natural river features. The in-stream structure as well as bank development will be constructed using rounded granite rock, large stone boulders. All structures are designed to be structurally stable at the normal range of seasonal flows as well as large flood events.

**Hydrologic Conditions:**

The U-Structures have not been specifically designed during this conceptual phase of the project. The final design will include analysis of different structure configurations that will have no effect on the flood elevations. A HEC-RAS floodplain computer model will be used to establish that there is no net effect to the floodplain due to the installation of the whitewater park. This flood model will also provide information with regard to flow depths and velocities throughout the park. However, at this preliminary stage of the design the Weir Equation can be used to give a general indication of the shapes of the structures. This analysis can be used to establish that a particular amount of constriction is generally appropriate for the existing geometry of the existing riverbed.

**Higher Flows:**

The high flow channels are designed to accommodate higher flows during the spring and summer run-off. These channels have been shown to capture, control, and divert flows throughout a range of design levels.



Figure 2. The U-structure at Charlie's Hole in Steamboat shown at 1850 cfs.

**Depth Of Flow:**

The specific dimensions of the U-structure are tailored by the designer to create the desired in-stream features. One of the most important variables that is controlled is the depth. The depth is described by the Weir Equation, which can be expressed as,



$$Q = Cbh^{1.5}$$

where C is an empirically determined constant, b is the river width as defined in the analysis section and h is the height of the flow. The weir equation can be used to determine the approximate depth of the flow in the specific channels. Note that this Equation is an approximation and does not represent an exact relationship. The actual depth at the top of the structure can vary due to a number of variables including upstream current velocity and channel roughness.

**Mean & Peak Flows In The City Of Spokane:**

The Spokane River experiences higher flows in the spring months (March through June) and reduced flows in the fall. The mean monthly stream flow is the highest in May (Figure 3).

The Peak flows have been known to exceed 46,000 cfs at this site (Figure 4). The “U” Drop structure should be designed to withstand major flooding events. However, maintenance of the structure may be required after extreme flooding events. This type of maintenance is typically limited to pool excavation and structural reinforcement.

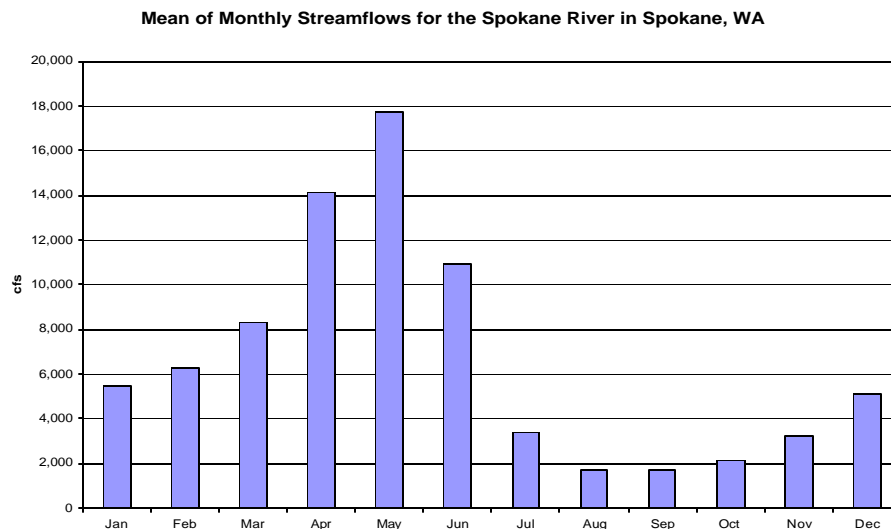


Figure 3. Mean of Monthly Streamflows for the Spokane River in Spokane, WA (source: [www.usgs.gov](http://www.usgs.gov), gauge 17010305, period of record; 1891-2004).

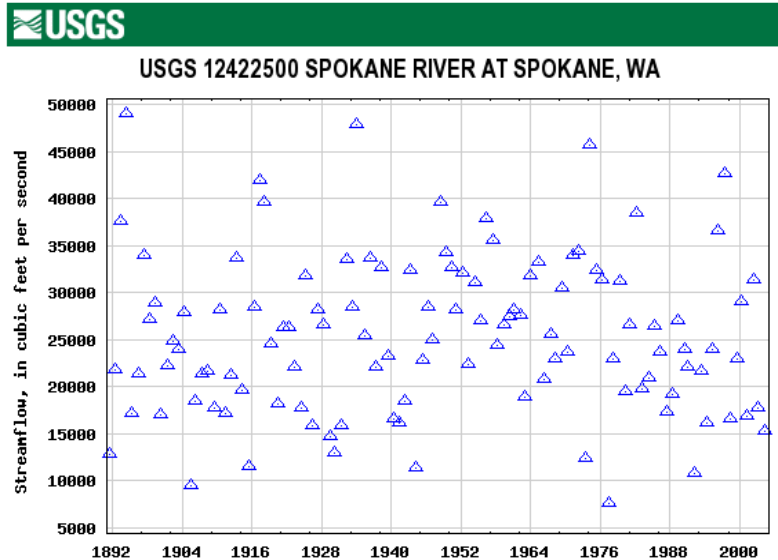


Figure 4. Peak stream flows for the Spokane River in Spokane, WA (source: [www.usgs.gov](http://www.usgs.gov), gauge 17010305, period of record; 1891-2004).

**General Description Of Development:**

One primary feature for use in flow control and the creation of whitewater features is the "U" Drop structure. The construction of a portion of one of these structures is shown in Figure 5. This feature is used to create a river wide "drop" and can be used to constrict lower flows of the water. By adjusting the gradient of the flow over the U-drop a wave or hydraulic can be formed. The structure also features elevated wings that are positioned along both riverbanks. These wings provide an eddy for easy recirculation to the wave. The gradient of the drop keeps a pool below the structure scoured.

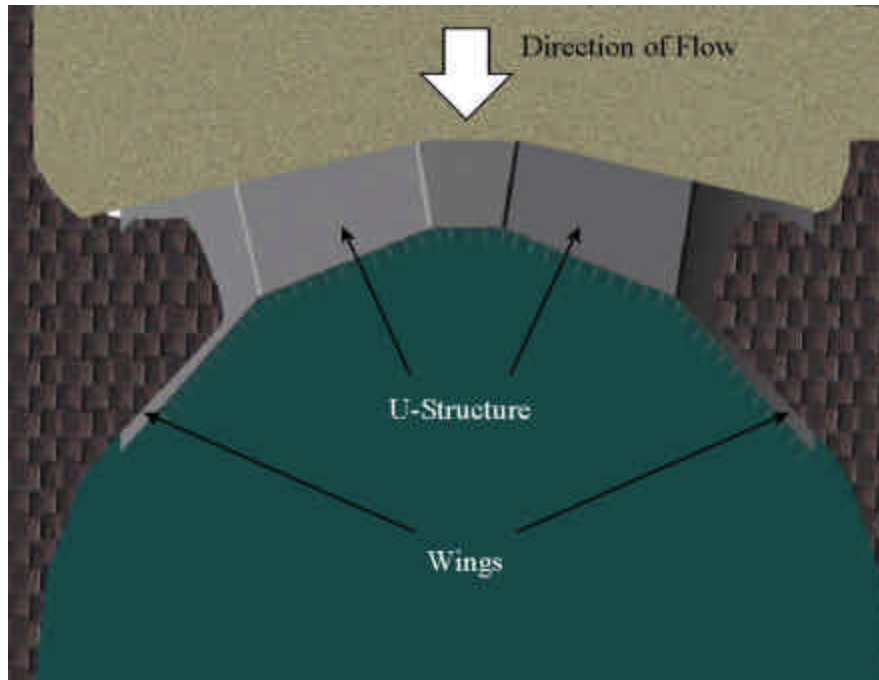


Figure 5. A top view of a 3-D computer model of a U-structure demonstrates its arched design.

The UDrop structure is very stable and will accommodate high volume/high velocity flows. The structure features an arched shape laid in the plane defined by the riverbed with its footing sunk into the riverbank, as shown in Figure 5, to bear these loads. The arch is a classic support structure that dates back to Roman civilization. This structure has two properties that make it desirable for in-stream use. The first is that it is extremely strong and stable. This structure can sustain very high and very imbalanced loads without becoming unstable. The second property of arches that makes them desirable for in-stream use is that all stresses induced in the arch due to external loading on the top face are compressive. This property, along with the general design and layout of the structures, allows REP to construct structures without the need for dangerous rebar and removing the risk that failure of the structures could ever result in a cohesive plate being washed downstream.

