

ASECAP 2011 ROAD SAFETY EVENT
"ASECAP TOLL ROADS: A SAFE JOURNEY IN EUROPE"
ATHENS, 1 MARCH 2011
Divani Caravel Hotel, 2 Vasileos Alexandrou Avenue

**Road Safety, a high priority
for Greek Motorway Concessions:**

" The cases of Olympia Odos, Aegean Motorway and Moreas."

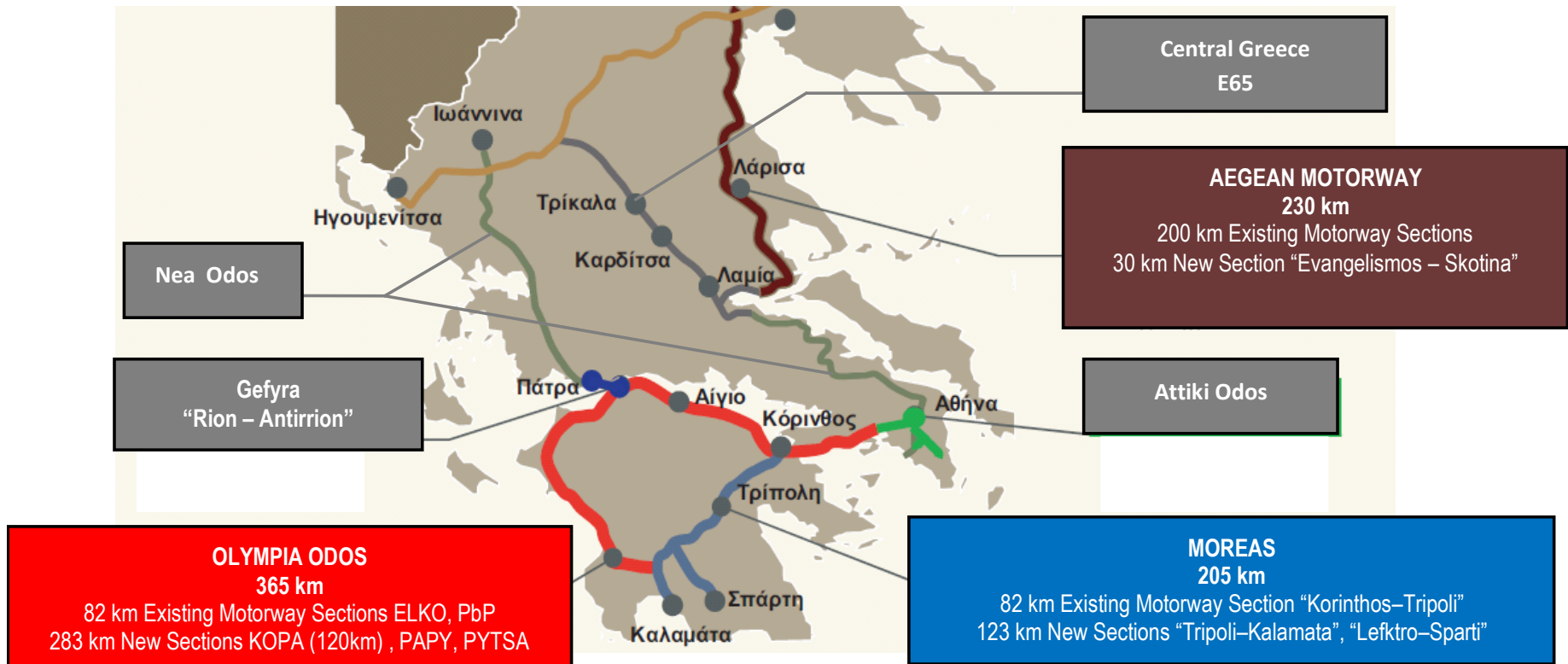


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Motorway Concessions Overview



