INDEPENDENT VERIFICATION OF LIGHT RAIL SYSTEMS - WHAT, WHEN, HOW AND WHY

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SUMMARY

Independent Verification is an area that is not always well understood, perhaps misunderstood, yet if applied correctly can produce huge benefits for both the contractor and client when implemented at the start of a project. In recent years there has been a continual growth in the area of Light Rail Systems and with this growth, the complexities of delivering these networks has also grown.

As the number of Light Rail Systems continues to expand, they not only need systems to ensure their safe operation, but they need to be planned and implemented in a safe fashion. This is where the role of the Independent Verifier comes into play and provides just as an important service to ensure that the system owner receives what they were expecting to end up with.

The Verifiers core function is to ensure that the design, construction, procurement, acceptance testing, completion along with the planning and documentation for the operations and maintenance phase are carried out in accordance with the project requirements.

1 INTRODUCTION

Independent Verification (IV) can entail a broad range of activities and is very much dependant on what level of assurance the client it looking for. More importantly, we need to understand what the IV role entails; when should you use IV; how it is particularly beneficial for complex projects with multiple stakeholders and why we should have Independent Verifiers.

The IV services, process and structure's required are explained, along with the benefits to everyone that is involved. A case study example is also provided to illustrate how the process is being applied for the implementation of a world class, Light Rail System which currently being implemented in Australia and is helping to set the standards for future networks worldwide.

The high degree of public concern these days is driving companies (both public and private) to ensure that projects are delivered with a value for money approach, are safe and that they are regulated for the good of all railway users.

2 WHAT - IS INDEPENDENT VERIFICATION

Verification is defined as the process of determining whether or not the product or outcome for each step of the project development phase is consistent with the requirements, as defined by the client's scope of work and specifications.

In other words, Verification', is verifying that the techniques, processes and methodologies are appropriate and adequate to achieve the objectives. There must be clear evidence of

- Planning,
- Control,
- An Audit Trail

Verification – The Oxford Dictionary defines ‘verify’ as – to examine for the purpose of establishing the truth, in terms of statements, items, figures etc. Or put another way, the process of checking procedures to ensure that they are appropriate and adequate, in order to obtain the correct results when validated.

The main aim is to ensure that the ‘specified requirements are being fulfilled’
IV requires a high level of discipline and subject matter knowledge to ensure compliance to the project requirements is met.

This is achieved through observing, monitoring, reviewing, auditing and verifying the quality assurance and project management systems and the design documentation, construction materials along with the operations and maintenance procedures. It also includes reviewing the design and construction program, the construction progress and helping to resolve defects and compliance disputes all for the good of the project.

3 WHEN - SHOULD YOU INVOLVE IV

With projects becoming more complex these days, demanding timeframes being imposed in order to keep costs down and with a range of interested stakeholders involved, clients are recognising the value of including IV into the process.

IV is included in a project when the client wants to ensure that all contractual deliverables, in regards to design, supply, testing & commissioning along with a high level of workmanship are satisfied. Clients want the assurance that the job complies with all applicable legislative and statutory requirements.

With larger projects, there can be a complex structure of client staff, key stakeholders, interested community parties, contractors and constructors. The IV can assist with the process flows, reporting and records for some or all of these parties.

Also, where there is a need for someone to play an independent role throughout the full life cycle of the project, the Verifier can manage the flow of information and ensure that the client is receiving the required standard of documentation and outcomes within the timeframes defined by the project program.

4 HOW – THE BENEFITS OF IV

One of the key benefits that IV provides is based around minimising future problems for both the client and the contractors producing the work.

IV provides a helicopter or unimpaired perspective to the client to protect their best interests. Often the fresh set of eyes approach is able to identify problems ahead of them becoming a key issue often saving both the client and their contractor a lot of grief.

The Verifier can assure for example, that all personnel dealing with safety related systems are competent to be performing their duties and are not putting the project at risk.

If we consider that competence [1] requires that all practitioners have qualifications, experience and qualities appropriate to their duties.

This includes:-

- Such training as would ensure the acquisition of the necessary knowledge of the field for the tasks which they are required to perform.
- Knowledge and understanding of the working practices used in the organisation for which they work for.
- The ability to communicate effectively with their peers, with any staff working under their supervision and with their supervisors.
- An appreciation of their own limitations and constraints, whether of knowledge, experience, facilities, resources etc and a willingness to point these out.

The Verifier then has to ensure that staff performing the work have the required knowledge, but are also applying that knowledge to the task at hand.

The client's project documents stipulate the project specific requirements and applicable standards that have to be complied with. The Verifier therefore provides assurance that these are being met or exceeded.
The role of IV is not to review and oversee all activities 100% of the time. It is to provide adequate resources to be able to monitor and review the management systems, the compliance to these systems, and to observe and comment on the effectiveness of these systems in producing the required outcomes to meet the project requirements. IV provides a cost effective compliance check through the use of both targeted and random sampling across the project in order to build confidence that the works are conforming to the requirements.

