

DATA**M**ARK

**Michael Baker**  
INTERNATIONAL



*February 26, 2021*

**DATAMARK PROPOSAL  
COCONINO COUNTY, AZ**

February 26, 2021

Ms. Katie Brandis  
Coconino 9-1-1 System Administrator  
911 East Sawmill Road  
Flagstaff, AZ 86001

**RE: COCONINO COUNTY BUDEGATARY QUOTE**

Dear Ms. Brandis,

DATAMARK®, the public safety division of Michael Baker International, Inc., in partnership with TerraSystems Southwest Inc., are happy to provide you the following budgetary quote requested to support on-going Next Generation 9-1-1 (NG9-1-1) data improvement for Coconino County.

This quote, including any scope of work and cost, is a firm offer until July 31, 2021.

Upon approval of the project, a final quote, scope of work (SOW) and Software as a Service (SaaS) agreement will be provided to Coconino County for signature.

We look forward to supporting Coconino County in their NG9-1-1 goals.

Best Regards,



Sandy Dyre, ENP, CPM  
Account Manager  
Sandy.Dyre@mbakerintl.com



Howard Ward  
Principal, TerraSystems Southwest, Inc.  
HLWard@terrasw.com

## INTRODUCTION

The DATAMARK® team of Michael Baker International, Inc. (Michael Baker), in partnership with TerraSystems Southwest, Inc. (TSSW) is pleased to present this scope of work for GIS data management software and data remediation services to Coconino 9-1-1.

Sandy Dyre is your account manager from the DATAMARK team. Sandy will work with your team as an advocate and advisor, through the execution of proposed solution, to maintain focus on the overall project vision and the future needs of Coconino 9-1-1. The account manager will act as the primary point of contact for this proposal.

The TSSW team will be coordinated by Cheryl Thurman, TSSW Vice President and GIS Manager, through their Tucson office. TSSW has been successfully supporting the GIS needs of state and local entities in Arizona for over 20 years. Recognized as local data experts, TSSW brings a depth of understanding of local and statewide datasets that would be advantageous in this effort.

The project team understands the project goals are:

- Conduct a detailed current state 9-1-1 GIS data analysis of the Coconino 9-1-1 road centerlines and emergency service response boundaries for PSAP, law, fire, and emergency medical services to identify where anomalies exist that would likely cause 9-1-1 call routing problems in a Next Generation 9-1-1 (NG9-1-1) system.
- Based on the data analysis performed by the DATAMARK-TSSW Team to support this project, work with Coconino 9-1-1 and its GIS and 9-1-1 staff to prioritize the remediation of identified anomalies in each of the GIS data sets.
- Execute agreed-to GIS data remediation of the anomalies identifies in the 9-1-1 GIS data analysis phase.
- (Optional) Conduct a detailed current state 9-1-1 GIS data analysis of the Coconino 9-1-1 updated emergency service response boundaries for PSAP, law, fire, and emergency medical services and community boundaries to identify where anomalies exist that would likely cause 9-1-1 call routing problems in a Next Generation 9-1-1 (NG9-1-1) system.
- Provide Coconino 9-1-1 a DATAMARK VEP (Editor) One (1) Year Subscription to support data analysis and validation efforts by project partners. TSSW will utilize VEP to support data remediation efforts on behalf of Coconino 9-1-1.

This project focuses on ensuring all possible resources have been reviewed to develop top-grade, quality GIS data for use in a NG9-1-1 call routing system, implementing a sustainable system of data and software that will allow continuous data maintenance and management and provides GIS data that can be use, in synchronous fashion, for Computer-Aided Dispatch, situational awareness applications and a myriad of other applications that support the government enterprise.

A DATAMARK project manager will be assigned to the implementation of the proposed solution. The project manager(s) will provide hands-on contact with Coconino 9-1-1 and TSSW and oversee all aspects of the project scope, schedule, and budget.

The project team will work closely with your team to collectively meet the requirements of this project from start to finish.

## **PROJECT MANAGEMENT APPROACH**

### **Project Kickoff**

The DATAMARK team will set up the project for budget management and perform internal project startup tasks. The DATAMARK team will conduct a project kickoff meeting with key Coconino 9-1-1 and TSSW staff overseeing the project and other stakeholders deemed appropriate for the kickoff meeting by Coconino 9-1-1 to establish a solid understanding of the project goals, timeline, and approach. Team members will be introduced at the kickoff meeting, and their project roles and responsibilities will be defined. The project schedule will be presented, with focus on the dates for key milestones, and the project management approach will be discussed.