	OO	Moreas	AMSA	E65	Nea Odos	Total
Existing Sections	82 km	82 km	200 km		173 km	537 km
State New Sections		23 km		57 km	11 km	91 km
New Sections	283 km	100 km	30 km	174 km	196 km	783 km
	365 km	205 km	230 km	231 km	380 km	1411 km

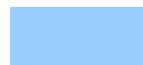
Fields of Activities

Design and Construction	Operation and Maintenance
<ul style="list-style-type: none"> ■ Existing Sections <ul style="list-style-type: none"> ➤ Safety Audit targeting to 1st priority measures for safety upgrade ➤ Implementation of first safety measures ➤ Gradual Refurbishment / Upgrade according to contractual schedule/ specs ■ New Sections <ul style="list-style-type: none"> ➤ Design according to modern specs ➤ Safety Audits in multiple stages ➤ Construction per Section with high standards, either: <ul style="list-style-type: none"> - in green field areas - widening of existing sections 	<ul style="list-style-type: none"> ■ Traffic Management & Safety (24/24h) <ul style="list-style-type: none"> ➤ Traffic Management Centers ➤ Emergency Dial Number ➤ Patrols & Intervention Teams ➤ Agreements with Emergency Services (est. common operational plans/ support and provision of premises & equipment to ES) ➤ Recovery Unit Services ■ Inspection & Maintenance <ul style="list-style-type: none"> ➤ Corrective & Preventive maintenance ➤ Safety audit & Improvement proposals ■ Interface with Construction activities ■ Toll Collection ■ Customer Service <ul style="list-style-type: none"> ➤ Communication Service (Phone calls, handling of complaints, info to users,.) ➤ Subscribers Service for ETC

Traffic Management & Safety Mechanism: "Before & After CCD"

TMC Activities	Incident Management	Dealing with routine incidents	Dealing with accidents and serious incidents	Handling Emergency Calls	Placing signage to incidents	Collaboration with other involved parties
	Monitoring of Road Network	CCTV use for Incident Management	CCTV use to monitor traffic and detect incidents	Real Time Traffic Management		
	Support to drivers	Provision of Information to the media	Placing Signs for deviations	Planning Strategic Signing		
Activities on the Road	General Activities on the Road	Routine Incidents Managements	Dealing with accidents and serious incidents	Imposing the law on Infractions	Patrolling	
	Traffic Flow Monitoring	Removal of broken down vehicles	Abandoned Vehicles	Provision of temporary signage	Cleaning debris, oil, animals etc.	Repair and improvement of infrastructure
	Other Services	Escort to special vehicles	Monitoring Road Works	Special Events / Crises	Training users of the road (information leaflets)	
Central Operations	Planning	Elaborating Protocols and Emergency Plans	Planning of standard Traffic Management Means	Planning of Works on the Road		

Services not provided or provided only fragmentary



Traffic Police



Company



Jointly

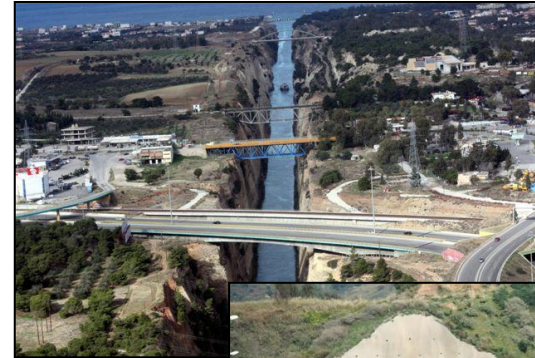
Special characteristics affecting Operation - OLYMPIA ODOS