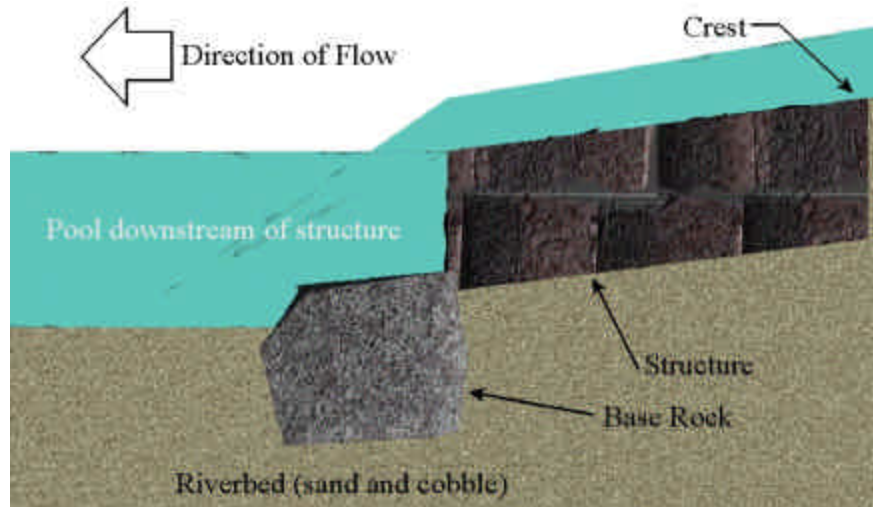


Figure 6. A section view of the apex of the U-structure.

Figure 6 shows a section view of the apex of the arch. This Figure shows that the arch is sunk into the riverbed such that the crest of the structure, which is the highest point on the upstream side, is even with the existing riverbed. Setting the structure even with the existing riverbed has two effects. First it ensures that the unconstricted river level is no higher than the existing river level and secondly it ensures that there are no dynamic fluid forces on the structure due to current flow. Sinking the arch in the riverbed also supports the structure laterally and prevents torsion on the structure.

A base rock, also shown in Figure 6, is shown at the downstream end of the structure. The base rock is sunk into the cobble and is keyed into the rock that forms the structure in order to reinforce the structure and to protect the structure from erosion caused by eddy currents.

These structures are designed such that the river is usable at a variety of water levels. Figure 7 shows a profile view of the U-Drop structure looking upstream. This view highlights the versatile design of these structures. The low flow channel can be designed to provide deep passage and a usable hydraulic feature during typical low flows. During the mid-range flows the low flow channel and part of the high flow would be submerged. During run-off the high flow channel would create a larger, more usable hydraulic feature (a hydraulic jump or wave train), and at extreme flood the river will overflow the shoulders of the structure. The downstream side of these shoulders are stepped to provide seating during normal flows and to prevent the formation of dangerous hydraulics during extreme flooding.

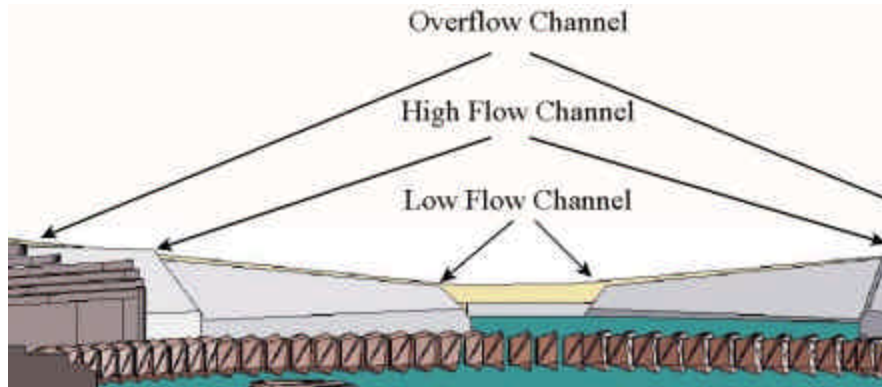


Figure 7. The upstream view of the U Drop structure shows how it is designed to accommodate varying flow levels.

**Description of Types Of Proposed Bankside Improvement:**

Access to the river from the banks can be encouraged at select areas, while areas for preserving vegetation and for re-vegetation efforts can be set aside. Boulders are typically anchored into the banks in areas to accomplish these goals as well as bank stabilization and erosion prevention. The banks in select areas can be terraced to create attractive and creative access, seating, bank stabilization, and vegetation preservation (Figure 8). Existing native vegetation will be preserved as much as possible.



Figure 8. Bank terracing and planting terraces in Salida, Colorado



**Description of Sandifur Bridge “Park and Play” Improvement:** The fastest growing sector of whitewater paddle sports is “Park and Play” or destination freestyle paddling. Freestyle paddling involves paddlers surfing and performing maneuvers in one, accessible wave or “hole”. These types of features are created by “U” drop structures similar to those described above. The recommended structure for the Sandifur Bridge site is the Double Crested “U” Drop. A Double Crested “U” Drop is an innovative structure that creates two segregated wave forms at the base of the structure; one that is designed to be optimal at lower flows and one which is optimal at higher flows. The “U” structure will be constructed just downstream of the Sandifur Bridge in part to prevent scouring of the existing bridge piers (upper edge will be tied into the existing bridge piers). This design incorporates two “park and play” features. The structure will be constructed of natural materials grouted to the river bottom. In addition to the Double Crested “U” Drop current deflectors and random boulders could be placed through the reach in order to provide fish habitat, increase safety by creating slow eddy currents next to the bank and prevent erosion. These features are not included in the conceptual design.

**Sandifur Bridge Bank Improvement:** The Sandifur Bridge Site is a natural place to create an active interaction between the Spokane River and the park setting. Construction of a path to the launch area will require bank stabilization and a natural stone retaining wall (Figure 9). The majority of this path should be constructed above the high water mark. However, a HEC-RAS analysis (typically performed during the design phase) establishing effects on the flood plain may be applied to this development to determine the necessity for protection from high flows. A good path to the launch area will reduce the frequency of individuals cutting over the bank. Creative planting areas will create an attractive bank area suitable for seating and viewing. In areas where healthy riparian growth exists, vegetation should be preserved and access discouraged.

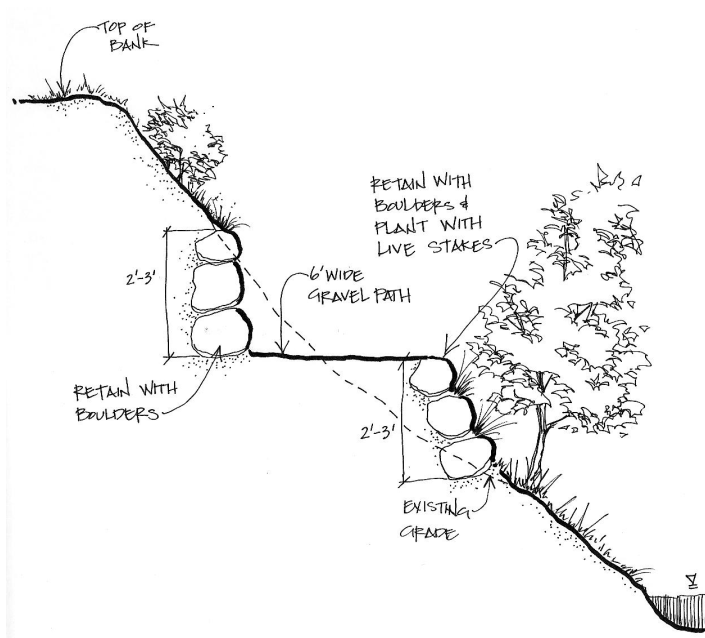


Figure 9. Typical access path cross-section

Riparian preservation is of particular interest on the north bank of the Spokane river where a stand of existing willow trees have been preserved as mitigation for the construction of the Sandifur Bridge. Final design plans will incorporate the majority of these trees into the stabilization efforts beneath the bridge. Typical stabilization techniques performed on projects of this nature incorporate existing vegetation in pockets of soil that are dispersed between large boulder anchoring. Figure 10 illustrates this technique utilized in terracing.

