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**Table of Contents**

1. **Introduction**…………………….…………………………………………………….…..3

Summary…………………………………….……………………………...……..3

Purpose…………………………..…………………..…………………………….3

Scope…………………………...………………………………….………..……..3

1. **Literature Review**………………………………...………………………..……………………..…..4

Literature…………………………………………………………………….…….5

1. **Proposal**………………………………..………………...………………………….……6

Data………………………………………………………………………….…….6

Data Dictionary……………………………………………………………………6

Methodology………………………………………………………………...…….7

Implications…………………………………………………………………..……8

Budget………………………………………………………………………..……9

Time Table……………………………………………………………….………10

Final Deliverables…………...………………………………………………...…11

1. **Conclusion.**………………...………………..………………………………..…............11
2. **Participation**……………...………………..……………………………………..……..12
3. **Bibliography**……………………...……..………………………………………………12

**I. Introduction**

**Summary**

The Five Mile Dam Soccer Complex is owned by Hays County, maintained by the city of San Marcos, and used by numerous sports groups of all ages. The city maintains the complex by replacing and/or fixing the old or broken features, such as light bulbs, sprinkler heads in need of repair, and general inventory that needs to be replaced. The soccer complex developed in conjunction with the city of San Marcos and other partners on September 18, 2010. The park covers 43-acres including a play scape, pavilion, and concession stand. This semester Geographic Resource Analysis & Maintenance will be working to provide the city of San Marcos with a detailed geodatabase concerning all features provided and maintained within the Five Mile Dam Soccer Complex.

**Purpose**

The objective of this study is to expand the geodatabase for the Five Mile Soccer Dam Complex with a focus on collecting GPS and attribute data for all the requested features of the soccer complex, establishing a methodology for collecting features which can be used for future city projects, and modeling the layout geospatially of the soccer complex. The project will be accomplished through the use of field methods to help gather and display geospatial information, as well as the option for clients to input which features need maintaining.

**Scope**

The geographic extent of our study area is the Five Mile Dam Soccer Complex in San Marcos, Texas, which is 43 acres. Our specific study area will be the soccer fields and the surrounding area that is maintained by the city of San Marcos. The study will take approximately four months to complete.

**II. Literature Review**

The use of geospatial information systems (GIS) on aiding city workers and employees to know which features of a park requires maintenance has become a new phenomenal process which helps city parks managers plan logistics, enhance communication, and cut costs. In 1962, the father of GIS, Roger Tomlinson, became the first person to define Geographic Information Systems (David DiBiase, 2012). Tomlinson was able to convince the Canadian Land Inventory to use computers to automate map making to create a more efficient way of conducting land inventory, and the inventory process. Since then we have seen many years of new knowledge and countless new and exciting advancements in the GIS technological world, and we are now able to apply almost limitless tools and various data management techniques to make many duties much more time and cost effective.

Geospatial technology can be used to ensure maintain and manage parks with ease after simply recording geospatial reference points of all amenities within the property, placing those points into an organized database, and finally create a visual representation of the area of study. The management and maintenance teams of many city parks and recreational departments all over the U.S. already use the power of geospatial technology today to help decrease the stress of countless task. One examples of the fact is the city of Philadelphia, who has recently utilized the endless possibilities of GIS to help boost the productivity of their parks and recreation department within the city. The Philadelphia Deputy Commissioner of Parks and Facilities Mark Focht explained “Our staff is being much more efficient, targeted and strategic because they’re not guessing what they should go to do this day, because they know that our top priority is to go to this rec center and fix this exposed wire, or go to this park and take care of this hazard”. With the help and power of GIS implementation, the city of Philadelphia has enjoyed an annual saving of approximately $355,000 with mowing contracts alone according to John Piller, a special projects manager with the Philadelphia Parks and Recreation Department (nextcity.org).

Our near neighbor, the city of Austin, has also wasted no time integrating Geospatial systems into their parks management tools to help them reach new heights in property management of parks and recreational facilities within the city. The city of Austin expresses their feelings for the importance of GIS implementation into their city’s parks stating, “ a few advantages to utilizing GIS includes improved communication, enhanced record keeping, cost savings, increased efficiency, and better decision making” (AustinTexas.gov). In fact, AustinTexas.gov includes a fully functional map of all parks and recreational facilities that visitors and residents within the city can use to navigate, find various recreational activities such as bike trails, and locate every amenity of every park from their home computer. This tool is extremely helpful to those who use the park, and those who want to travel from out of town to experience the Parks and recreational facilities, therefore helping boost the overall economy in Austin.