### **Project Management Approach**

The DATAMARK team will outline the project management approach, techniques, and tools. The project management approach adheres to Michael Baker's practices for managing project finances, contracts, operations, and schedule.

### **Scope/Schedule/Budget Tracking**

The DATAMARK project manager will perform ongoing tracking and monitoring of the scope, schedule, and budget to keep the overall project on track. This involves regular communication to the DATAMARK-TSSW team on project status to keep the team focused and working efficiently.

### **Project Reporting**

The project manager will provide project status reports to Coconino 9-1-1 on a schedule to be determined during the kickoff meeting.

### **Project Invoicing**

The project manager will provide invoices to Coconino 9-1-1 on a monthly basis or by project milestone, as agreed to with the Coconino 9-1-1.

#### **CLIENT TASKS/RESPONSIBILITIES**

- Participate in project kickoff meeting
- Review, comment on (as necessary), and approve monthly invoices

#### **DATAMARK TEAM DELIVERABLES**

- Project kickoff meeting
- Schedule project status calls and reports with the client
- Deliver invoices to the client

## **SCOPE OF WORK**

This Scope of Work is attached to and made part of the Arizona Contract, ID# ADSPO17-168184.

This proposal, including the scope of work and cost, is a firm offer valid until July 31, 2021.

The DATAMARK-TSSW team, in partnership with Coconino 9-1-1, will initiate the project and begin execution of the proposed Scope of Work within 15 business days of receiving a fully executed purchase order and/or signed SaaS agreement, as applicable.

This proposal includes Editor subscription of VEP, GIS Data Remediation, and Consulting Services, as described in detail below.

### **PHASE 1**

#### **DATAMARK VEP - Validate, Edit, and Provision GIS Data for Public Safety**

VEP is a cloud-native software solution for public safety GIS data aggregation, preparation, analysis, and maintenance. VEP provides a highly configurable user-friendly interface for GIS and non-GIS personnel to perform location data validation, editing, and quality control in alignment with NENA NG9-1-1 data standards and GIS industry best practices. VEP supports data from local and regional GIS data providers and neighboring 9-1-1 authorities.

VEP is designed to support the most current NENA NG9-1-1 GIS Data Model and to provide the flexibility to incorporate custom fields and additional schema requirements from our Clients' GIS datasets. As Coconino 9-1-1 implements the NENA NG9-1-1 GIS Data Model, VEP will become an integral tool for validating, editing, and aggregating GIS data from multiple sources that will be provisioned into the NG9-1-1 GIS Core Services (NGCS) solution.

DATAMARK's technical team, comprised of experts in NG9-1-1 requirements and public safety data workflows, is ready to support Coconino 9-1-1 with their data remediation and NG9-1-1 preparedness by providing:

- Highly configurable GIS data management solutions for novice to expert level GIS users
- Dedicated technical support of the VEP system
- Comprehensive data QC and validations to prepare data for NG9-1-1
- Platform agnostic design supporting existing public safety systems including CAD, CAD mapping, and AVL

## **Software as a Service (SaaS) Solution**

VEP is a true Software-as-a-Service (SaaS) solution that provides end users with a secure, web-based system for collecting, preparing, maintaining GIS data. VEP streamlines and optimizes editing and validation processes for provisioning data in 9-1-1 systems and other systems reliant on accurate, reliable GIS information. VEP requires no additional investment in specialized hardware or software.

## **Cloud-Native GIS Data Management Software**

VEP leverages the benefits of cloud-native application development including on-demand access to powerful computing resources, modern data and application services, and dynamic coordination of development activities. This enables DATAMARK to quickly and effectively stay ahead of changes to industry processes and standards and bring meaningful product innovations to market faster than traditionally developed software platforms.

## **VEP Software Subscription**

VEP is offered in two subscription models, VEP Validator and VEP Editor, to address the broad range of requirements of local, regional, and state GIS stakeholders. Additionally, VEP Aggregator provides purpose-built solutions to regional and state organizations for aggregating and managing consolidated GIS datasets used in legacy 9-1-1, NG9-1-1, and other applications.