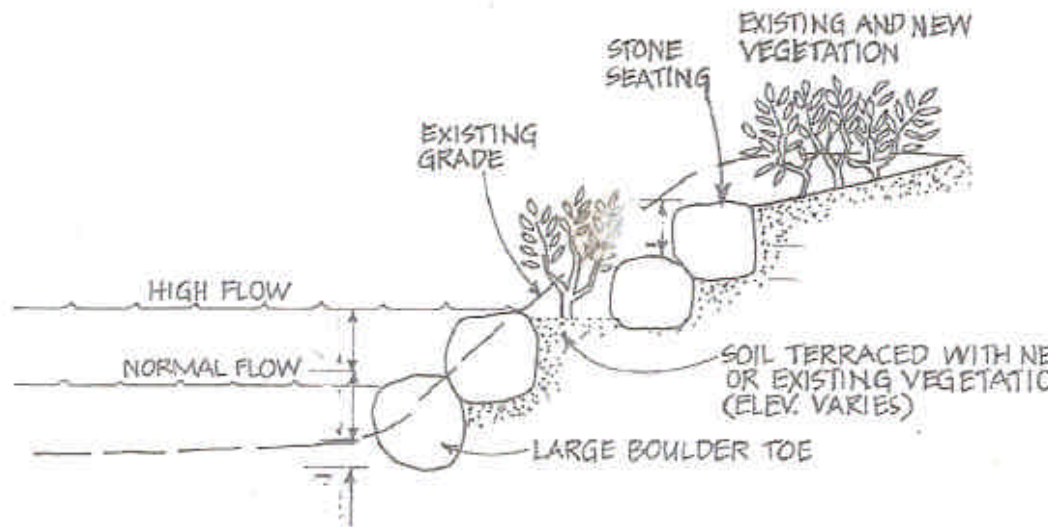


Figure 10. Typical bankside terracing and preservation

**Phasing:**

The Sandifur Bridge Site serves as both the practical access point and the figurative “heart” of this project. From that standpoint it makes sense to develop the project in a phased approach that puts highest priority on the portion of the project that is most visible and has the greatest positive impact on the existing park facility.

**Phase 1:**  
(Construction of  
the Double “U”  
Drop)

It is recommended that the entire Double Crested “U” Drop be constructed in one phase. There are significant fixed costs for permitting, water control, water quality control and mobilization that are required for in-stream construction. Therefore, the most effective approach to construction is to consolidate all in-stream work into one phase. A single phase construction approach also avoids disturbing the river more than once.

Phase I development includes:

- All in-stream work associated with the Double Drop itself
- Grouted rock island
- Resetting of existing riprap and new stone terracing along the base of the slope on the south bank
- Bank stabilization including subsurface reinforcement and planting on the north bank
- Gravel river access trail and stone retaining wall
- Removal of abandoned piers



Phase 2:  
(Bank access  
developments, and  
re-vegetation.)

The second phase of this project does not include any in-stream development. This phase is designed primarily to further enhance integration of the Spokane River into the park experience.

Phase II future development may include:

- Spectator seating, bank re-grading and restoration, additional parking and restrooms on the south bank
- Natural surface trails, picnic/day use facilities on the north bank

**Water Quality  
Impacts during  
Construction:**

Great care should be taken to provide the least amount of impact possible to the stream and riparian environments while construction occurs. This requires water control issues that may include:

- Diversion of the river such that the flows bypass the active construction location.
- Temporary coffer dams or port-a-dams will be used in all areas of the river where grouting activities will occur. Cofferdams will be left in place until grout is dry. Cofferdams may consist of riverbed material that is generated during excavation activities necessary for site preparation and pool creation. Imported clean fill material or bladder dams may also be used.
- The site will be completed to design specifications and will be meshed into the existing streambed. All excess material will be removed from the riverbed and will be disposed of in a proper location.
- During construction no petroleum products, chemicals, or other deleterious materials shall be allowed to enter or to be disposed of in such a manner that they could enter the water.
- Construction access will be as limited as possible and will occur primarily from one location. Any disturbed bank areas will be restored after construction.
- Standard inspection requirements require that the contractor service his equipment prior to climbing into the river, inspect the equipment for leaks on a daily basis, and to park any unused machinery out of the streambed when not in use. The contractor will be contractually held to best practice standards for in-stream work.



- Sediment laden wastewater if present should be diverted or pumped to an upland area for infiltration prior to reentering the river.

**Maintenance:**

Maintenance of existing park developments will require routine park maintenance for parking areas, trails and future restrooms. Generally, whitewater structures are maintenance-free. However, periodic inspection and a commitment to the ongoing maintenance of the whitewater park would ensure the integrity of the in-water structures and other features. Responsibility for maintenance of the whitewater park has yet to be firmly established. It will likely involve a partnership with the City Parks Department, the local paddling community and nearby neighborhoods. The Annual River Cleanup conducted in this area over the last three years is a good example of the potential for a partnership. This partnership would provide ongoing cleanup of the in-water structures to remove flotsam and jetsam, as well as removing litter and garbage from the adjacent trail and access points. The City of Spokane would provide maintenance as part of its routine parks and facilities service. No additional costs or annual maintenance fees are anticipated for in-river structures.

**Implementation:**

The first step in implementation of this conceptual plan is to complete a preliminary design and submittal for various environmental permits. This includes submittal of an Army Corp of Engineers, section 404 Nationwide permit application for the in-stream developments portion of the project. The Army Corps of Engineers has permitted numerous similar projects. It is recommended that six to twelve months be allowed for processing this permit application.

Prior to construction, final design and bid documents will need to be completed in order to provide details regarding dimensions, elevations, and floodplain impacts.

Timing, with regards to water flows, is a critical element when considering the construction of in-stream structures. Late summer into the fall will present the best opportunity to work within channel with typically low flows. In addition, WDFW (Washington Department of Fish and Wildlife) has designated a construction window between June 15<sup>th</sup> and August 15<sup>th</sup> to reduce impacts on fish spawning and other species within the rivers ecosystem. If possible in-channel construction should be coordinated with water releases to ensure the lowest possible flow.

Access to the project area for construction presents several different options. These alternatives should be explored during permitting and design while considering their effect on cost and impact to existing facilities.



**Permits and Approvals:**

Modifications to the bed or banks of the Spokane River would require approval from several agencies. Ensuring fish passage and preserving vegetation will be important for HPA approval. Resolution of any cultural resource issues is important and approval of the 404 permit is contingent on SHPO (State Historic Preservation Office) concurrence of findings.

A list of the permitting agencies, required permits and approvals may include:

- Department of Ecology 401 NPDES permit
- Department of Ecology temporary water withdrawal approval
- Spokane Tribe consultation
- SHPO consultation (pier removal)
- U.S. Army Core of Engineers Nationwide 404 permit
- City of Spokane conditional use permit
- WDFW Hydraulic Project Approval (HPA)
- City of Spokane/Ecology Floodplain Development Permit
- City of Spokane SEPA- Determination of Non Significance

**Cost Estimate:**

Detailed cost estimates for the Final Concept Plan are set forth in Appendix B. Permitting and Cultural Resource survey costs are for both Phase 1 and 2. Cultural Resource survey for Phase 1 is estimated at \$23,000, for Phase 2 \$37,000. The total estimated cost to design, permit, and construct the improvements is as follows:

- Phase I Whitewater Structure and Access Trail: \$613,700.00 to \$628,700.00
- Phase II North and South Bank: \$384,400

**Conclusion:**

The Spokane River offers the opportunity for development of a premier whitewater development. The combination of year round flow, a mild climate, and the existing park facility create an excellent site. In-stream whitewater developments will provide an extended boating season and accessible river recreation for novices and expert whitewater boaters while maintaining existing uses. Bank and trail developments along Sandifur Bridge Park will create an interaction between the park and river, allowing access to the river for a variety of users. Bank stabilization and re-vegetation efforts could not only enhance access, but will maintain a healthy riparian corridor within the project area.



Figure 11. A young paddler enjoys the Clear Creek Whitewater Park in Golden, Colorado.