GIS can be used as a catalyst for ensuring that all functions of the entire Parks and Recreation team of San Marcos are being utilized to their maximum potential. Rather than having employees show up day to day unknowing what their tasks will be for that day and simply just tackling jobs as they come, GIS software can ensure that mangers and their employees understand exactly what the tasks are within facilities as well as what will be needed to complete these tasks and when this task will need maintenance once again in the future. Through the implementation of the data management and data sharing capabilities of ArcGIS, the San Marcos Community Services-Parks and Recreation Department will be able to effectively communicate, improve productivity and efficiency, and stream project management throughout the department with minimal effort.

**III. Proposal**

**Data:**

The majority of our data will be collected primarily using a Trimble GPS unit. Within the GPS unit we will have a data dictionary assigning field classes for all the data recorded on the complex. Upon completion of the data collection we will use computer program’s Pathfinder, ArcMap, and Adobe Illustrator to create an understandable final map layout of the soccer complex. Below is a data dictionary our group will customarily program into the Trimble GPS unit to make data collection simpler and more efficient for everyone.

**Data Dictionary**

|  |  |  |  |
| --- | --- | --- | --- |
| **Feature** | **Data Type** | **Primary Attributes** | **Secondary Attribute** |
| Field | Polygon | Usage | Active, Inactive |
| Parking Lot | Polygon | Usage | Active, Inactive |
| Sprinkler System | Point | Usage | Active, Inactive |
| Material | Plastic, Metal, Other |
| Type | Valve Box, Sprinkler Head |
| Stationary Garbage Receptacles | Point | Usage | Recycling |
| Non-Recycling |
| Trail | Line | Type | Running |
| Building | Polygon | Name | (Text Box) –  Concession Stand |

**Methodology**

The primary objective of this project is to collect attribute data associated with requested features and amenities within the Five Mile Dam Complex and establish a geodatabase of these amenities that can be applied to all city sports facilities in the future. Along with creating a functioning database containing amenity statuses we will be providing a detailed map of the complex that the city of San Marcos and Hays County can use as a visual interpretation showing the functionality of the entire park. Upon finalization of this project we will then establish a step-by-step methodology that other clients and workers can use for similar park and recreational complex situations.

In order to do this we will model a layout of the soccer complex with precise data input collected with an advanced GPS unit. We will record the accuracy of each feature located in order to be as precise as possible with our data. This requires around one to five minutes of coordinate collection for each feature to improve both accuracy and precision for the best mapping results. This portion of the project will be the most time consuming and strategically planned. Not only will we strive to collect the most accurate data, but we will have a well thought out process of collection for each day we work on the complex.

Upon collection we will then file a geodatabase including not only the data dictionary mentioned above but also a more thorough feature analysis that can be provided and accessed for the city of San Marcos. Our data will be specific and will pertain to the requested features and amenities. The location, functionality, and needed maintenance will be included in the attributes and classes of each feature within our filed geodatabase for the complex. The features existing on the park currently will be filed appropriately as well as the requested amenities for maintenance analysis. Allowing multiple classifications for related features (such as sprinkler heads and valve boxes according to sprinkler system coordinates) will provide the City of San Marcos much more flexibility and comfort when they access our database for their specific maintenance needs.

Once the geodatabase has been created, we will model a detailed layout of the park that can be easily referenced with the geodatabase. The 43-acre soccer complex contains many features to be recorded such as garbage receptacles, field locations, irrigation devices and distinctive boundaries. This will require hours of GPS waypoint collection in order for the accuracy of this project to be solid. When the data has then been collected and filed completing the geodatabase and fieldwork we will then provide a methodology for future amenity maintenance professionals to use as a guide for preserving their park or recreational complex.

**Implications**

The end result of our efforts will provide the city of San Marcos with an easily updateable, visual model format of the Five Mile Dam’s many amenities as well as the attributes of each of these amenities to ensure that maintenance of the complex is carried out at the highest level of efficiency. Our overall objective is to provide the city of San Marcos with a geospatial referencing system that includes all of the amenities of the Five Mile Dam Soccer Complex that can be accessed and easily updated by the city’s parks and recreation department. This product will provide the Parks and Recreation Department with the geospatial data within the complex allowing them to manage, maintain, and preserve the quality of this complex as well as any other desired sports facility in the future without ever leaving the office. We will also present a well-organized, well designed map of the entire study area that will afterwards be available as a tool for the city of San Marcos to implement into park management duties and tasks with unparalleled ease. The final presented model will be applicable to any other city-owned and operated sports facility throughout the city of San Marcos to allow excellent data management possibilities increasing the quality and efficiency of maintenance of all sports facilities. The parks and recreation department in San Marcos will therefore be able to complete more tasks sooner, therefore saving the city of San Marcos considerable amounts of time and money through simple GIS implementation for years to come.