### **VEP Validator**

Validation is the process of validating and aggregating GIS, MSAG, and ALI data using VEP's data validations. VEP Validator is used to perform a broad range of validations across dozens of categories, configured for each client's specific GIS data management requirements. Validation results are downloadable as markup tables for use within client's GIS environment. VEP's validation features are included in all subscription types.

Validator subscription includes Administrator and Validator user roles; the number of users is based on client population. Additional Validator and Administrator users can be added for additional fees. Validator subscription does not include Editor, Observer, or Aggregator functionality. VEP's user roles are defined in detail in the VEP User Roles section, below.

### GIS Data Validation

VEP's validation engine includes a comprehensive suite of tools used to validate and aggregate GIS, MSAG and ALI data which meets and exceeds NENA validation standards. The validation engine enables administrators to run unique QC checks on demand, including DATAMARK's unique Fishbone Analysis.

VEP Validator identifies schema inconsistencies and incompleteness and identifies spatial anomalies and discrepancies within the various datasets. VEP's validations evaluate attribute, topological, and spatial accuracy within each layer and performs cross-feature validations. These validations meet and exceed the NENA standards, and include additional checks that

support GIS industry best practices for quality control assessments. VEP Validator delivers a comprehensive series of reports on anomalies and changes over time.

### Fishbone Analysis

VEP's fishbone analysis compares the placed address point to its geolocated location on the road centerline. This process creates a line between the two locations which provides a powerful dataset for analysis. In clean GIS data, this typically resembles a 'fishbone' with no crossed lines. Where lines cross, a potential anomaly may exist in the GIS data. Data with crossed fishbone lines may be marked as an exception in VEP, following review, to avoid being flagged in future validations.

This analysis reveals anomalies such as address points on the wrong side of the road, out of order address points, or a range of other anomalies.

Fishbone analysis will show an address point that maps to multiple road centerlines and shows attributes duplicated on multiple road segments, or where ranges overlap, causing the address point to be placed on both segments.

Where traditional address point comparison methods may produce false positive results, VEP Validator's fishbone analysis draws a line from the address point to where it falls on its street centerline range as shown in the figure below.

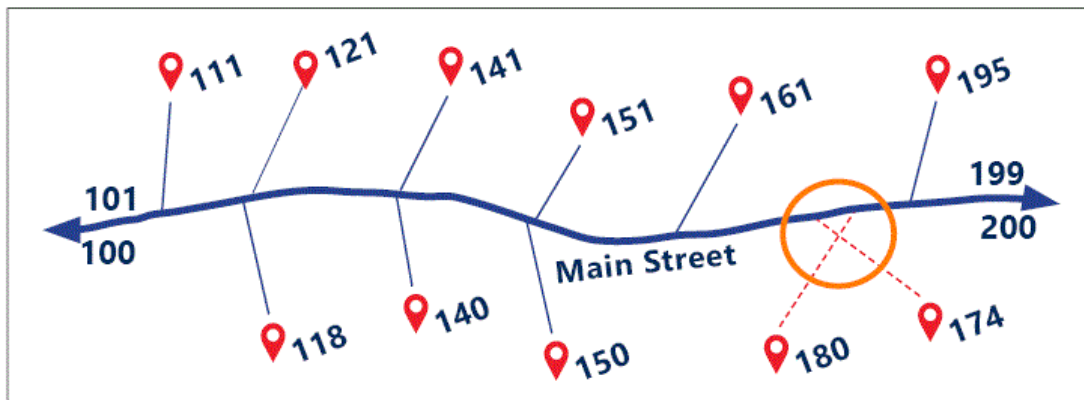


Figure 1: Fishbone Analysis

*Example: If the address range of Main Street is 100-200, 150 Main Street will draw to the center of that Main Street centerline segment. In clean GIS data, the visual analysis typically resembles a fishbone along the 100-200 range of Main Street. The crossed lines for 174 and 180 Main Street show a potential anomaly in the GIS data to be reviewed and resolved.*

### **VEP Editor**

VEP Editor provides a web-based editing interface that enables users to create, maintain, update, validate, and export public safety GIS data. VEP's editing environment includes a comprehensive suite of tools and becomes a force multiplier for GIS departments with limited resources. Editor subscription also includes VEP's Observation features, described below.

