

Attachment A

July 1, 2020 – June 30, 2021

CARS Maintenance & Operations (CARS M&O) Plan



Prepared for:
CARS Group Member Agencies

Finalized:
Last updated: June 30, 2020

Contents

Introduction.....	3
Maintenance and Operations Services Scope.....	4
Module Hosting	4
Data Center Management	5
System Monitoring Services.....	5
Software Maintenance Support	7
Annual Software Upgrades.....	7
Annual CARS-Location Updates.....	7
Bug Fixes	7
24/7/365 Support Service.....	9
Response Times and Resolution Timescales	10
Incident Response Plan – Google Groups.....	11
IVR-related services	13
511 Phone Usage Costs (Pass-through)	13
Hosting Cloud Usage Costs (Pass-through).....	14
Core Updates.....	15
Annual Work Plan	15
CARS Module M&O Price Sheet.....	16

Introduction

The 2020-21 CARS Maintenance and Operations (M&O) Plan includes a scope of work and base pricing structure for CARS module software maintenance services and joint hosting & operations for the 12-month period from July 1, 2020 to June 30, 2021. This price list is intended primarily for new CARS agencies and/or those who will be renewing their contracts with Castle Rock at the outset of the 2020-2021 year. It does not affect pricing for agencies that have direct contracts with Castle Rock that already cover the period from July 1, 2020 to June 30, 2021.

Maintenance and Operations Services Scope

This section describes the M&O services that Castle Rock provides to CARS M&O clients. The services are organized into the following categories:

- Module Hosting
- Software Maintenance
- 24/7/365 Services
- 511 Phone Usage Costs (Pass-through)
- Hosting Cloud Usage Costs (Pass-through)
- Core Updates
- Annual Work Plan

Module Hosting

Castle Rock shall maintain and support a **production** instance of each agency's CARS modules. Castle Rock shall also maintain a separate **staging** instance of each agency's operational modules for testing/staging/training purposes.

Castle Rock will also maintain a **pre-production**, or "**prep**", environment that allows for automated promotion of upgrades and configuration changes to the production environment. As a cost-saving measure, the prep environment will only be switched on for planned production updates.

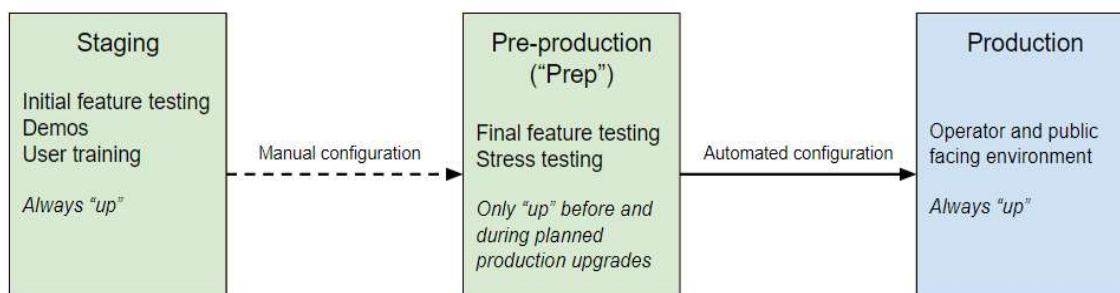


Figure 1 Staging, Prep, Production Pipeline

Data Center Management

Castle Rock shall be responsible for operating the CARS System on the Amazon Web Services¹ (AWS) cloud platform. The CARS-511 IVR phone system will be managed on the Verizon telephony platform.

- **AWS.** Amazon is the cloud-based hosting platform that supports all 511 front-end traffic, as well as back-end traffic for several CARS agency deployments. AWS also provides the foundation for CARS Disaster Recovery functions.
- **Verizon.** Verizon is the telephony platform on which 511 IVR calls are answered. The speech recognition functions (i.e., Nuance server) are also provided by Verizon.