Road Sections with totally different character

- ✓ **"Elefsina - Korinthos" Motorway section:**
 - 64 km length (3 lanes & 1 EL / direction)
 - Including Kakia Skala complex of tunnels (~4,5km)
 - 2 big toll plazas (Elefsina and Isthmos)
 - AADT of 30.000 veh/day per direction (70.000 in peaks)
 - Adjacent to Athens serving mainly interurban traffic
- ✓ **Patra Bypass:**
 - 18.3 km length per direction (2 lanes & 1 EL / direction)
 - Including Patras By-Pass tunnels (~4,7km)
 - AADT of 8.000 veh/day per direction (15.000 in peaks)
 - Half section (eastern section) serving interurban traffic
- ✓ **Korinthos - Patra NNR:**
 - 120.0 km of National Road (1 lane & 1 EL / direction)
 - Mostly undivided, with poor geometry, high accident rate,..
 - AADT of 10.000 veh/day per direction (30.000 in peaks)

and generally:

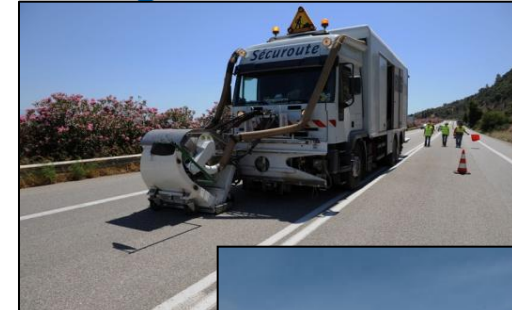
- ✓ **High traffic fluctuations during the year**
increased traffic during weekends, holidays & summer
- ✓ **Smooth terrain – Limited winter maintenance needs**
- ✓ **Mentality and habits of Users connected to old operation framework**
(e.g. throwing garbage, stopping in dangerous locations, walking, illegal exits/entrances etc.)
- ✓ **Extended construction activities inside or adjacent**
all above sections [see before and next slides]



Design and Construction Works - OLYMPIA ODOS – existing sections

“Korinthos-Patra” NNR: 1st year safety works after safety audit

- **Signing:**
 - marking works (240 km), “cat eyes” at the edge of the road (25 km)
 - cleaning/replacement of damaged signs (1000 pcs.) and
 - barriers reflectors (17,700 pcs)
- **Safety Barriers:**
 - replacement and improvement (74 km)
- **Pavement:**
 - improvement of anti-skid features / shot-blasting (66 km)
 - local pavement repairs (50,000 m2)
- **Road lighting:**
 - repairs of existing infrastructure (38 km)
- **Vegetation:**
 - cleaning/trimming bushes & trees at the side of road (176 km)
- **Hydraulics:**
 - cleaning of shoulders from plants, dirt, waste and gutters for rainwater drainage (242 km)
- **Parking areas:**
 - signing upgrade and shape re-arrangement