IV is able to identify areas of the works that need scrutiny. Efforts can then be applied within the specific areas that may require additional attention or work to ensure compliance earlier in the process, thus saving time and money for both the client and contractor.

5 WHY – SHOULD WE HAVE IV

IV involves an independent confirmation process that the client is receiving what they have contracted to receive in regards to quality, environment, and value for money and compliance to scope and specifications. It ensures that client objectives are met or exceeded whilst adding value to the delivery process and systems. Beyond the basic project objectives, verification can also address safety and community issues.

The Verifier’s core function is to ensure that the design, construction, procurement, acceptance testing, completion along with the planning and documentation required for the operations and maintenance phases are carried out in accordance with the project document requirements.

For larger projects, IV is able to work across a range of key areas and phases within it to ensure compliance. These can include areas such as:-

- Quality Management
- Documentation control
- Community and stakeholders
- Design Review
- Construction surveillance
- Acceptance and testing

The Verifier is able to ensure compliance is achieved to the design, through the design review, quality assurance and systems verification assures quality, construction and procurement verification ensure the build phase, the auditing and review of the contractors systems identity’s any project interface issues with the public or key stakeholder. They certify the validation of the testing process and verify the end user aspects of the operations.

For the client, the Verifier is also able to provide them with an additional assurance mechanism that they will receive the desired outcome through the Verifiers Professional Indemnity insurance policy. No one wants to claim on their insurance and whilst this is a backstop for unforeseen outcomes, the Verifier is required to provide a highly professional service in the services they provide.

IV works across a range of delivery models including Alliances, Public Private Partnership (PPP’s) and Design & Construction (D&C) contracts. Independent Verification has been applied in large Australian projects such as major tunnel constructions, motorways, and desalination plants.

Large rail projects where IV has been successfully applied includes:-

- Epping to Chatswood Rail Link Project, New South Wales – is a 14km of dual underground passenger rail line including four underground stations with mined caverns on a very business suburban network.
- Seaford Rail Extension Project, South Australia – is 5.7km rail extension of dual line at grade suburban railway which is also being electrified. There are two new stations, a major elevated bridge (the 3rd largest incremental bridge in the world), grade separations and bus interchanges.
6 CASE STUDY

Putting theory into practice is one way of proving the value of a concept and the following provides an overview of a current complex project where IV is being utilised to benefit the project.

The Gold Coast area is located on the Eastern seaboard of Australia in the state of Queensland. It is one of the fastest growing regions and the sixth largest city in Australia. It has a population of nearly six hundred thousand and is expected to exceed eight hundred thousand residents by 2026. It has become one of the country’s major domestic and international tourist destinations with an average of sixty thousand visitors each day.

With an increasing population and growing visitor’s numbers, there is a heavy reliance on car and bus travel to get around the city which has resulted in an increased amount of traffic congestion. To address the growth in urban congestion, whilst enhancing the public transport network, the State Government along with the Gold Coast Council and the Federal Government have all come together to fund a world class Light Rail System.

6.1 Gold Coast Rapid Transit Project

The key objective of the Project is to provide a world class light rail system that will integrate with and enhance the current public transport systems.

This is a two staged project, with stage 1 which commenced in 2011 and which is due for completion in 2014. Revenue services will also commence in 2014 and will make a positive impact on the current traffic congestion along the route.

The first stage is a $1 billion investment initially consisting of 14 vehicles and 16 stations, it will service the 13 kilometre route powered from a 750V DC overhead power line system, and operating between the Gold Coast University Hospital, Griffith University (health and knowledge precinct) to the fast growing commercial, retail and recreational centres of Southport, Surfers Paradise and Broadbeach.

Patronage numbers have been projected to grow to 50,000 passengers per day and the light rail system has been designed to cater for up to 75,000 passengers per day helping to future proof the project.

The project is based on a 3 year design and construct program. It then has a 15 years operations and maintenance period contract associated to it.

The light rail vehicles have been designed to operate up to 70km/hr along the route, are of a bi-directional configuration and have a passenger capacity of 309 people (80 seated).

The Gold Coast light rail project is an 18 year Public Private Partnership (PPP) contract with the Queensland State Government to design, build, finance, operate and maintain a light rail public transportation system. A PPP requires confident equity partners to facilitate a portion of the funding for the project.

The contractor providing the light rail has defined their charter as being – “To create a world class, sustainable, city changing, integrated light rail system for the future prosperity of the Gold Coast community”.

Hyder Consulting in conjunction with our joint venture partner, APP are working together under the name “CERT-TRAM” for the State Government of Queensland in the role of Independent Verifier for this prestigious project. CERT-TRAMs role is to ensure that the design, construction, procurement, acceptance testing, completion and
the planning and documentation for the operations and maintenance phase are carried out in accordance with the State Project Documents requirements. CERT-TRAM is also responsible for reviewing the design and construction program and construction progress and for resolving defects and compliance disputes.