Editor subscription includes VEP's validation, editing, and provisioning features. The number of end users who can access the system is based on client population; access for additional Administrator, Editor, Validator, and Observer end users is available for additional fees. VEP's user roles are defined in detail in the VEP User Roles section, below.

#### Web-Based GIS Editing

VEP Editor's secure web-based editing environment supports experienced GIS users and can be accessed by non-GIS personnel who have been provided with access credentials without requiring separate expensive GIS desktop software, plug-ins, or extensions. This reduces operating costs, reduces the time spent administering standalone GIS solutions, and enables non-GIS users such as dispatchers, fire inspectors, and other authorized personnel to make meaningful contributions to the State's 9-1-1 and public safety GIS data.

#### Observation

VEP Editor subscription includes observation features which enable non-editors to drop a point on the map and record observations which will be reviewed and processed by GIS editors. The Observation function's ability to provide GIS data feedback from creates operational transparency, increases communication between public safety and GIS professionals, and improves the quality of the 9-1-1 and NG-1-1 GIS data in real-time.

*Example: A fire engine misrouted to an incorrect location will inform the dispatcher of the routing issue. The dispatcher, who is not a GIS data editor, can use VEP's Observer features to create an observation point and report the routing error. This will send a notification to the GIS authority's GIS data editors, creating an audit trail the editor can use to investigate the issue, resolve any problems in the GIS data, and report how the reported observation was processed.*

### **GIS Data Provisioning with VEP**

Validator and Editor subscriptions both include VEP's GIS data provisioning functions and features. Implementation of VEP includes provisioning to the client's native GIS schema and to the NENA NG9-1-1 GIS schema. VEP is platform-agnostic and capable of provisioning GIS data into the DATAMARK Spatial Interface and into other Spatial Interface (SI) systems.

VEP's download function offers the ability to effectively field map the default database into a custom schema of choice. This functionality enables the client to support multiple public safety and government enterprise systems without needing to change business practices, systems, and data schemas.

Examples of relevant output schemas include:

- CAD systems (to potentially include regional stakeholders')
- Transportation
- Asset Management
- Permitting
- Mobile data collection application

## VEP Aggregator

VEP Aggregator provides regional public safety GIS stakeholders with solutions for consolidating GIS data from multiple sources into a single database, performing cross-jurisdictional validations on the aggregated dataset, identifying anomalies in the data, and exporting the dataset. After anomalies are identified, before they are exported, they are sent back to the original jurisdiction for review, correction, and resubmission.

Centralized, regional management and ongoing validation of the aggregated GIS dataset streamlines its use across public safety platforms, including legacy 9-1-1, NG9-1-1, Computer-Aided Dispatch (CAD), and others.

VEP Aggregator does not require the purchase of additional software or tools and includes VEP's validation and provisioning features. Consolidating and synchronizing local and regional databases is a seamless process using Aggregator from the VEP system dashboard. As local jurisdictions submit data into the aggregated dataset, regional GIS administrators supporting the database can use Aggregator to perform the following tasks:

- Input local GIS data to an aggregated database
- Perform validations focused on boundary, address point, and road centerline data
- Identify anomalies in the data including boundary gaps, overlaps, and other anomalies
- Export aggregated data in the NENA NG9-1-1 GIS schema

Aggregator is provided to regional or statewide GIS stakeholders managing multi-jurisdiction implementations and includes VEP's validation and provisioning features. Aggregator is not meant to replace VEP Validator or Editor for the management of individual local or regional datasets. Clients who currently use VEP to manage local GIS data can efficiently and easily submit their GIS into the aggregated dataset.

Pricing for Aggregator includes Administrator and Validator role subscription for two (2) users; access for additional Validator and Administrator users is available for additional fees. VEP Aggregator does not include Editor or Observer functionality as these are used by the organizations tasked with managing the individual local and regional GIS data which will be provisioned into the aggregated GIS dataset.

## VEP User Roles

Each VEP subscription model provides clients with specific numbers and types of end user subscription. Access to VEP is based on user role and subscription level, to ensure each user of the system has the features, functions, and tools necessary to perform the tasks that meet our Client's goals while maintaining security and access control. Available user roles include:

The **Administrator** role is included in each VEP subscription type and provides users the access to review and approve edits, provisions users and permissions, limits configuration

capabilities for display and web service content of the Editor map, and more. This is the highest permission level assigned in the VEP system.