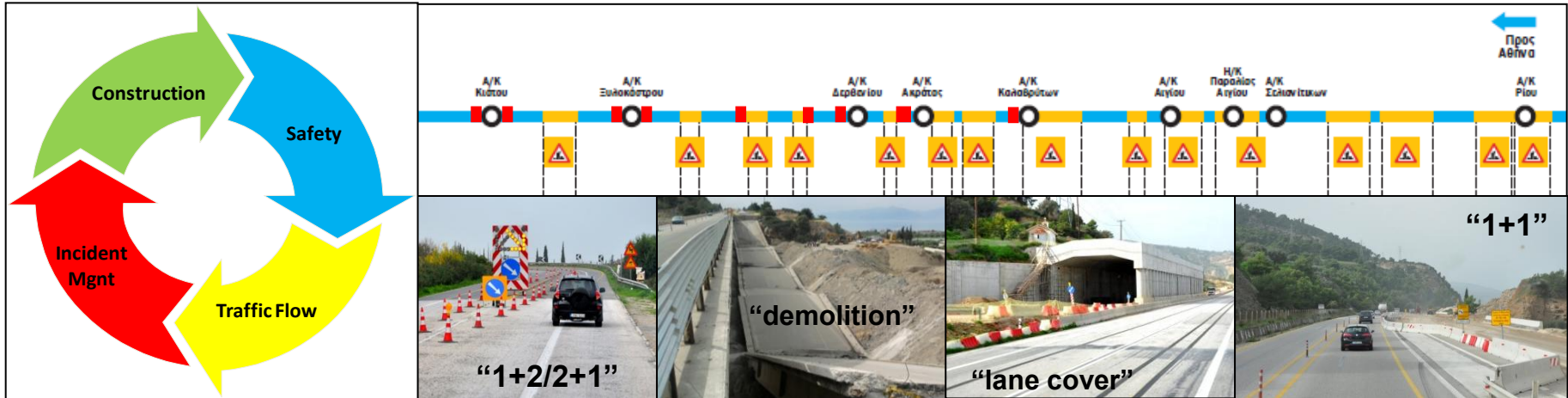


“Elefsina-Korinthos” and “Patra By-Pass” Refurbishment works

- **Pavement:**
 - asphalt repairs in specific locations and extended sections
- **Signing:**
 - all gantries replacement, new small side signs, speed limits, removal of hundreds of advertisement signs, etc
- **Safety Barriers:**
 - new, replacements (central reserve and structures), NJ profile
- **Fencing:**
 - repairs and/or relocation
- **Slope stability measures**
- **Hydraulics:**
 - specific enhancements (side ditches) and cleaning
- **Parking areas:**
 - safety upgrade (median and barriers), new WC buildings
- **Structures:**
 - conditions inspections, inventory and massive repairs of joints
- **EEM Systems:**
 - SCADA, new Traffic Systems, Sub-Station and lighting upgrade
- **Local interventions:**
 - Local widening before Tripolis I/C, new Pachi bridge, I/C
- **Anti noise:**
 - construction of zones with panels for first time
- **Vegetation:**
 - plantation and irrigation,

“Big Challenge”, Operation Under Construction - OLYMPIA ODOS

“Korinthos-Patra” Section



Difficulties and particularities:

- **Construction works along with traffic** in a very limited width
- **Construction activity simultaneously developed** along the entire length (120km)
- **Short time schedule** in combination with **uncertainties / delays in land acquisition**, due to expropriations, archaeology and P.U.,..
- **Many existing technical structures** (bridges, underpasses, culverts, hydraulics etc.) requiring expansion or demolition (>100)
- **Simultaneous construction of Railway Line** (ERGOSE) for long stretches in adjacent areas.

Large number/density of traffic arrangements :

Currently approx. 42 km (35% of KOPA length)

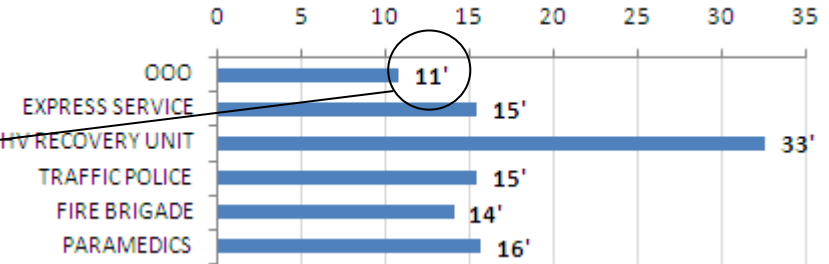
- **Various types of cross sections** (1+1 or 1+2/2+1, 2+2):
- **Special design** and approval procedures, involving **several entities** (designer, Constructor, CJV, Operator, IE, Service, Traffic Police,...)
- **Uniformity** of signing and safety means used
- **Special Operation/Intervention Plans**
- **Emergency parking areas & access – evacuation points**
- **Specific emergency 4 –digit phone number**
- **Close collaboration with the Emergency Services and local authorities**
- **Intensification of patrolling / recovery units**
- **Quick incident response**

First years operational results/performance - OLYMPIA ODOS

Incident Management

- ✓ 57 incidents / day
- ✓ 87% immobilized vehicles and obstacles while the rest 13% are accidents, problems with users, traffic congestion etc.
- ✓ Quick Response