System Monitoring Services

Castle Rock shall provide the following system monitoring services for CARS modules:

- Cloud hosting for all CARS servers and services.
- 24/7/365 Troubleshooting email and SMS issues for end users.
- Setup, testing, and management of upgrades, new releases and patches.
- Software installation and updating using remote access services.
- Virtualization, load balancing, and redundancy for high availability.
- Automated resource scaling based on site traffic.
- External interface monitoring and troubleshooting (FEU, DMS, CCTV, Traffic, Waze, ATMS, etc.)
- Crashlytics app crash monitoring and associated software patching for CARS-App module.
- Monthly and real-time usage statistics for web and mobile app.
- Monthly usage statistics for 511 phone.
- Uptime monitoring provided via Site 24/7.
- Monthly usage statistics for 511 phone services.
- Monitor system vitals, including bandwidth, CPU, memory and disc space utilization levels.
- Monitor application availability and connectivity.

¹ AWS stands for Amazon Web Services, which is Amazon's cloud hosting product. See <https://aws.amazon.com/>.

- Manage and maintain automated alarms to detect and proactively repair system hosting issues.
- Correct system and/or module issues.
- Send notification of corrective actions performed.
- Notify internal Operations staff of errors via email and SMS alerts.
- Firewall services, e.g., port lockdown, Secure Network Address Translation (SNAT), IP load balancing/routing, and Denial of Service (DoS) protection.
- Intrusion detection and prevention services.
- Host-based antivirus protection and updating provided by AWS service.
- Database management, maintenance, and replication.
- OS patching of pooled VMs, and scheduled patching of non-pooled VMs.
- Nightly backups of non-pooled VMs.
- Snapshots of production databases taken every 8 hours in AWS with continual backup replication to DR site.²
- Domain name registration and maintenance services.
- DNS management and support.
- SSL certificate installation and management.
- Port availability and specific port management.
- FTP and HTTP redirection support.
- Network connectivity management.
- Bandwidth management.
- Administration of infrastructure service agreements.
- Negotiate and manage third-party licenses.
- Calculate and invoice third-party and bursting costs to agencies according to each Agency's usage.

² The term "snapshots" here refers to a copy of the database that is used for back-ups in the event of massive data loss. Snapshots are taken less frequently in the AWS-hosted environment because there is constant replication or "mirroring" to the disaster recovery site.

Software Maintenance Support

Castle Rock will provide software maintenance support services for the CARS modules operated for the agency. This section describes the services that are included.

Annual Software Upgrades

Castle Rock will provide CARS agencies with annual upgrades so that deployments remain up to date with their production module versions. As before, this task excludes new modules and major configuration changes, which will continue to be handled by change orders.

Castle Rock will provide a detailed Deployment Plan with release notes prior to carrying out a software upgrade on production systems and will require client approval before proceeding. The Deployment Plan will clearly state what modules will be affected in the update, a planned maintenance window, and anticipated downtime (if any).

Annual CARS-Location Updates

Since 2015-16, Castle Rock has provided CARS-Location updates as part of the standard M&O services offered under this plan. CARS agencies may submit CARS-Location requests to Castle Rock throughout the year when they identify problems or out-of-date information in the location coding database. The process is as follows:

- Agencies shall submit desired location coding changes on an as-needed basis by emailing their project manager or submitting a non-urgent request to the 24/7 support system.
- Best efforts will be made to complete each request within 1-3 weeks of submission; however, this time may vary according to the number and the magnitude of the location requests in the work queue at any given time.

Castle Rock shall also perform annual updates to all roads for each participating agency (if desired by the agency). Agencies that desire their annual update should inform their project manager, who will schedule and coordinate their annual update sometime within the 2020-2021 M&O year.

Bug Fixes

Castle Rock will provide Bug Fixes for bugs identified in CARS modules operated for each agency. A computer bug is an error, flaw, mistake, defect, failure, or fault in a computer program that prevents it from working correctly or produces an incorrect

result. Bugs arise from mistakes and errors in a program's source code. Bugs can have a wide variety of effects, with varying levels of inconvenience to the user of the program. Some bugs have only a subtle effect on the program's functionality and may thus lie undetected for a long time. More serious bugs may cause a program to crash or freeze.

Following are examples of reports that likely indicate an underlying bug:

- CARS 5 doesn't respond when I click the "Add Cause" button.
- Mark-up code is appearing on the CARS-Web site
- The detour that I created isn't showing up correctly on the 511 CARS-App.

Bugs are assigned "Emergency" or "Routine" status depending on the severity of the issue. Bugs that interfere with critical system functions are assigned Emergency Status. Bugs that do not prevent primary system operations, or that can be temporarily avoided or worked around by operators, are assigned Routine Status.