**Budget**

|  |  |  |  |
| --- | --- | --- | --- |
| Data Collection | | |  |
| Total Hours | 2(10 hours for 2 weeks) | 40 |  |
| Hourly Pay | Assistant | $25 |  |
| Hourly Pay | Consultant | $20 |  |
| Total |  | $900 |  |
| Data Analysis | | |  |
| Total Hours | 2(10 hours for 2 weeks) | 40 |  |
| Hourly Pay | Manager | $30 |  |
| Hourly Pay | Assistant | $25 |  |
| Total |  | $1,350 |  |
| System Management | | | |
| Project Manager |  |  |  |
|  | Total Hours | 50 |  |
|  | Hourly Pay | $30 |  |
|  | Pay | $1,500 |  |
| Assistant Manager |  |  |  |
|  | Total Hours | 40 |  |
|  | Hourly Pay | $25 |  |
|  | Pay | $1,000 |  |
| GIS Consultant |  |  |  |
|  | Total Hours | 40 |  |
|  | Hourly Pay | $20 |  |
|  | Pay | $800 |  |
|  | Total Pay | $3,300 |  |
| Travel Expenses | | | |
|  | 50 miles @ $0.20/mile | $10 |  |
| Total Costs | | | |
|  |  | $8,060 |  |

**Projected Time Table**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Sun | Mon | Tues | Wed | Thu | Fri | Sat |
| January |  |  |  |  | 1 | 2 | 3 |
|  | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|  | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|  | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|  | 25 | 26 | 27 | 28 | 29 | 30 | 31 |
| February | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|  | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|  | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
|  | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| March | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|  | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|  | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
|  | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| April | 29 | 30 | 31 | 1 | 2 | 3 | 4 |
|  | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|  | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|  | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| May | 26 | 27 | 28 | 29 | 30 | 1 | 2 |
|  | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|  | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|  | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|  | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
|  | 31 |  |  |  |  |  |  |

|  |
| --- |
| **Dates** |
| **January 21 - First Day of Class** |
| **January 26 - Receiving RFP** |
| **February 2 - Client Day** |
| **February 23 - Proposal Due** |
| **February 25 - Proposal Presentation** |
| **March 30 - Progress Report Due** |
| **May 4 - Last Day of Class** |
| **May 8 - Project Presentations** |

|  |
| --- |
| **Time Line** |
| 1-2 Project Assessment |
| 3-6 Data Collection |
| 7-8 Organizing Data |
| 9 Spring Break |
| 10-11 Data Analysis |
| 12-13 Data Interpretation |
| 14 AAG Meeting |
| 15-16 Final Markups |

\*This timetable and timeline are subject to change as the project progresses throughout the five months. Being a tentative schedule, the project may be completed sooner than shown or later, depending on variables such as weather permitting situations during data collection in the field or technical difficulties with the software.

**Final Deliverables**

1. Detailed final report and presentation
2. CD (multiple copies) containing amenity analysis GIS data, project proposal, reports and presentations
3. Instructions on how to access and use the created data on the CD
4. Hardcopy of final map layouts and designs
5. Professional poster for display in the Geography Department
6. Professional website containing all work and progress done pertaining to this project

**IV. Conclusion**

Geographic Resource Analysis & Maintenance (GRAM) has researched and developed criteria for the preservation and maintenance of city sports facilities by establishing an amenity file geodatabase. This criterion includes, in order from this project’s beginning to end: GPS coordinates, a geodatabase for amenity analysis, a detailed map of boundaries and amenity locations, and a final methodology of amenity collection and database instructions for future use. When we have completed this project the City of San Marcos will be better equipped to maintain the Five Mile Dam Soccer Complex’s original functionality and aesthetic beauty for decades to come.

**V. Participation:**

Daniel Cohen: Project Management, Budget Analysis, and Timetable,

Sam Boesch: Data, Methodology, Company Design, Final Deliverables, and Conclusion

Matt Riggan: Literature Review, Purpose, Scope, References, Implications, and Bibliography

**IV.Bibliography:**

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* Stephens, Alexis. *High-Tech Advances Make Smarter City Parks.* Next City. Web. January 12, 2015. Accessed February 5, 2015.