## References

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- 4.) Greenburg, L.A., T. Steinwall, and H. Persson. 2001 Effect of depth and substrate on use of stream pools by brown trout. Transactions of the American Fisheries Society 130:699-705.
- 5.) Allouche, S. 2002. Nature and functions of cover for riverine fish. Bull. Fr. Peche Piscic. 365/366:297-324.
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- 7.) Hunter, C.J. 1991. Better trout habitat: a guide to stream restoration and management. Island Press, Washington, D.C.
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## **Appendix A. Meeting Summaries**

Project: Spokane Whitewater Park Design  
Date: September 20, 2005  
Location: SRBC  
Attendance: Consultants: Gary Lacy, REP, Kathy Schultheis, DEA  
FOF: Steve Faust, Jeff Warner, Terry Novak, Travis Nichols  
WW Committee: John Patrouch, Mick French, Travis Nichols  
Bryan Flett, Spokane Tribe and Upper Columbia United Tribes  
Abbie Davis (Leopold), SRSC  
David Bauermeister, Chamber of Commerce  
Jeff Nave, Downtown Spokane Partnership  
Steve Haynes, City of Spokane shorelines management  
Connie Grove, Peaceful Valley  
Jeff Holmes, fly-fisher/Sierra Club  
Stan Grater, fly-fisher/Orvis  
Topic: Scoping Meeting to discuss project goals and concept design  
Prepared by: John Patrouch, FOF Whitewater Park Committee  
Reviewed by: Steve Faust-FOF, Katy Shultheis-DEA, Gary Lacy-REP

### Introduction:

Kathy Shultheis introduced herself and Gary Lacy to the group and described the purpose of this scoping meeting, which is to gather input from the stakeholders that will be incorporated into the design.

The stakeholders then introduced themselves and described their interest in the project.

### Design Concept:

Gary Lacy presented an initial concept for the WW Park. The design concept includes a “double U” structure to be constructed just downstream of the Sandifur Bridge, in part to prevent scouring of the existing bridge piers (upper edge will be tied into the existing bridge piers). This design incorporates two “park and play” features. The structure will be constructed of natural materials grouted to the river bottom. Removal of the existing bridge piers is proposed. Pedestrian access to the feature will be by a pedestrian path from the existing parking area, routed under the bridge to a launch area just downstream of the bridge. Viewing areas on the north and south banks will be kept relatively undeveloped to fit the existing park scheme, but minor modifications may be made to enhance viewing opportunities. The location of the structure also allows viewing from



the Sandifur Bridge, but the bridge should not be the primary viewing area since it is used by pedestrians and bicyclists.

The design is similar to proven designs. The target use group is the recreational whitewater paddler. The intent is to construct a quality whitewater park that provides good dynamic whitewater features for the users while allowing safe passage by other users of the Spokane River (canoe, kayak, fishing, tubing, swimming).

The target flow range is from about 1,500 cfs to 5,000-6,000 cfs. Actual flow range is difficult to predict but REP thinks that the design will support use in this range. At the lower design flows, the features will be less dynamic, allowing use by beginners and intermediate paddlers as well as more experienced paddlers. At flows lower than about 1,500 cfs the wave/hole feature will be less dynamic, but still usable. At higher flows, the eddy's may become less friendly and the wave more difficult to enter. During spring runoff it is anticipated that the feature will be submerged and not noticeable. The target flow range provides for a long season.

Gary L. thought that this was an ideal site for a WW park and that the concept design was appropriate for the site based upon the target users, usable flow range, safety, access, viewing areas, and cost. There is ample gradient, good riverbed geology, good access with viewer/spectator sites, and plenty of flow. The site is close to downtown, restaurants, lodging, and other amenities. The trail system for walking, biking, running will be a further draw. Access from out of town is very good, with the freeway nearby. It is difficult to estimate future use of the park, but communities that have constructed one, have been very pleased with the results.

If the community decides to go forward with the park after the initial design and cost estimate is completed, and if all permits can be acquired, construction would be mainly within the river. Most of the bank impact would be for construction staging and for the pathway to the launch area. Construction of the structure could be done in as little as 3 weeks.

#### Group Questions:

This meeting provided an opportunity to discuss issues relevant to the stakeholders. A number of questions/concerns were raised including:

- Traffic and crowds in Peaceful Valley - Peaceful Valley residents are concerned about the potential for increased traffic through their neighborhood. Access to the WW park will likely be from the west side (A Street), with little impact to Peaceful Valley. A future Gorge Park plans is to construct a non-motorized boat



- ramp on Water Street. We discussed the possibility of adding a boat ramp by the WW Park. This will be considered during the design, however, this access, if built, will likely not replace the one at Water Street.
- Bank stabilization – It is thought that very little work will be done on the river banks. The design of the structure will act to direct energy towards the center of the river channel, away from the banks. Construction of a path to the launch area will require some bank stabilization. A good path to the launch area will reduce the frequency of folks cutting over the bank.
  - CSO Outfall – We discussed the CSO basin and the location of the outfall, which is thought to be upstream of the bridge. The CSO discharge is a potential health risk to WW park users, but the new CSO basin is designed to reduce the frequency and amount of discharge. Normally discharge would occur during rainy/snow-melt type events when use of the WW Park would be reduced. (Note-Probably a good idea to post the outfall and have an indicator if discharging).
  - Flooding – Portions of upstream Peaceful Valley, are located within the 100 year flood plain. It is important that the WW Park feature does not increase flooding upstream. Gary L. explained that the design of the feature, where the upstream edge is flush with the existing channel bottom and should not increase upstream stream elevations. Removal of the bridge piers may improve the hydraulics of this area. The impact of the design on the upstream water elevations will be modeled in accordance with FEMA approved procedures.
  - Safety - Many users of the river require easy passage through the WW Park feature. We discussed incorporating a bypass. Gary L. said that he does not recommend a bypass since it may be difficult to find and negotiate safely. Instead, the design of the WW park feature will allow pass through by other river users. Waves will be created and other users will have to navigate through it. The waves should not be any more difficult to navigate than many other features on the Spokane River and could be safer than navigating the existing rapids and bridge piers. **(NOTE: One topic not discussed was the River Rescue group (powered inflatables and jet boat) that launch from the Water Street access, will they be able to get back up to the launch if downstream of the feature ?)**
  - Fisheries – The area is currently fished and a concern was raised about reducing the fisheries in this area. Generally, WW parks have been shown to improve fisheries, but at the least, it should not negatively impact fisheries. This will be looked at in more detail during the permit process.
  - Cultural Resources – The adjacent area is known to be culturally significant. There is a large archeological excavation being performed for the CSO basin. Cultural surveys were performed for the Sandifur Bridge construction. In the area close to the bridge (WW Park) artifacts have been found relatively close to the surface, but apparently were not found at lower elevations (discussion with Stan



Gough EWU and John Patrouch after the meeting). A cultural resources study will be done for the WW park, as necessary.

- Recreational Use – Future Events (Rodeos) – One of the goals of the WW Park is to hold events that bring participants into the area, contributing to the business community (hotels, restaurants, other businesses). Questions were raised about the ability of this WW Park design to attract participants and elite paddlers to support major events; and will this park be competitive with other planned parks such as the one being constructed in Missoula and the proposed park in Yakima.

Gary L. said that from his experience the WW parks have been a great success in all the areas he is familiar with and that they seem to support each other. Looking at the location, access, amenities there is no reason to think that this site should not be successful.

A few comments and thoughts from others on this topic that were discussed after the meeting:

- The Spokane site has a lot to offer: close to town, easy access, good dining and lodging, and close to freeway and airport. The WW Park is just one of the features of the Gorge Park that will draw in paddlers and tourists.
- With the limited budget of ~\$450,000 this is an affordable feature that will bring participants and advertise Spokane and the Gorge Park. In the future, if warranted, a more dynamic, top-end feature that further entices the elite paddlers could be constructed at the Glover site included in the Gorge Park Master Plan.
- The WW Park feature, as described, is targeted at the majority of the paddling community, being the recreational paddlers. A more dynamic feature for the elite paddlers would discourage the majority of paddlers (to hard). The business community will benefit more from attracting the recreational user.
- As shown by Reno, support and advertising by the business community is important for the parks success. A small river, in a downtown setting, with aggressive advertising has turned it into a destination for paddlers (Gary Lacy-REP designer). Their major whitewater event is by invitation and/or pre-qualification. Spokane does big events well as evidenced by Bloomsday and Hoopfest.
- Design characteristics – The proposed design includes:
  - A river wide structure made from natural material grouted to the river bottom.
  - Two flow channels that will create two whitewater features, one channel will be lower than the other and at low flow most to the river will flow



through the lower channel, extending the usable season. Note: during the late summer months, even if not an ideal feature, it will be used since there are few options in the region. Lowest flows are 500-600 cfs, median summer flows are slightly over 1,000 cfs.