Castle Rock assumes that CARS agencies will report suspected bugs as they come up. Bugs that cause the system to crash or freeze should be reported immediately to Castle Rock's 24/7/365 system and will be addressed urgently. Less serious bugs can be reported to the project manager and/or to Castle Rock's 24/7/365 system for tracking and resolution. Bugs will be addressed when the work will be scheduled in an agreed-upon timeframe between the agency PM and the Castle Rock PM.

Change Requests

A Change Request is a request for a new or modified function that outside the scope of a bug fix because it does not fall within an existing module's design and implementation. These requests will be passed to the agency's Castle Rock project manager, who will prepare a scope of work and budget for the agency to review and consider for implementation.

A change request may be for a *System Enhancement* or a *New Module*.

System Enhancements typically involve changes or additions to the functionality of existing, operational CARS module. Examples include:

- Changing the logic for how Waze events are imported into the platform
- Adding a new type of hands-free/eyes-free alert to the 511 mobile app.
- Adding hurricane shelters as a new layer on the 511 web site and mobile app.

New Modules are typically bigger efforts that would bring new functionality, a new 511 channel, new data types, or new data sources into the platform.

- Building a 511 chatbot
- Developing an app to allow users to check in and out of roadwork events on CARS so that worker presence can be detected.
- Rewriting the 511 IVR to support natural language processing.

It is recommended that agencies discuss any new needs and requirements with their Castle Rock project manager, as well as on the monthly CARS calls. There are opportunities in both cases to look for similar requests from different states/agencies, which may create joint funding opportunities.

When Castle Rock prepares a scope of work for either a system enhancement or a new module, a timeline will be provided based on our current resourcing plans. Typically, “bundles” of enhancements or changes to a particular module can be implemented more cost efficiently when grouped together than spread over multiple task orders or scopes of work. Castle Rock kindly request agencies bundle similar requests together whenever possible to help improve the efficiency of implementation, to the benefit of all members of the CARS group.

24/7/365 Support Service

Castle Rock shall provide 24/7/365 support services for all CARS modules operated for each CARS agency, staffed by an adequate number of fully trained and adequately qualified personnel.

Castle Rock shall operate an integrated ticketing support system that allows CARS agencies to open a ticket by telephone or email. The contact details are as follows:

Email: support@castlerockassociates.zendesk.com

Telephone: +1 (844) 326-4011

All tickets are automatically transcribed into a single ticket tracking system. CARS administrators have access to their own issue tracking logs. Users may see all issue reports they have personally submitted, as well as their current resolution status.

Operational groups can also be set up so that all submitted issues can be tracked by their agency.

Software maintenance requests are classed as one of three types:

Severity	Description	Examples
Severity 1 (Critical): Emergency Reports	Unexpected problems that result in a major service disruption.	<ul style="list-style-type: none"> • CARS is “down” or not available • CARS is responding too slowly for effective use • A CARS-Web site is not updating • The CARS-Web site is inaccessible • The latest event or winter driving data aren’t appearing on the web site or mobile app
Severity 2 (High): Functionality/Feature Reports	A feature or function is identified as not being usable in the way that it is supposed to, due to a program defect or other code- or system-level issue.	<ul style="list-style-type: none"> • Link to an external web site on OneWeb needs to be updated • User cannot add a PDF attachment to an event using the Attachment Upload feature
Severity 3 (Normal): Routine Reports	Issues that do not affect the production environment or pose any immediate detriment to a system’s functionality, though they must be attended to as soon as resources allow.	<ul style="list-style-type: none"> • Staging system issues • Link to an external web site needs to be updated

Response Times and Resolution Timescales

When an urgent report is submitted, Castle Rock’s on-call staff will respond by email or phone call to let the agency know that the report has been received. If it is an urgent issue, they will immediately begin problem-solving. Further discussions or fact-finding may be needed before addressing the problem—i.e., the staff may call or email you with follow-up questions/requests for screen shots/etc.

Castle Rock operations staff will then allocate additional staff resources if needed to the evaluation and resolution of the problem. Our help desk platform automatically creates a ticket comprising all communications about the issue, and keeps the ticket (and the client, via email) continuously updated until the issue is resolved.