The **Validator** role provides access to VEP’s upload, validate, and download functions used to perform data validation and quality control.

The **Editor** role provides access to the VEP dashboard and to the map interface used to perform geometry and attribute edits and validation markups.

The **Observer** role provides access to the map interface to create observations. Observers do not have access to VEP’s editing functions.

This proposal includes **VEP Editor** subscription and the following user roles:

User Role	Number of Users
Administrator	2
Editor	3
Validator/Observer	2

Table 1: User Roles and Number of Users in the Proposed Solution

### VEP SaaS Agreement

This proposal includes VEP subscription provided to Coconino 9-1-1 for a period of one (1) year.

VEP is sold through an annual subscription and is subject to an annual fee. VEP is provided as a software subscription and contracted through the execution of a Software as a Service (SaaS) Agreement. The agreement will be automatically renewed unless notice of cancellation is received 60 days before the renewal date.

### VEP Implementation – Onboarding and Training

The DATAMARK team will provide onboarding and training services to Coconino 9-1-1 to support the use of the VEP software. Coconino 9-1-1 will provide a suitable location, computer equipment, and internet connectivity required for the DATAMARK team to provide remote virtual onboarding and training services.

#### VEP Onboarding

The DATAMARK team will load Coconino 9-1-1 addressing data into VEP and conduct a virtual onboarding session for VEP users to review native data schema mapping into the VEP software. Administrator user accounts will be set up during Onboarding, other user accounts will be set up by Coconino 9-1-1’s VEP Administrator user(s).

### Training – Validator

Following VEP Onboarding, DATAMARK will conduct one four-hour virtual training session for the users identified in Table 1. Validator training will cover:

- Overview of VEP’s functions and features
- Accessing the VEP system
- Navigating VEP using the system dashboard
- Uploading and downloading data using VEP
- Data validation and reporting with VEP

### Training – Editor

Following VEP Validator training, DATAMARK will conduct one four-hour virtual training session for the Editor users identified in Table 1. Editor training covers additional VEP functions and features provided to Editor and Observer roles, including:

- Navigating the map section of the VEP interface to view and edit data
- Using VEP’s Observation Tool to identify locations with outstanding data issues
- Reviewing and resolve observations submitted using the Observation Tool
- Reviewing editing sessions, validation anomalies, and observations

## **VEP Software Support**

Software support for VEP is included in the annual SaaS subscription and provided through the term of the SaaS Agreement with the Client.

VEP’s annual subscription includes access to an online support and self-service knowledge center. The DATAMARK VEP Support Center is the first stop for questions about VEP workflow, functionality, and enables users to request support, report issues, and search an online library of videos and articles for information about the system.

### DATAMARK VEP Support Center

Client’s VEP users will be provided with access to the Support Center through the VEP user interface. The VEP Support Center includes an online support ticket system, a knowledge center to query common issues and system documentation, and a module-based library of user guides, how-to articles, FAQs, video workflow tutorials, and video tips and tricks.

### VEP Support Tickets

VEP provides users with secure access to the Support Center ticket system. This system is used to submit, review, and track the status of support tickets. The DATAMARK VEP Technical Support team responds to Support tickets, users can track the status of support tickets directly from the VEP Support Center.

#### **CLIENT TASKS/RESPONSIBILITIES**

- Participate in a review of client GIS data field mapping for upload into VEP
- Provide a space, computers, and internet connections for training

## DATAMARK DELIVERABLES

- Conduct the review of GIS data field mapping for upload into VEP with Client
- Provide user access to VEP and the knowledge base/ticketing system
- Conduct VEP end-user training

## PHASE 2

### GIS Data Remediation

The DATAMARK-TSSW team is experienced in remediating GIS data for completeness and quality, leveraging our VEP validation checks, to meet the objectives of public safety workflows including but not limited to NG9-1-1, CAD and AVL.

Coconino 9-1-1 will receive data remediation for the following layers:

- Emergency Service Zone (ESZ) Layer
- Emergency Service Boundary Layers
- Community Boundary Layer (Optional)
- Address Points, as applicable
- Road Centerlines, as applicable

Our best practice for data remediation is to execute in phases ranging from fixing GIS-based fixes to discussing anomalies that may require field verification. After each phase, DATAMARK-TSSW Team will perform pulse checks with the Client to review findings and remediation statuses.