- Upper flow range at about 5,000-6,000 cfs, may go higher but difficult to predict.
- The two channels will form slightly different features (one more of a hole, the other more wavelike).
- From our experienced local paddlers - a feature(s) similar to Salida would be ideal.

#### Design issues:

- Removal of Bridge piers -who has the authority to permit removal of the piers?
- Check tailwater conditions. Somewhat concerned that the backwater from the pool below the bridge extends almost up to the bridge piers.
- The Spokane can peak at 40,000 cfs, though more typical flows are 25-30,000 cfs.

#### To Do

- Find geotechnical report done for the bridge – JCP (Done)
- Get background map done for the bridge – JCP (in progress)
- Project schedule       DEA, REP



Project: Spokane Whitewater Park Design  
Date: December 6, 2005  
Location: SRBC  
Attendance: Consultants: Kathy Schultheis, DEA  
FOF: Steve Faust, Terry Novak, Greg Sweeney, Travis  
Nichols,  
John Patrouch  
David Bauermeister, Chamber of Commerce  
Randy Abrahamson, Spokane Tribe  
Stan Gough – EWU-AHS  
Bob Horrocks – Spokane Canoe and Kayak Club  
Speed Fitzhugh – Avista  
Kaye Turner – Centennial Trail  
Connie Grove, Peaceful Valley  
Judith Gilmore – West Central Neighborhood, Mountain Gear

Topic: Conceptual Design Review Meeting  
Prepared by: John Patrouch, FOF Whitewater Park Committee  
Reviewed by: Steve Faust, Travis Nichols-FOF, Kathy Schultheis-  
DEA

#### Introduction:

Kathy Schultheis introduced herself as the design consultant representing DEA and REP. The stakeholders then introduced themselves.

Kathy presented drawings and photos of the existing site and the proposed conceptual design and reviewed the design elements, including improvements to the north and south banks. The in-river improvements included a double “U” structure located just below the Sandifur Bridge to be constructed of local rock grouted in place to resist scour and movement. The North bank development is proposed as a viewing area made of rock on the river bank designed, in part to stabilize the in-river structure. Other North bank improvements include path and stairs from the bridge and a picnic area and shelter above the 100 year flood plain. South bank development includes bank stabilization at the river shore and a pathway to the in-river improvements. Other south bank improvements shown included additional paved parking, a restroom, and revisions to the centennial trail.

Steve Faust then stated FOF’s intent to focus its effort on the in-river features and expressed the hope that other groups present would step up and take leadership in regard to improvements on the north and south banks. FOF will need to focus on fund raising



for the whitewater park given that the recent cost estimates for just that project have risen to about \$700,000. While the north and south bank elements are important to the overall master plan and complement the whitewater park, FOF does not intend to take the lead in funding these projects. FOF will work with others to achieve the bank improvements. Steve also said that City utilities through their CSO basin project may present a great opportunity to develop the south bank in a way that celebrates the cultural significance of the recent archaeological findings there. Steve expressed his hope that all present could work together to leverage that opportunity. FOF wants to be clear that by including design elements for the banks, it is not intended that they be considered as part of the whitewater park project or that FOF is taking responsibility to accomplish the bank improvements as part of its current effort.

Kathy then reviewed the design elements of the in-stream structure and the suggested bank improvements in greater detail, and opened the floor to questions and discussion from those present.

#### General Comments and Discussion:

David Bauermeister stated that parking facilities would be important and asked what the backup parking strategy would be. Steve noted that the master plan identifies additional parking in High Bridge Park and on the west side of A Street above Riverside.

Kaye Turner stated the suggested relocation of the Centennial Trail on the south bank was consistent with the original intentions of the Sandifur Bridge project, but that the trail location had been modified to the present situation due to cultural concerns which are still an issue.

Randy Abrahamson stated that the Spokane Tribe has been meeting to discuss the South Bank area, and that the tribe views the whole of the Gorge area as one culturally important and very sensitive site. Randy stated he was there to listen as the tribe is early in the process of understanding the proposed project. He stated that many in the tribe would prefer no development in the area. While there are pros and cons to further development, the tribe is willing to listen and has not made a decision on this issue.

New facilities will bring more people to the area. Education, signage and patrolling to limit people digging and picking up artifacts should be considered.

Kathy noted that there may be mitigation requirements attached to any shorelines permit, and this may result in South Bank or North Bank improvements, such as restroom facilities, as a condition to the construction of the in-river features.



David expressed the view that if improvements were going to be mandated on the South Bank as a permit requirement, it was imperative that the improvements be done in a way that was appropriate to the importance of the area, as contemplated by the Master Plan. David stated, to general approval, that those present, and other interested groups, should work together to make sure these improvements are done right.

Greg Sweeney reminded the group that there was a good opportunity to leverage the City's current interest in the area if those interested can unite around a vision for the south bank and act quickly.

Kaye asked if there was any concern with permitting agencies regarding changes to the topography of the river bed. Kathy replied that a consultation meeting with the agencies was scheduled for Dec. 8 and that initial agency reactions to the project have been neutral to mildly positive. Kathy feels agency concerns can be addressed.

Speed Fitzhugh asked if the project design was targeted to any optimum in-river flows. John Patrouch replied that the intent was to optimize at least one of the features at around 2,500 cfs and that the target range was 2,200 and below to 5,000-6,000 cfs. (Note that the previous meeting with Gary Lacy the flow range discussed was from 1,500 cfs to 5,000- 6,000 cfs).

The group discussed the need to address operations and maintenance of the area. Judith Gilmore mentioned the possibility of funding for full-time positions in which residents of West Central, or tribal members, might be employed to maintain the area, pick up trash, and report inappropriate activities to law enforcement authorities. Long term maintenance of the site is already an issue with the increased use created by the Sandifur Bridge. The addition of the whitewater park will increase current maintenance needs.

#### Bridge Piers:

Judith asked about Kathy's statement that removal of the bridge piers would increase the river's capacity to handle flood waters and thus reduce flood risk. Kathy explained the reasoning supporting this statement. A hydraulic model to the 100 yr flood plain will be performed during the next design phase.

Kaye was asked why the unused high-bridge piers had not been removed when the Sandifur Bridge was constructed. Kaye said it was primarily an issue of expense and permitting concerns with total removal of the piers, including the substructure. Removal of just the above ground portions of the piers, as proposed in the whitewater park conceptual design, should be less expensive with less permitting issues.



The group discussed the impact that modification of the piers will have on improving river safety.

#### Cultural – Archaeology:

Stan Gough spoke regarding potential cultural issues of the project design. There are recorded archaeological sites on both sides of the river around the Sandifur Bridge. Both the south and north banks are eligible for inclusion in the National Register of Historic Places. As a result, state law requires that the ground in this area cannot be disturbed without first identifying any adverse effect on cultural artifacts that may be present. The Centennial Trail construction on the south bank involved minimal cutting and mostly filling of soil above the existing site, and thus the cultural investigation required was fairly minimal. Most of the area on the south bank has not been surveyed for cultural sites and there would have to be archaeological work done before cutting or excavating below the surface as part of the whitewater project.

Similar considerations apply in the area of the north bank. There were surveys done as part of the bridge project, but these were closely targeted to the specific areas to be disturbed as part of that project. The areas that were studied were found not to contribute to the North bank's eligibility for listing on the historic register. In Stan's opinion, further archaeological testing will be needed to evaluate areas on the north bank regardless of the specific design of the trails and picnic areas shown on the proposed conceptual plan.

In Stan's view, there are no cultural concerns affecting work on the in-river features. Stan thought the old bridge pilings have been determined ineligible for listing on the historic register. The removal of other objects from the river, e.g., old railroad girders and similar debris, would likely raise no concerns. Randy said that no studies have been done in the river and additional studies and information might be needed.

Kathy suggested that improvements, such as trails could be constructed on top of the existing grade, or not below 8" and that might be acceptable as has been approved in other areas such as the Ahwahnee Hotel grounds in Yosemite National Park.