When a solution has been found and implemented, a ticket closure message will be sent to the agency that submitted the report, explaining what steps were taken and explaining the resolution. A record of the issue is kept in the help desk system repository, for future reference.

Depending on the problem's severity and priority, reaching a solution may take anywhere from a few minutes to several weeks. Experience has shown that most issues can be resolved within 24 hours, and typically less. For longer-duration problems, Castle Rock keeps the agency that reported the issue up-to-date as progress is made and gives updates on the estimated resolution time per the SLAs in this agreement.

The following table presents target timescales for acknowledging and resolving the three types of Maintenance & Operations support issues.

Support Type	Response	Target Resolution
Severity 1 (Critical): Emergency Reports	Less than 1 hour (24/7)	3 hours (24/7)
Severity 2 (High): Functionality/Feature Questions	Less than 3 hours (during business hours)	24 hours (during business hours)
Severity 3 (Normal): Routine Reports	Less than 24 hours (during business hours)	Scheduled with the affected agency(s), and subject to resource availability
CARS-Location update request	Less than 2-3 days	One to three weeks, depending on the urgency and scale of the requests

Incident Response Plan – Google Groups

The CARS Google Group forum is used to inform *all* agencies of widespread CARS system outages. *Google Groups* allows authorized members to view and post content in a forum-like interface. Each time there is a system incident, Castle Rock posts a new topic to the forum. Castle Rock's project management team posts frequent updates to the topic until the incident was resolved. Each post triggers email notifications to all members of the Group.

CARS agencies can respond directly to the email to ask questions or comment. The entire conversation is also available to all on the web-based *Google Groups* forum.

Castle Rock PMs are asked to answer the following questions in each update:

- Which agencies are impacted (i.e. Am I affected?)
- Which systems are impacted (i.e. How am I affected?)
- Expected time until resolution (i.e. For how long?)
- Time for next update (i.e. When will I hear from Castle Rock?)

After the incident is resolved, a detailed incident report is provided, identifying the root cause and any follow-up steps.

“How-to” Questions

CARS Agency system managers sometimes have questions about how a particular CARS or CARS-related module feature works. These are referred to here as **“how-to” questions**. The support response to a “how-to” question typically involves assisting the agency administrator in better understanding the feature – e.g., by walking them through the steps required to use or understand the feature.

Following are examples of “how-to” questions:

- How do I attach a PDF file to an event report?
- How do I change the key phrase of an event?
- How do I make this event show up as a large icon on the CARS-Web site?
- How do I make a floodgate message?

Castle Rock is available to answer these questions during business hours. We request that such questions are funneled through your agency’s CARS system manager to your Castle Rock PM. The “how-to” support service is not intended to replace initial CARS deployment “train the trainer” training, data entry “cheat sheets,” continued in-house training, or within-agency help desk functions. On general principle, agency administrators are responsible for ensuring that their CARS operators are familiar with all commonly used system functions. However, Castle Rock will provide supplementary support to the best of its abilities to help support successful, ongoing CARS operations for all of our agency clients.

Sometimes, a “how to?” question can evolve into a change request. Following are examples of system functionality questions that may lead to a change request:

- Why can't I add a cause to a CARS-Segment road condition report?
- Why can't I create an event that covers two different route designators?
- Why can I create a third detour and attach it to this event?

Castle Rock shall evaluate system functionality questions against the relevant functional requirements and/or product designs to determine if the required response constitutes a "How-To" Question, a Bug Fix, or a Change Request, as follows.

- If the requested function is already supported by the software, the report is a "how to" question.
- If the requested function is included in the software functional requirements, but is not actually supported by the software, a Bug Fix is needed.
- If the requested function does not fall within the system's functional requirements, it is a Change Request.

IVR-related services

For CARS-511 (phone) agencies, Castle Rock will coordinate and manage agreements with Verizon (telephony services) and ReadSpeaker (text-to-speech engine).

Castle Rock will collate and distribute agency-by-agency statistics and billings for 511 usage each month using Verizon's invoices. Each month, the following details will be provided to each agency's main contact for review: summary of phone usage and a detailed call log showing originating phone number, call length, individual cost, etc. Castle Rock will prepare invoices for individual states according to their actual usage that month.

Castle Rock Project Managers will make a best effort to identify and call attention to any irregularities in the detailed phone log (e.g. high usage by call centers) and coordinate with the agency in an effort to resolve it.