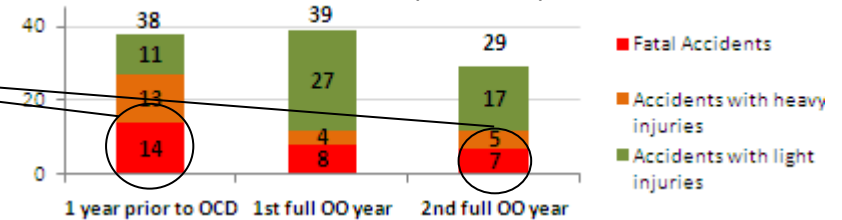
Average Response Times (min)



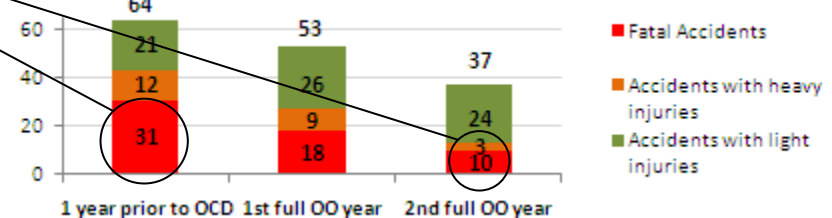
Accidents Statistics

- ✓ along Existing Sections (ELKO & PbP)
 - accidents with injuries reduced by 24%
 - fatal accidents reduced by 50%
- ✓ along KOPA
 - accidents with injuries in KOPA reduced by 42%
 - fatal accidents in KOPA reduced by 68%

EXISTING SECTIONS (ELKO / PbP) accidents



KOPA accidents



Maintenance interventions/repairs

- ✓ 151 Road infrastructure damages per month:
 - 58% signing, 22% fencing & barriers and the rest 20% pavement, tunnels, sewage & draining, etc.
- ✓ 143 EEM damages/failures per month:
 - 27% toll system, 25% MMS, 28% EEM in open sections, 18% EEM in tunnels and the rest 2% other damages.
- ✓ 70% within the same day
- ✓ 90-95% repaired within the current month

Communication

- ✓ 46 calls per day and 62 written requests per month
- ✓ average response time within 1 week
- ✓ Continuous information to the Users related to traffic conditions, works along the road, etc.



400 employees permanent staff 24hours per day + subcontractors

Special characteristics affecting Operation- AEGEAN MOTORWAY

- Different carriageway patterns
 - ✓ 135 km of two lane motorway
 - ✓ 30 km of National Road with undivided carriageway
 - ✓ 65 km of three lane motorway with one C&C in urban environment
- National Road section characteristics
 - ✓ Very poor geometrical characteristics (min. total width 6,80m)
 - ✓ Extreme seasonality of traffic
 - ✓ Frequent rockfall phenomena
- Simultaneous snow falls possible along the entire stretch of 230km



Design & Construction Works – AEGEAN MOTORWAY

Infrastructure Interventions in Existing Sections:

- Paving (2.062.000 m² anti skid layer, 1.860.000 m² other layers) and marking (100% of the project)
- Repair and enhancement of guard rails (according to safety audit)
- Improvement of Park and Rest Areas & installation of toilets
- Construction of 2 OMCs, 2 MSS, 3 FTP, 3 RTP, 3 Police and 2 Fire Brigade buildings
- Cleaning of hydraulic works
- Installation of CCTV system and Emergency Telephones
- Rockfall protection works in Tempi Valley
- Everything completed 2,5 months ahead of schedule

New Section:

- Construction of 30 km motorway section including 11,5km of tunnels (6 km + 3 km +2,5 km).
- All construction traffic uses the existing national road section