Spokane Whitewater Park  
Conceptual Design Review Meeting  
Tribal Representatives  
December 2, 2005

<b>Attendees:</b>	phone	fax	e-mail
Randy Abrahamson, Spokane Tribe of Indians	258-4315	258-6965	<a href="mailto:randya@spokanetribe.com">randya@spokanetribe.com</a>
Bryan Flett, Upper Columbia United Tribes	838-1057	838-1292	<a href="mailto:bryanf@aimcomm.com">bryanf@aimcomm.com</a>
Steve Faust, Friends of the Falls	981-6296		<a href="mailto:steve@faustlawfirm.com">steve@faustlawfirm.com</a>
Kathy Schultheis, DEA	327-8697	327-7345	<a href="mailto:kms@deainc.com">kms@deainc.com</a>

Conceptual Design review meeting

The purpose of the meeting was to review the conceptual design for a whitewater park on the Spokane River at the Sandifur Bridge in the City of Spokane. Kathy and Steve presented the conceptual design for the core project, an in-stream facility to create a whitewater venue, and extension projects on the north and south banks to provide shoreline access and accommodate visitors in context with the natural environment. The project is part of The Great Spokane River Gorge Strategic Master Plan and the first of 15 projects identified in the plan to be funded for implementation. The project area is identified as a gateway to the Spokane River Gorge.

1. Randy described that with the findings from the archaeological dig associated with the proposed City CSO detention facility on the south bank, the Tribe was requesting that no development occur in the project area.
2. The Tribe is planning to meet with the City to discuss the whole Hangman Creek area.
3. Bryan described that three or four years ago the Spokane River Gorge Master Plan concept (which includes the whitewater park) went before the Spokane Tribe and two years ago the concept was reviewed by UCUT.
4. Review by UCUT's Technical Body raised the concern of river bank erosion as a result of the whitewater park and requested that technical review be provided as part of the design work to confirm in-stream features would not increase riverbank erosion up or downstream.
5. Randy offered that the Tribe follows PME goals (protect, mitigate, enhance).
6. Randy felt that prior to improvements education of the laws that protect and prohibit collecting and digging of artifacts would be important.
7. Site signage could include educational material, as consistent with the overall master plan.
8. Given the recent site findings it was acknowledged that this location presents a great opportunity to tell the legends, stories and history of the area as a Traditional Cultural Property (TCP).
9. Randy offered the Spokane Tribe intends to have their own Archaeological unit up and running by January 1, 2006. Randy asked that FOF ask the Tribe for a bid to do the archaeology required in association with the whitewater park. The Tribe can also do the TCP, wetland archaeology and construction monitoring.



10. Steve invited Randy and Bryan to the Conceptual Design review meeting on December 6<sup>th</sup> (Kathy had forwarded email invitations to them prior to the meeting).
11. Randy said he would take the proposed concept to the Cultural Affairs Committee (CAC).
12. Randy thought we could hear feedback form the Tribe before the end of the year.

Action Items

1. Kathy will send aerial and concept to Randy for use in presenting the concept to the Tribe. *(Done)*
2. Randy and Bryan will get back to FOF with feedback as discussions continue.

**Distribution (by email):**

- All Attendees



DAVID EVANS  
AND ASSOCIATES INC.

**Spokane Whitewater Park**  
*Conceptual Design Review Meeting*  
*Agency Representatives*  
**December 8, 2005**

<b>Attendees:</b>	<b>phone</b>	<b>e-mail</b>
Tim Eikel, <i>Corps of Engineers</i>	238-4570	<a href="mailto:tim.eikel@usace.army.mil">tim.eikel@usace.army.mil</a>
Michael Maher, <i>WA DOE</i>	329-3584	<a href="mailto:mimah461@ecy.wa.gov">mimah461@ecy.wa.gov</a>
Ted Olson, <i>WA DOE</i>	329-3413	<a href="mailto:tolson461@ecy.wa.gov">tolson461@ecy.wa.gov</a>
Karin Divens, <i>WDFW</i>	892-1001 x323	<a href="mailto:kdivens@dfw.wa.gov">kdivens@dfw.wa.gov</a>
Bruce Heiner, <i>WDFW</i>	332-0892	<a href="mailto:bheiner@dfw.wa.gov">bheiner@dfw.wa.gov</a>
Steve Haynes, <i>City of Spokane, Shorelines</i>	625-6088	<a href="mailto:shaynes@spokane-city.org">shaynes@spokane-city.org</a>
John Patrouch, <i>Friends of the Falls</i>	927-7256	<a href="mailto:patrouch@fotf.com">patrouch@fotf.com</a>
Michelle Anderson, <i>DEA</i>	327-8697	<a href="mailto:mca@deainc.com">mca@deainc.com</a>
Kathy Schmitheis, <i>DEA</i>	327-8697	<a href="mailto:kms@deainc.com">kms@deainc.com</a>

**A. Conceptual Design Review**

The purpose of the meeting was to review the conceptual design for the Spokane Whitewater Park *(dated 11/1/05)* with agency representatives and identify permitting and design specifics for incorporation in preliminary design and the project schedule. Kathy presented the conceptual design for the park proposed on the Spokane River at the Sandifur Bridge, west of downtown Spokane and upstream of the Lemhi Creek confluence. The core project, promoted by the Friends of the Falls, is a flow through in-stream structure constructed by modifying the river bottom to create a whitewater venue and includes a trail on south bank to access the river. Extension projects are proposed, for promotion by others, on the north and south banks to provide shoreline access and accommodate visitors in context with the natural environment. The project is part of The Great Spokane River Gorge Strategic Master Plan and the first of 15 projects identified in the plan to be funded for implementation.

Kathy confirmed the in-stream structure is made by excavating the river bottom and grouting rounded boulders in two U-shaped structures that will span the width of the river. The base rocks would be set below scour depth and the rock structure would be anchored at the center bridge pier and each riverbank with expanded rock areas also used as viewing areas. Review of a typical profile through a U-structure shows that the finished in-stream structure elevation is at or below the existing stream bottom. The structure would result in directing river flow to the center of two channels and away from the river banks. The structure is not anticipated to raise the floodplain, impact existing islands or areas upstream and downstream. Debris in the river within the structure area and within the south bank access trail footprint would be removed. Preliminary design will include a scour analysis and 100 year flood hydraulic model. Construction would be done in the dry using coffer dams or other isolation measures to divert the river from one side to the other.

**B. Agency Consultation**

Following extensive discussion of the project components the agency representatives offered the following comments and concerns for consideration:



**City of Spokane, Shorelines – Steve**

1. Would prefer not to remove willows on the north bank for the armoring.
2. Provide confirmation that project would have no impact to existing river islands.
3. Provide confirmation that removal abandoned piers would have no impact on the bridge piers and pool.
4. Provide confirmation that the tail of existing pool downstream would not be impacted.
5. The south bank is highly disturbed in its existing state, the concept is viewed as a positive improvement.
6. A Habitat Management Plan will not be required as long as WDFW conditions are met during permitting.
7. The City could not complete SEPA without WDFW involvement.
8. Anticipated that there are no cultural concerns on the south bank since it is highly disturbed.

**WA DOE – Ted**

1. The Floodway is in the national flood insurance and therefore the project must not raise the base flood elevation, will accept only zero rise in the flood plain.
2. Advised to reference the flood insurance study done either by the Corps or Howard Needles Tammen. The 1982 flood map shows cross sections P, D, M, and N in the project area.
3. The floodplain development permit would be handled by the City of Spokane.

**WA DOE – Mike**

1. Provided a copy of the City of Spokane Shoreline Master Program commenting that the project would need to be consistent with the program.
2. The project is viewed as an appropriate use for the shoreline and increases public access to shorelines.
3. Advised to go through the shorelines conditional use permit process as planned.
4. Concerned with removal of mature willows on the north bank for armoring, since such maturity is difficult to replace.
5. Concerned with timing of the support facilities, some of the north and south bank improvements may be seen as needed concurrent with the in-stream structure. Consider the need for parking, restrooms, and changing area.
6. Concerned with water quality, provide confirmation that there would be no impacts.
7. Advised dredging is prohibited, excavation is permitted.
8. Consider 100' setback from OHW in site layout, parking etc.
9. No individual 401 permit would be needed, just comply with the Corps general conditions.
10. No 402 NPDES permit would be required.
11. For irrigation of plants, a temporary water withdrawal approval would be needed from DOE.

**WDFW – Karin and Bruce**

1. Concerned with impact to shoreline vegetation. The willows on the north bank need to be preserved as that was mitigation for the previous bridge project.
2. Will require fish passage during all flows. Prefer that the structure not be the full channel width, however anticipates that acceptable passage may be achieved on either side of the U-structure center. Provide confirmation that acceptable fish passage can be achieved, provide velocities in hydraulic analysis. Advise utilizing the online culvert criteria.
3. Bruce thinks the size of the pool will take care of scour. Provide confirmation through hydraulic analysis.
4. Confirm long term scour would not affect the tailout of the existing downstream pool, this is a typical potential spawning area and should not be impacted.
5. Woody debris could have a chance to get caught up on the center islands, needs to be allowed to flow down stream (maintenance education issue).
6. If the entire triangle of rock on the north bank is not needed for anchoring, reduce the size of the area to the minimum needed.