511 Phone Usage Costs (Pass-through)

CARS agencies shall be invoiced month-by-month for their actual usage of the Verizon telephony platform, as well as a % split of the remaining platform costs, which may include telephony surcharges, fees, taxes, miscellaneous costs and other contingencies. The % split will dynamically fluctuate each month according to the relative usage of the phone platform by each agency in that month.

Verizon bills arrive at Castle Rock on the 10th of the month, following the month of service. For example, Castle Rock receives the invoices for January charges on February 10th. As such, states should expect that their January phone bill charges will appear in February invoices, which are mailed out in early March.

Upon request, Castle Rock will prepare estimates of the agency's anticipated 511 phone usage costs pass-throughs to help with budgeting. These are always ballpark in nature due to the unpredictability of events such as hurricanes and winter storms and their impacts on usage patterns. The dollar amounts given in each agency's budget estimate are intended to help agencies plan their budgets for the upcoming year on the assumption that their relative call volumes remain relatively steady. The actual costs to be billed shall be determined by the actual annual usage and billing by Verizon. Agencies are responsible for paying these costs in full each month.

Verizon's contract quotes a rate of 1.69 c/min and \$0.03 per call. Transfer call minutes also incur charges at the relevant long-distance rates.

Various miscellaneous telephony charges are added to monthly invoices by Verizon and shall be reimbursed by the agencies under this task. These typically run at ~30% of the usage fees.

Hosting Cloud Usage Costs (Pass-through)

CARS agencies shall be invoiced month-by-month for their actual usage of the AWS platform and Google Maps API. Castle Rock uses *labels* and *channels* to track each individual agency's usage of these platforms to the greatest extent possible in order to prepare the pass-through costs. Some resources on AWS are shared across agencies. These will be shared out on a month-to-month basis using the calculated % splits of each agency's individual use of the platform for the month in question.

The AWS platform includes both shared resources and agency-specific resources. Each agency will be invoiced for their specific charges, as well as a % split of the shared platform costs. As with the Verizon pass-throughs, the % split will fluctuate each month according to the relative usage of the AWS platform by each agency.

Google Maps API charges shall also be passed through to agencies, month-by-month. Agency-specific usage will be tracked using Google channels and portioned out using the same approach as is applied to AWS costs.

Upon request, Castle Rock will prepare estimates of the agency's anticipated cloud usage pass-through costs based on analysis of previous year's usage in that state and/or states with similar populations and anticipated 511 usage. As with 511 Verizon usage costs, these are also ballpark in nature due to the unpredictability of events such as hurricanes and winter storms and their impacts on usage patterns. The dollar amounts given in an agency's cloud budget estimate is intended to help with budget planning for the year ahead. The actual costs to be billed shall be determined by the actual annual usage and billing by AWS, Google, and third-party cloud providers. Agencies are responsible for paying these costs in full each month.

Core Updates

Each year, Castle Rock carries out "Core Updates" to the CARS platform, calculated as percentage of each state's M&O budgets. Prior to the beginning of each state fiscal year (July 1), Castle Rock defines a set of goals for changes and improvements in the year ahead to keep the platform modernized and up-to-date. At the end of each year, the work completed is documented in the Year in Review section of the annual work plan (see next item). Detailed Core Updates plans are captured in the Year-in-Review and Annual Work Plan document (discussed below).

Annual Work Plan

Each year, Castle Rock prepares an annual work plan that includes a Year in Review (including a report on Core Updates activities), a Work Plan for the year ahead, and an update to this document. It is shared and reviewed at the annual CARS Summit.

CARS Module M&O Price Sheet

Annual CARS modules hosting & support costs are identified in the list below. In most cases, the list prices are based on those of previous years, adjusted for inflation using the consumer price index. For the 2020-21 M&O year, CPI was listed at 0.3%.³

New modules are shown in red.

Costs from last year (2019-2020) are included for reference.