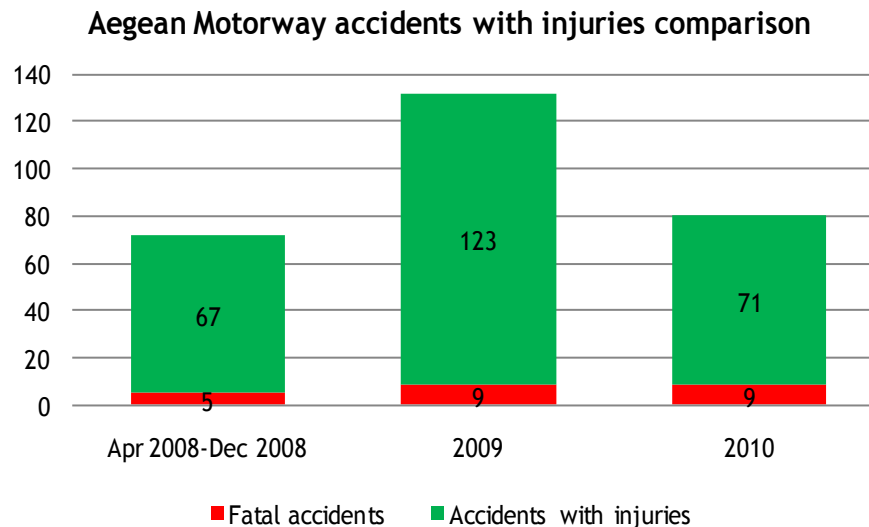
“Special Case” of Operation Under Construction - AEGEAN MOTORWAY

- Operation for five months under extreme conditions “Tempi Rockfall”
- Project “cut in two” (transport of personnel, distribution of winter maintenance equipment)
- On top of that, occupation by farmers for three weeks
- Support of the State for the establishment of alternative routes (signage, supply of equipment to Police and Fire Brigade)
- Operation “outside the Project” (legal issues, insurance, signage, communication, responsibilities)
- Increased demand for driver information (call center, leaflets)
- Increased demand for equipment
- Standstill of Toll plaza operation (personnel issues)



First years operational results/performance - AEGEAN MOTORWAY

- AADT 22.500 along the busiest section (Katerini - Kleidi)
- 39 incidents per day [excluding toll violations]
- Response time of 50 minutes (no contractual obligation)
- Response time of subcontractors & authorities is 40 minutes
- 76 incoming calls per day
- 50 incoming written requests per month
- Response time to written requests 2 weeks maximum



400 employees permanent staff 24 hours per day

Design and Construction Works - MOREAS

- **Safety audit** (a contractual requirement) on the pre-existing Korinthos-Tripoli section (82 km), resulted in introduction of further improvements (in addition to those already stipulated)
- **Low-cost measures** taken immediately on operation commencement (March 2008): guardrails, marking, signing, drainage cleaning, pruning etc.
- **Refurbishment / heavy maintenance** of the Korinthos-Tripoli section (completed in 2010), including full resurfacing, provision of hard shoulder, partial realignment and construction of 2 new tunnels and 2nd bore of existing Artemisio tunnel, plus Traffic & Toll System installation
- **Construction of new sections** towards Kalamata and Sparti. Already 31 km of new motorway are in operation.



Special characteristics affecting Operation - MOREAS

- Motorist habits developed over 16 years prior to concession (such as parking, walking, waiting for bus on the motorway)
- Seasonality of traffic (summer, weekends, Easter)
- Largely interurban (Athens-related) traffic; low trip frequency (few intra-regional commuters)
- On completion of project, a second (satellite) Operation and Maintenance Centre will serve as a base for the southern half of the motorway, to rationalize use of resources
- Extended area with altitude >500m relatively susceptible to winter weather