7. Consider establishment watering for new vegetation. Could obtain a temporary water withdrawal from DOE.
8. State Parks has \$5,000 that needs to fund vegetation for the bridge mitigation that could potentially be applied through this project.
9. Plantings would need to be native along the shoreline.
10. Would need to consider multiple recreational users for this project including fly fishers.
11. Consider removal of concrete and asphalt along the riverbank as a mitigation measure.
12. Would prefer to see bioengineering treatments for retaining the south bank trail access to the river.
13. Need to determine the dewatering location for dirty water during construction.
14. Need to determine construction access for both sides, and potential mitigation.
15. Advised the construction window is June 15<sup>th</sup> through August 15<sup>th</sup>. Any in water work outside of that work window would require mitigation.

#### **CORPS – Tim**

1. The north side anchoring seems excessive, reduce and retain the mature vegetation.
2. Suggested port-a-dam to be used for coffer dam and could use gravel to anchor during construction then release gravels into riverbed to benefit fish habitat and serve as mitigation. Release of additional gravels into the system could be a mitigation measure.
3. Advised may need to check with SHPO for removal of piers.
4. Mitigation could be revegetation of the shoreline and rehabilitation of areas that are trashed.
5. Anticipates this project would fall under a nationwide permit for recreation that permits ½ acre of impact rather than an individual permit.
6. Provide the area size and volumes for entire area of disturbance for permit application.
7. Tim would do the no effect letter for ESA compliance.
8. Corps requires SHPO concurrence and correspondence from Tribes to finalizing the nationwide permit.
9. The current nationwide permits expire in Spring 2007, perhaps mid March and nationwide permits could change. Advised that a construction contract be signed and in place prior to that date in order to use current permits.

#### **C. Schedule**

1. Cultural Resources Survey would need to be complete and concurrence received before 404 permit is granted. Preferably wait to see the outcomes of other archeological work nearby to determine direction.
2. SEPA would need to be complete before Shorelines or HPA could be finalized.
3. SEPA would take about 45 days to process.
4. WDFW would process the HPA within 45 days of receiving a complete application. Mitigation would need to be negotiated after impacts are assessed and would be submitted with the application.
5. The Corps would take approximately 2 months as long as it fits under a nationwide.
6. The floodplain development permit would take about 30 days or less to process.
7. A temporary water withdrawal permit would take 2 weeks or less to process.
8. The Shorelines approval (Conditional Use Permit) would take approximately 5 months and would need to include one month of city review, one month of Ecology review and three weeks of public review and the hearing examiner's decision. Public review could consist of review of the conceptual designs.
9. We would not be able to permit this for this summer's work window.
10. The time frame for permit processing would be contingent on the cultural, SEPA and Shorelines but could be approximately 5-8 months.

**Distribution (by email):** All Attendees, Gary Lacy, *Recreational Engineering and Planning*



## **Appendix B.**

### **Cost Estimate Phase I.**

**Recreation Engineering and Planning**  
**Opinion of Probable Construction Cost: Spokane Whitewater Feature**  
**Dated: 2/13/2006**      **Prepared by: Gary Lacy**

Item Number	Description	Estimated Quantity	Unit	Unit Price	Item Total Price
<b>Whitewater Feature</b>					
1	Mobilization to include costs for bonding, insurance, traffic control, staging, etc.; no measurement for payment shall be made of any of the work, materials and equipment used for mobilization.	L.S.	L.S.	\$50,000.00	\$50,000.00
2	Water Quality *	L.S.	L.S.	\$30,000.00	\$30,000.00
	Water control*	L.S.	L.S.	\$80,000.00	\$80,000.00
	* Will depend on permitting requirements				
3	Drop #1, Double "U" drop. Includes excavation, rock placement, and backfill	1300	Cubic Yards 4' - 6' dia. rock	\$85.00	\$110,500.00
4	Rock Scour Protection at Base of Structure including all excavation, rock placement and backfill	400	Cubic Yards 1'-2' dia rock	\$25.00	\$10,000.00
5	Boulder overflow mattress on north bank including all excavation, rock placement, and backfill	400	Cubic Yards 4'-6' dia. rock	\$85.00	\$34,000.00
6	Overflow reinforcement and terracing on the south bank including excavation, rock placement, backfill and compaction	300	Cubic Yards 4' - 6' dia. rock	\$85.00	\$25,500.00
7	Concrete grout pumped within voids in rock as directed.	170	Cubic Yards	\$180.00	\$30,600.00
8	Concrete Pier Removal (5- Assume work is done when river is diverted)	140 (Each)	Cubic Yards	\$25.00	\$17,500.00
9	Additional Heavy Equipment if required or authorized by Engineer (not part of any bid item): Backhoe w/thumb (CAT 235 or equiv.)	80	Hours	\$120.00	\$9,600.00
<b>Boater Access Trail (6' wide)</b>					
	Grading	1	L.S.	\$10,000.00	\$10,000.00
	Rock Boulder Wall	200	L.F.	\$75.00	\$15,000.00
	Crushed surfacing top course (4" thick)	250	S.Y.	\$5.00	\$1,250.00
	Landscape (vegetation)	1	L.S.	\$4,000.00	\$4,000.00
<b>Construction Cost Estimated Subtotal</b>					<b>\$427,950.00</b>
10	Contingency 10%	L.S.	L.S.	\$42,795.00	\$42,795.00
<b>Construction Cost Estimated Total</b>					<b>\$470,745.00</b>
Design and Permitting (for in-channel work)					\$80 - \$95,000
Design \$40 - \$45,000					
Permitting \$15 - \$20,000					
Bid Administration \$10,000					
Construction Phase Services \$15 - \$20,000					
Sales Tax 8.5%					\$40,000
Cultural resource survey					\$23,000
<b>Total Cost Range of Phase I: \$613,700.00 to \$628,700.00</b>					

Itemized costs:	Normal	
Rock costs per cubic yard	85	*Permitting and Cultural Resource survey costs are for both Phase I and 2. Cultural Resource survey for Phase 1 is estimated at \$23,000, for Phase 2 \$37,000.
Grout costs per cubic yard	180	
Heavy equipment cost/hour	120	
1'-2' Rock	25	
Concrete Removal per cubic yard	25	



## **Appendix B. Cost Estimates**

**Cost Estimate Phase II.**

**Civil Engineering/Landscape Architecture  
Opinion of Probable Construction Cost**



Type Estimate:  Preliminary      Construction of:  Softscape      Improvement of: Spokane Whitewater Park  
 Final       Hardscape

Based on Plan: Conceptual Plan      Project #: REPX0001  
Dated: 3/17/2006      Prepared by: KMG/REP      Date: \_\_\_\_\_      By: \_\_\_\_\_

**SOUTH BANK**

Item #	Description	Quantity	Unit	Unit Price	Total
<b>1</b>	<b>Parking</b>				
	Grading	600	CY	\$10.00	\$6,000.00
	Crushed surfacing top course (CSTC) 4" thick	2,800	SY	\$5.00	\$14,000.00
	Class 'A' ACP, 2" thick	2,800	SY	\$6.00	\$16,800.00
	Spokane County Type A curb	1,500	LF	\$9.00	\$13,500.00
	Drainage	1	LS	\$10,000.00	\$10,000.00
	Concrete reinforced driveway	48	SY	\$50.00	\$2,400.00
	Signage and Striping	1	LS	\$1,000.00	\$1,000.00
<b>2</b>	<b>Concrete Flat Work</b>				
	Grading	1	LS	\$500.00	\$500.00
	Crushed surfacing top course (4" thick)	5	SY	\$5.00	\$25.00
	Concrete slab for restrooms	20	SY	\$33.00	\$660.00
<b>3</b>	<b>Trail (12' wide)</b>				
	Grading	1	LS	\$2,000.00	\$2,000.00
	Crushed surfacing top course (4" thick)	1,200	SY	\$5.00	\$6,000.00
	Class 'A' ACP (2" thick)	1,200	SY	\$6.00	\$7,200.00
<b>4</b>	<b>Trail (6' wide)</b>	<b>Moved To Phase I Cost Estimate</b>			
<b>5</b>	<b>Restroom</b>	1	EA	\$80,000.00	\$80,000.00
<b>6</b>	<b>Site Furnishings</b>				
	Bollards	4	EA	\$500.00	\$2,000.00
	Gate	1	EA	\$1,000.00	\$1,000.00
<b>7</b>	<b>Landscape</b>				
	Landscape (trees, shrubs, groundcovers)	1	LS	\$7,000.00	\$7,000.00
<b>Subtotal</b>					<b>\$170,085.00</b>
	Contractor Mobilization/Overhead (5%)				<b>\$8,504.25</b>
	Contingency (20%)				<b>\$35,717.85</b>
<b>Construction Cost Total (South Bank)</b>					<b>\$214,307.10</b>