CARS-Module	2019-2020	2020-2021
	Hosting + Support Annual Total	Hosting + Support Annual Total
Event + Incident Management Tools		
CARS 5 includes CARS-Ramps, Rest Area Update Tool, and TG-Phrases, where deployed	\$ 51,287	\$ 51,441
Mobile CARS 5: Data Entry App	\$ 13,988	\$ 14,030
CARS/TG-Segment inc. Segment Definition Tool and mobile app (1 function)	\$ 9,328	\$ 9,356

³ See Consumer Price Index, US City Average 12 mos. Average ending 2020: <https://www.bls.gov/news.release/pdf/cpi.pdf>

CARS-Module	2019-2020	2020-2021
	Hosting + Support Annual Total	Hosting + Support Annual Total
CARS/TG-Segment inc. Segment Definition Tool and mobile app (2 functions)	\$ 11,658	\$ 11,692
CARS/TG-Segment inc. Segment Definition Tool and mobile app (3 functions)	\$ 13,988	\$ 14,030
CARS-AMBER	\$ 13,988	\$ 14,030
CARS-Radio	\$ 13,988	\$ 14,030
Data Import/Exports		
CARS/TG-Imports (1 source)	\$ 9,328	\$ 9,356
CARS/TG-Imports (2 sources)	\$ 11,658	\$ 11,692
CARS/TG-Imports (3 sources)	\$ 13,988	\$ 14,030
CARS-Hub inc. CARS-Waze (1 function: Publish)	\$ 4,660	\$ 4,674
CARS-Hub inc. CARS-Waze (2 functions: Publish & 1 Specialized Data Import)	\$ 9,328	\$ 9,356
CARS-Hub inc. CARS-Waze (3+ functions: Publish & 2+ Specialized Data Imports)	\$ 13,988	\$ 14,030
CARS-API (1 function: Publish)	\$ 4,660	\$ 4,674

CARS-Module	2019-2020	2020-2021
	Hosting + Support Annual Total	Hosting + Support Annual Total
CARS-GIS	\$ 9,152	\$ 9,180
Archiving + Analytics		
CARS-Log / CARS-Metrics	\$ 6,994	\$ 7,014
Traveler Information Websites + Mobile Apps + 511 Phone		
OneWeb	\$ 54,550	\$ 54,714
TG CARS-Web: Highway and/or Truckers	\$ 54,550	\$ 54,714
CARS-Web LB	\$ 6,994	\$ 7,014
CARS-Web 3G	\$ 6,994	\$ 7,014
OneApp	\$ 54,550	\$ 54,714
CARS-App: Highway and/or Truckers	\$ 54,550	\$ 54,714
CARS-511	\$ 27,456	\$ 27,538
Alert D	\$ 13,988	\$ 14,030
Alert B: social media integration (1 account)	\$ 6,994	\$ 7,014
Alert B: social media integration (2+ accounts)	\$ 13,988	\$ 14,030

CARS-Module	2019-2020	2020-2021
	Hosting + Support Annual Total	Hosting + Support Annual Total
Vox: crowd-sourced reporting	\$ 13,988	\$ 14,030
Incident Detection, Traffic + Travel Time Reporting		
CARS/TG-Traffic	\$ 13,988	\$ 14,030
CARS-Delay	\$ 13,988	\$ 14,030
CARS-Park (real-time parking availability monitoring) *	\$ 6,664	\$ 6,684
ICMS-Lite	\$ 13,988	\$ 14,030
CARS-ArrowBoards	\$ 2,280	\$ 2,286
Traffic Camera Maximizer	\$ 13,988	\$ 14,030
Winter Driving + Weather Conditions		
CARS-CAP (inc. storm polygons and radar overlay)	\$ 13,988	\$ 14,030
CARS-SnowPics	\$ 4,660	\$ 4,674
CARS-SnowReports (MDSS Integration)	\$ 4,660	\$ 4,674
CARS-Wx (NWS Forecast Integration)	\$ 4,660	\$ 4,674
CARS/TG-Signs	\$ 4,660	\$ 4,674

CARS-Module	2019-2020	2020-2021
	Hosting + Support Annual Total	Hosting + Support Annual Total
CARS/TG-RWIS	\$ 9,328	\$ 9,356
CARS/TG-CCTV Level I	\$ 9,328	\$ 9,356
CARS/TG-CCTV Level II	\$ 13,988	\$ 14,030
TG-Tolls (dynamic toll pricing)	\$ -	\$
Transit Tools		
Modes-Update + Modes-Alert	\$ 13,988	\$ 14,030
GTFS Realtime Writer* (no additional cost if Modes is deployed)	\$ 4,660	\$ 4,674