#### Phase 1 – GIS Based Fixes

GIS-based fixes focus on issues that do not require any questions of the Client and are fixed quickly.

#### Phase 2 – Q/A Review with Client

Anomalies flagged require interaction with the Client to verify and answer questions related to editing the data. This may include any spelling discrepancies or input from Client that will allow for a quick fix without requiring any field verification or extensive research.

#### Phase 3 – Final Data Delivery

Remaining anomalies require the Client to perform tasks to verify through other resources or field verification. These anomalies are not simple data fixes. DATAMARK-TSSW will review the Data Remediation results with Coconino 9-1-1.

### **Emergency Service Zone (ESZ) and Emergency Service Boundary (ESB) Remediation**

Coconino 9-1-1's focus is to complete a project previously performed for the emergency services response boundaries in northern Coconino County. The focus of this project is the southern part of Coconino County starting with the areas congruent with the previous work area.

An analysis of the Coconino 9-1-1 GIS data will be performed to include research of legal descriptions and authoritative datasets as well as coordination with key stakeholders to collect the information needed to understand the level of effort necessary to support data remediation. Based on the conclusion of the analysis, a summary of results will be prepared and used to develop a data remediation plan for the emergency service boundaries datasets. The plan recommendations will be reviewed with Coconino 9-1-1 staff and partners to determine the final Project Data Remediation Plan.

The DATAMARK-TSSW team will make appropriate boundary changes identified by the Project Data Remediation Plan. This phase of the project is designed to remediate the anomalies resulting from the analysis.

The Emergency Service Zone (ESZ) and Emergency Service Boundary (ESB) datasets may be updated in a number of ways:

- Based on the research performed previously, the ESZ may be changed to reflect the appropriate boundary to include Public Safety Answering Point (PSAP), Law Enforcement, Fire, and Emergency Medical Services. Once completed, the ESB will be developed utilizing the ESZ feature class for consistency between datasets to support Coconino 9-1-1's goal of NG9-1-1.
- Address points will be updated to reflect the new ESZ attribution as appropriate and agreed upon by Coconino 9-1-1 and its partners.
- Road segments geometry and/or attributes will be edited to support the new ESZ boundary. Since Coconino 9-1-1 is still reliant on legacy routing and the ESZ feature class, road segment geometry edits to support NG9-1-1 ESB will need to be performed as part of the active transition to NG9-1-1 as appropriate and agreed upon by Coconino 9-1-1 and its partners.

### **Community Boundary Remediation (Optional)**

DATAMARK and TSSW are prepared to assist Coconino 9-1-1 with the remediation of their Community Boundary dataset. Utilizing validation checks available through DATAMARK VEP and based on research performed with key stakeholders, the community boundaries will be evaluated for any topological concerns. Attribution and geometry for address points and/or road centerlines impacted by changes will be evaluated and updated as appropriate and agreed upon by Coconino 9-1-1 and its partners.

#### **CLIENT TASKS/RESPONSIBILITIES**

- Accept Data Deliverable

#### **DATAMARK-TSSW TEAM**

- Final data output and data remediation summary report

## Consulting Services

DATAMARK will provide GIS data support services at a fixed price not to exceed 50 hours per year.

### DATAMARK DELIVERABLES

- Provide Consulting Services requested to support the project goal

## COMPENSATION AND PAYMENT

This budgetary quote, including any scope of work and cost, is a firm offer until July 31, 2021.

DATAMARK will invoice Coconino 9-1-1 on a monthly basis for services as they are rendered, not to exceed the total fixed price shown below.

Annual subscription for DATAMARK VEP will begin and be invoiced upon execution of the VEP SaaS agreement.

Services	Price
GIS Data Remediation	\$74,452
Consulting Services	\$8,954
<b>Base Total</b>	<b>\$83,406</b>
Optional Services	Price
Community Boundary Remediation	\$14,860
<b>Base Total with Optional Services</b>	<b>\$98,266</b>
Products	Price
DATAMARK VEP – Editor	\$20,000
One-time Database Setup Fee	\$1,750
<b>Base Total</b>	<b>\$21,750</b>
<b>GRAND TOTAL</b>	<b>\$105,156</b>
<b>GRAND TOTAL with Optional Services</b>	<b>\$120,016</b>