Operation Under Construction - MOREAS

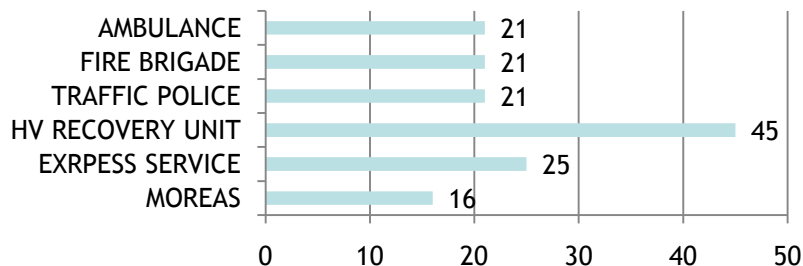
- This phase lasted during the first two years of the concession period (2008 to 2010) and affected the pre-existing Korinthos-to-Tripoli section.
- Moreas was fortunate in having already a dual carriageway cross-section. Works were typically performed across one-half of each carriageway.
- Queuing incidents proliferated during the “operation-under-construction” phase, but there was no adverse safety impact.
- Special arrangements were made for the Artemisio tunnel, where the new bore was completed first and temporarily served two-way traffic during refurbishment of the old bore (late 2009).



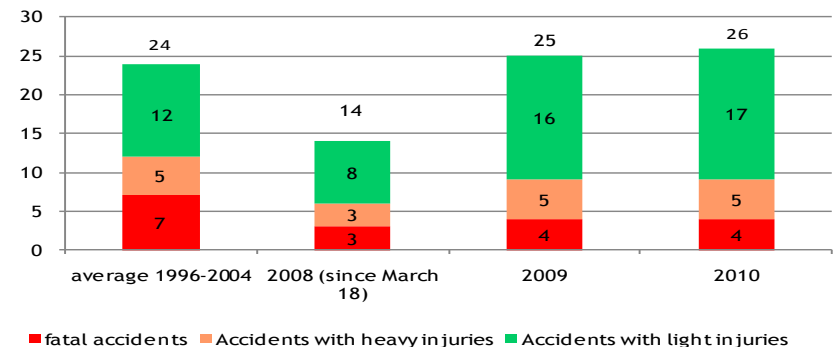
First years operational results/performance - MOREAS

- AADT 10.500 per direction along the busiest section (Korinthos to Spathovouni)
- 20 incidents per day [excluding toll violations]
 - 80% immobilized vehicles & obstacles, the rest (20%) are accidents, traffic congestion, incidents in tunnel, etc.
- Average response time (2008 to date) at 16 minutes
- Average response time of subcontractors & authorities (2008 to date) at 27 minutes
- Maintenance:
 - 41 road infrastructure damages per month (22% signing, 47% barriers and fencing)
 - 73 EEM damages/failures per month (53.7% toll system, 18.4% EEM in tunnels, 9.5% EEM in open sections)
 - 91% of all damages repaired within a month - 41% during the same day
- 4 incoming calls per day (not including the emergency response number 1866)
- 13 incoming written requests per month
- Response time to written requests: 3 days

Average response time (min)



MOREAS accidents with injuries comparison



180 employees permanent staff 24 hours per day

Conclusions

*The cooperation of private and public sector in managing road infrastructure projects contributes to **improving road safety** and specifically:*

on the level of construction by:

- Implementing Road Safety Audits in all stages
- Systematic efforts to improve the worksite arrangements
- Maintain/ secure the necessary equilibrium between LOS (traffic flow, safety) & constructability
- Utilizing the operation experience in design/construction issues

on the level of operation by:

- Enhanced monitoring of the road network (24h a day, 365 days a year)
- Quicker detection and response to incidents and problems
- Improving coordination among the involved parties
- Immediate dealing with many “routine” incidents so they don’t escalate to serious accidents – reduction of secondary accidents
- Ensuring the means and saving resources for the state services, in order to concentrate on their duties (Policing and Fire Fighting)
- Exploitation and extensive use of new technologies and systems
- Provision of new services to the drivers (road assistance, information etc.)
- Contribution to providing a safer road environment
- Setting up and monitoring specific LOS standards and operational criteria (KPI’s)