The initial steps of the project have involved the production of the Independent Verifiers and monitoring Plan (VMP). This contains CERT-TRAMs approach to verification, but it also recognises the areas of particular importance for the key stakeholders within the project. Under this plan a number of subs plans which have then been developed and cover, Quality Management, Document Control, Community and Stakeholder, Design Review, Construction Surveillance and Acceptance Testing & Verification.

The IV project works consists of a number of key verification areas. These are all interrelated parts of the project which ensure that all of the design and construction activities are covered during the project lifecycle. There are six key parts that include:

- Design verification
- Quality assurance and systems verification
- Procurement, construction, fabrication and installation verification
- Auditing and reviewing the contractors systems for managing the project interface with the community
- Verification of the acceptance testing process
- Consideration of operations and end user aspects

Providing quality verification services for the design and construction works is the independents verifiers key role during the D&C phases. The process is managed at all levels of the business and covers corporate, project and task level activities through project specific procedures that identify and delegate as necessary the independent Verifiers functions.

A project of this type needs to not only be built well, but also last the test of time. As Verifiers we are placing a strong emphasis on the project works durability to ensure that all components meet or exceed the design life with minimum maintenance and disruption to the network. This sort of approach requires a review of the designers durability reports against the design life of the various project components. It takes into account the local environment where the system is being installed and considers such the effects of things like sand, salt and wind resulting from its close proximity to the coast. A comparison with materials and equipment used on other Australian and International light rail projects is then performed by the review team.

Interface issues can arise in large complex projects and the IV reviewers have the advantage that they have an overview of all of the areas of the project. They have been using this knowledge and experience to comment on possible pinch points and clashes between the various disciplines early in the design phase before it becomes a major issue. Likewise, during the construction phase all interface issues are being monitored through site observations and monitoring of RFI’s and non-conformance systems.

The IV team are not reviewing or overseeing 100% of all of the activities all of the time. They instead, apply a combination of targeted and random sampling of the various project areas. This approach is supported by a range of review, audits and surveillance activities.

The targeted sampling approach has been determined through a process of risk analysis which identifies a hierarchy of high risk project areas, where the consequences of non-conformance would be significant to safety, durability, cost, or the infrastructure or asset itself.

The frequency of the sampling itself is a real balancing act, with the aim being to ensure that there is surveillance over all parts of the project. Small sampling works are carried out by the individual team members, whereas significant hold points are attended and witnessed by the team.

Throughout the project program, the IV’s function can include activities such as, reviewing, auditing, and surveillance of the works performed against the specifications, management plans and procedures. Dependant on the complexity of the project, the IV can ultimately end up testing all of the components of the project against the client strategic objectives. For the Gold Coast Rapid Transit Project, a team of subject matter experts with
Light Rail experience, in the delivery and operation of Light Rail projects locally and internationally have been assembled to ensure that we meet the overall objective of the project.

The project objective is:

“To provide a world class light rail system that will integrate with and enhance the existing public transport network and efficiently and reliably connect the people and places of the Gold Coast.”

7 CONCLUSION

Independent Verification is a process that helps to ensure that whether or not the outcome required for each step or phase of a project is consistent with the requirements, as defined by the scope of work and specifications.

Too often people, even for all of the right reasons do what they believe is best which may not necessarily translate into the right outcome. This is true where there are, time or cost pressures brought to bear on the company delivering the work particularly by multiple stakeholders.

The Verifier can be their best friend, whilst acting in the best interests of the client, by being involved with the project from start to finish; they are able to provide that unimpaired and independent perspective which is crucial to ensuring a good outcome. Through the IV process, they ensure that there is regular reviews, auditing and verification of the deliverables and outcomes. They not only help to flush out any defects or compliance issues early on in the project, but are also able to work alongside those involved in order to resolve them.

The Verifier ensures that the project complies with the applicable legislative and statutory requirement which requires a high degree a professional skill and knowledge of the industry they are working in. They follow a rigorous process that ensures that they have the confidence that the right processes have been followed in accordance with the project requirements. They have to be able to certify the process being followed and verify the end results in order to give their client the peace of mind they are looking for.

With IV there is no one size that fits all approach when it comes to projects works. This is particularly driven by the various forms of project delivery models being used in the rail industry at present. We have seen Alliances, Public Private Partnerships (PPP’s), Design & Construct (D&C) or variations of these being used over the years. One of the key elements that remain consistent across the different projects models is the need for the Verifier to highly professional in all that they do. They need to have skills and experienced staff in order to meet or exceed the client's expectations.

The Gold Coast Rapid Transit Light Rail project is just another example of the level of responsible that the Government and key stakeholders are able to place on an independent, trusted consulting firm to act on behalf of their best interests.

In conclusion, I want to mention “Excellence as Defined by our Clients”. Hyder Consulting listens to its clients and also uses this approach to measure its own delivery outcomes. This is particularly important when providing professional and specialised services such as Independent Verification that you know what your client expects.

REFERENCES

Golding Gold Coast Rapid Transit Web site www.goldlining.com.au
Cert-Tram Gold Coast Rapid Transit: Stage 1, Independent Verifier, Verification and Monitoring Plan (Hyder Consulting & APP Joint Venture)