**Civil Engineering/Landscape Architecture  
Opinion of Probable Construction Cost**



Type Estimate:

Construction of:

Improvement of:

Preliminary

Softscape

**Spokane Whitewater Park**

Final

Hardscape

Based on Plan: **Conceptual Plan**

Project #: REPX0001

Dated: 3/17/2006

Prepared by: KMG/REP

Date: \_\_\_\_\_

By: \_\_\_\_\_

**NORTH BANK**

Item #	Description	Quantity	Unit	Unit Price	Total
<b>1</b>	<b>Concrete Flat Work</b>				
	Grading	1	LS	\$750.00	\$750.00
	Concrete slab for shelter	67	SY	\$33.00	\$2,211.00
<b>2</b>	<b>Trail (8' wide)</b>				
	Grading	1	LS	\$2,000.00	\$2,000.00
	Crushed surfacing top course (4" thick)	555	SY	\$5.00	\$2,775.00
	Class 'A' ACP (2" thick)	555	SY	\$6.00	\$3,330.00
<b>3</b>	<b>Concrete Flat Work</b>				
	Grading	1	LS	\$1,000.00	\$1,000.00
	Crushed surfacing top course (4" thick)	70	SY	\$5.00	\$350.00
	Concrete slab for restrooms	70	SY	\$33.00	\$2,310.00
<b>4</b>	<b>Picnic Shelter</b>	1	EA	\$15,000.00	\$15,000.00
<b>5</b>	<b>Site Furnishings</b>				
	Picnic tables	4	EA	\$950.00	\$3,800.00
	Stairs	1	EA	\$5,000.00	\$5,000.00
<b>6</b>	<b>Landscape</b>				
	Landscape (trees, shrubs, groundcovers)	1	LS	\$5,000.00	\$5,000.00
<b>Subtotal</b>					<b>\$43,526.00</b>
	<i>Contractor Mobilization/Overhead (5%)</i>				<b>\$2,176.30</b>
	<i>Contingency (20%)</i>				<b>\$9,140.46</b>
	<b>Construction Cost Total (North Bank)</b>				<b>\$54,842.76</b>
	<b>Construction Cost Total (North and South Bank)</b>				<b>\$269,149.00</b>
	<i>Permitting</i>				<b>\$15,000.00</b>
	<i>Design (15%)</i>				<b>\$40,372.00</b>
	<i>Cultural Resources</i>				<b>\$37,000.00</b>
	<i>Tax (8.5%)</i>				<b>\$22,878.00</b>
	<b>Total Cost of Phase II</b>				<b>\$384,399.00</b>

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## **Appendix C. Project Schedule**

# Federal Documentation and Approval

## 1. Cultural Resources

### Task 1.1 Cultural Resources Investigation

An archeological and historical survey and report to identify significant cultural resources is needed to comply with Section 106 of the National Historic Preservation Act (NHPA). This would include development of the Area of Potential Effect (APE) in consultation with the State Historic Preservation Office (SHPO), the Spokane and Coeur d'Alene Tribe and the Advisory Council for Historic Preservation and the US Army Corps of Engineers. There would be background research of ethnography, environment, methods and results. There would be shovel testing, and documentation of findings. The identified resources would be evaluated to determine if they are eligible for the National Register of Historic Places (NRHP). The Criteria of Adverse Effect would be used to determine the effects of the project action on the NRHP eligible resources. This scope assumes there would be cultural resources eligible for NRHP in the APE and that the project would adversely effect some of those resources. This cultural resources survey report will be submitted to the State Historic Preservation Office for review and a concurrence obtained.

### Task 1.2 Tribal Consultation

In addition, tribal consultation with the Spokane Tribe would be an important part of this task. This would involve the project proponent meeting with the Spokane Tribal Historic Preservation Office twice, a meeting/field visit with Tribal Elders and a presentation for the Tribal Council. It is anticipated that these would be full day meetings. This task would also involve documentation of the meetings.

### Task 1.3 Memorandum of Agreement (MOA)

In order to complete the Section 106 process, if there are NRHP eligible resources found and they would be adversely affected by the project and SHPO concurs, a MOA will be prepared outlining the affected resources and stipulating mitigation measures. These measures will be coordinated and agreed upon by the MOA signatories and consulting parties. If a data recovery plan, inadvertent discovery plan or any other supplemental documentation is required by the stipulations of the MOA, a supplemental agreement will be prepared.

## 2. Threatened and Endangered Species



The Endangered Species Act requires that a Biological Assessment or No Effect Letter be prepared to determine species presence and impacts to species in the action area. Our contact with USFWS indicates that there are no Threatened or Endangered plant species that occur in the project area at this time. It is anticipated that a Biological Assessment would not be prepared and that a No Effect Letter would be the appropriate level of documentation. The U.S. Army Corps of Engineers would provide the No Effect letter.

### 3. Project Permitting

This task involves assessing the types of permits that would be required for environmental impacts to the project, preparing permit applications, coordinating project details to avoid, minimize and otherwise mitigate for impacts to the resources. This would also involve assisting with development of plan sheets and specifications of the project and applicable mitigation sites for submission to the regulatory agencies. DEA would coordinate one meeting with the following agencies to obtain information on issues and resources. It is assumed that the impacts to the project would be able to be covered under a Nationwide 404/10 permit and any mitigation required by agencies would be able to be conducted on-site within the project limits. Agency Coordination meetings would discuss regulatory requirements that would need to be addressed, or procedures or protocols that would need to be used. It is anticipated that there would be one meeting with all agencies to provide an overview of the project. Subsequent meetings would be held with agencies as needed if agencies were unable to attend or to discuss one or more resources.

Coordination would occur with the following agencies:

Specific agencies to be contacted include:

- United States Army Corps of Engineers (Corps)
- United States Fish and Wildlife Service (USFWS)
- Washington State Department of Ecology (Ecology)
- Washington State Department of Fish and Wildlife (WDFW)
- City Planning Departments

#### Assumptions

- The permitting process completion is contingent on the cultural resources completion (SHPO concurrence), Endangered Species Act compliance, and SEPA approval. Permits may not be approved without these items being completed.
- The longest time frame would be the Shorelines Permit processing. It is assumed that a conceptual design may be used for the public involvement and hearing for this process.
- There are no wetlands on site.



- No Habitat Management Plan would be required to comply with the City of Spokane Critical Areas Ordinance.
- No NPDES general permit would be required.
- This would qualify as a Recreational Facility 404/10 Nationwide permit.
- No separate mitigation plan would be required. Mitigation would be included in the general project design and plans or otherwise incorporated into the project.
- The proposed project would require the following permits and sufficient information to complete the permit applications would be provided:
  - Section 404/10 Nationwide permit
  - 401 Water Quality Certification
  - Flood plain Development Permit
  - Hydraulic Permit Authorization (HPA)
  - Shorelines Substantial Development Permit
  - SEPA DNS Checklist

**Deliverables:**

- 2 Drafts and 1 final Permit application package (JARPA)
- Section 404/10 Nationwide Permit
- 401 Water Quality Certification
- Flood plain Development Permit
- Hydraulic Project Authorization (HPA)
- SEPA Determination of Non Significance
- DEA participation in 1 public hearing and up to two agency coordination meetings.

**Time and Budget**

- The project permitting tasks are estimated to require 140 hours and 5 months from the time the following information is provided to complete plans and applications for the permitting process:
  - quantities of fill and excavation above and below ordinary high water
  - anticipated construction methods (staging areas), construction sequencing and equipment used.
  - Materials to be used.
  - Erosion control and work area isolation measures.
  - Fish passage hydraulic analysis/
  - Duration and timing of construction.
  - Other information as request.



## **Appendix D. Conceptual Design (Graphic 1)**



## **Appendix E. Cross-section and Details (Graphic 2)**



**Appendix F. Existing Site (Graphic 3).**

